Role of psychological and culturally influenced risk factors on symptoms and disability for musculoskeletal disorders. CUPID study (Spain)

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DEPARTAMENT DE CIÈNCIES EXPERIMENTALS I DE LA SALUT

To my beloved wife and son

When you walk through a storm,
hold your head up high,
and don't be afraid of the dark ;
at the end of the storm there is a golden sky
and the sweet silver song of the lark.

Walk on through the wind,
walk on through the rain,
though your dreams be tossed and blown.

Walk on, walk on with hope in your heart,
and you'll never walk alone,
you'll never walk alone.
Walk on, walk on with hope in your heart,
and you'll never walk alone,
you'll never walk alone.

Richard Rodgers and Oscar Hammerstein, 1945

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"Develop an attitude of gratitude, and give thanks for everything that happens to you, knowing that every step forward is a step toward achieving something bigger and better than your current situation".

Brian Tracy

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Barcelona, November 2013

ABSTRACT

ABSTRACT

Background: Musculoskeletal pain is a major cause of disability in people of working age. It has been suggested that culturally-influenced and individual psychosocial factors may have a role in the development and chronicity of musculoskeletal pain and associated disability.

Objectives: Three research objectives have been considered for this doctoral dissertation. Firstly, we assess the importance of health beliefs, mental health, and somatising tendency as predictors of incidence and persistence of low back pain in a Spanish working population. Secondly, we explore whether psychological risk factors for the development of new episodes of upper limb pain differ from those for its persistence. Finally, we investigate if these psychological risk factors primarily influence the development and persistence of pain, or whether their impact is more on the disability that musculoskeletal pain causes.

Methods: 1105 nurses and office workers were asked at baseline about socio-demographic and lifestyle characteristics, current working conditions, culturally-influenced (health beliefs concerning pain) and individual (mental health, and somatising tendency) psychological factors and musculoskeletal pain in the past month and past year at six different anatomical areas (back, neck, and shoulders, elbows, wrists/hands, and knees). Pain was classed as disabling if it made ≥1 specified everyday activities difficult or impossible. At 12-month follow-up, pain in the past month and associated disability was again ascertained. Pain-free and painful sites in the month before baseline were included in the analyses for incident pain and persistent pain respectively. Log binomial (first objective) and multilevel multinomial logistic regression (second and third objectives) models were used to explore associations of baseline risk factors with pain outcomes at follow-up, conditioned on pain status at baseline.

Results: 971 participants (87.9%) completed follow-up. Low mood and somatising tendency predicted subsequent incidence of low back pain and associated disability. Low mood was significantly associated with the persistence of disabling low back pain, and somatising tendency with both, the

incidence of upper limb pain and the persistence of low back pain. Incidence of disabling low back pain was also predicted by adverse beliefs about pain work-relatedness. The development of disabling musculoskeletal pain at any anatomical site was associated with most of the psychological risk factors examined, and its persistence was predicted by adverse beliefs about prognosis. Although those findings suggest that risk factors for incident pain may differ from those for its persistence, our findings give only limited support to that hypothesis. Associations with the development and persistence of non-disabling pain were weaker and less consistent.

Conclusions: Established psychological factors have an important role in the development and persistence of musculoskeletal pain, however, their influence is less on occurrence and awareness of symptoms and more on the disability they cause.

Keywords: body regions; case definition; disability; health belief; longitudinal study; low mood; mood; musculoskeletal pain; upper limb pain; low back pain; musculoskeletal symptom; psychological risk factor; somatization; somatising tendency.

RESUMEN

Antecedentes: El dolor músculo-esquelético es una causa importante de discapacidad en las personas en edad de trabajar. Se ha sugerido que los factores psicológicos culturalmente-influenciables e individuales pueden tener un papel en el desarrollo y la cronicidad del dolor músculo-esquelético y la discapacidad asociada.

Objetivos: Se han considerado tres objetivos de investigación para esta tesis doctoral. En primer lugar, se evalúa la importancia de las creencias sobre la salud, la salud mental y la tendencia a reportar síntomas somáticos como predictores de la incidencia y persistencia de dolor lumbar en una población trabajadora española. En segundo lugar, se explora si los factores de riesgo psicológicos para el desarrollo de nuevos episodios de dolor se diferencian de los factores de riesgo para su persistencia. Finalmente, se investiga si estos factores de riesgo psicológicos influyen principalmente en el desarrollo y la persistencia del dolor, o si su impacto es mayor sobre la discapacidad debida al dolor músculo-esquelético.

Métodos: 1105 enfermeras y trabajadores de oficina fueron entrevistados al inicio del estudio sobre sus características socio-demográficas y de estilo de vida, condiciones de trabajo actuales, factores psicológicos individuales (salud mental y tendencia a somatizar) y culturalmente-influenciables (creencias sobre la salud aplicables al dolor) y la presencia de dolor músculo-esquelético en el último mes y en el último año en seis zonas anatómicas diferentes (espalda , cuello, hombros, codos, muñecas/manos y rodillas) . El dolor fue clasificado como discapacitante si se reportaban 1 o más actividades cotidianas difíciles o imposibles de realizar. A los 12 meses de seguimiento, se volvió a entrevistar a los participantes sobre la presencia de dolor en el último mes y la discapacidad asociada. Aquellos lugares anatómicos sin dolor y con dolor fueron incluidos en los análisis para el dolor incidente y dolor persistente, respectivamente. Se utilizaron modelos de regresión log-binomial (primer objetivo) y logística multinomial multinivel (segundo y tercer objetivos) para explorar las

asociaciones de los factores de riesgo basales con el dolor al seguimiento, de acuerdo al estado del dolor al inicio del estudio.

Resultados: 971 participantes (87,9 %) completaron el seguimiento. El bajo estado de ánimo y la tendencia a somatizar predijeron la incidencia de dolor lumbar y la discapacidad asociada. El bajo estado de ánimo se asoció significativamente con la persistencia de dolor lumbar discapacitante, y la tendencia somatizadora se asoció con la incidencia de dolor en las extremidades superiores y con la persistencia del dolor lumbar. Las creencias negativas acerca del trabajo como casusa de dolor fueron también predictoras de la incidencia de dolor lumbar discapacitante. El desarrollo de dolor musculo-esquelético discapacitante en cualquier lugar anatómico se asoció con la mayoría de los factores de riesgo psicológicos examinados, y su persistencia fue predicha por las creencias negativas sobre el pronóstico del dolor. Estos resultados sugieren que los factores de riesgo para el dolor incidente podrían diferir de los de su persistencia; sin embargo, nuestras observaciones sólo apoyan parcialmente esa hipótesis. Las asociaciones con el desarrollo y la persistencia de dolor no-discapacitante fueron más débiles y menos consistentes.

Conclusiones: Los factores psicológicos establecidos tienen un papel importante en el desarrollo y persistencia de dolor músculo-esquelético; sin embargo, su influencia es menor en la ocurrencia y la preocupación de los síntomas y mayor en la discapacidad que causan.

Palabras clave: regiones del cuerpo; definición de caso; discapacidad; creencias sobre la salud; estudio longitudinal, bajo estado de ánimo; estado de ánimo; dolor músculo-esquelético; dolor en las extremidades superiores; dolor de espalda; síntomas músculo-esqueléticos; factor de riesgo psicológico; somatización; tendencia a somatizar.

PREFACE

PREFACE

In the past, when we thought about hazards at the workplace the first thing that came to mind was the exposure to serious chemical, physical, and biological hazards. Fortunately, thanks to the improvement of working conditions and the reduction of the exposure, most of the morbidity and mortality of these occupational hazards have been successfully avoided or largely reduced in western countries. Recently, the attention has shifted to other disorders, which are rarely lethal and not exclusively caused by work, but account for substantial costs and impact on workers quality of life. Musculoskeletal disorders might be an example of these "new" work-related disorders, where the classical preventive approach of eliminating or reducing the exposure, might not be enough to avoid illness.

Musculoskeletal disorders have been linked with various physical activities in the workplace. However, exposure to these activities does not adequately explain substantial international variations in reported rates of musculoskeletal pain and disability attributed to such disorders. For example, during the early 1980s in Australia, there was a major epidemic of disability from arm pain that was not corresponding in other countries where similar working methods were employed [i]. Outbreaks like the one in Australia, might suggest that a considerable proportion of the attributed illness and disability due to musculoskeletal disorders may arise from culturally-influenced and individual psychological factors and not entirely by an organic underlying pathology, say mechanical injury to tissues.

This PhD thesis is based on the Spanish sample of the International Cultural and Psychosocial Influences on Disability (CUPID) study. This multicentre international study is coordinated by Professor David Coggon at the University of Southampton (UK) and the project focuses on 47 occupational groups (nurses, office workers and manual workers) from 18 countries (see figure 1). At the beginning, it was planned that each country which takes part in the study would include the three occupational groups mentioned before. However, in the

Spanish sample of the study, due to logistic reasons, it was not possible to access local postal workers who carried out sorting mail tasks.

The international CUPID study was designed to explore the impact of cultural and psychosocial influences on musculoskeletal symptoms and associated disability. It aims to compare the prevalence of symptoms and disability in workers who are carrying out jobs with similar physical demands, in dissimilar cultural settings, and to explore risk factors for the incidence and persistence of symptoms and disability in these varying cultural environments. Publications from the International CUPID study to date are attached at the appendices section of this PhD thesis; in all of them, the author of this dissertation is listed as co-author.

Figure 1. The International CUPID Collaboration

According to the regulations of the PhD Programme in Biomedicine from the Department of Experimental and Health Sciences at Universitat Pompeu Fabra, this dissertation includes three scientific papers which have been submitted for peer-review at MEDLINE indexed international journals, and two of them have been accepted for publication. The author of this dissertation is listed as first author in the three papers, and main findings of those three papers have been presented in domestic and international scientific meetings (see appendices section). This PhD thesis was funded by the Spanish Health Research Fund

(FIS 070422) and it allowed me to stay for 4 months at the Salus Occupational Health and Safety Service at the NHS Lanakshire and the Healthy Working Lives Group at the University of Glasgow and the MRC Lifecourse Epidemiology Unit at the University of Southampton with the aim to fulfil the requirement to apply for the European Doctoral Mention.

i. Gun RT. The incidence and distribution of RSI in South Australia 1980-81 to 1986-87. Med J Aust. 1990;153:376-80.

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"Pain is only what you allow it to be"

Cassandra Clare

"Pain is never the sole creation of our anatomy and physiology. It emerges only at the intersection of bodies, minds and cultures"

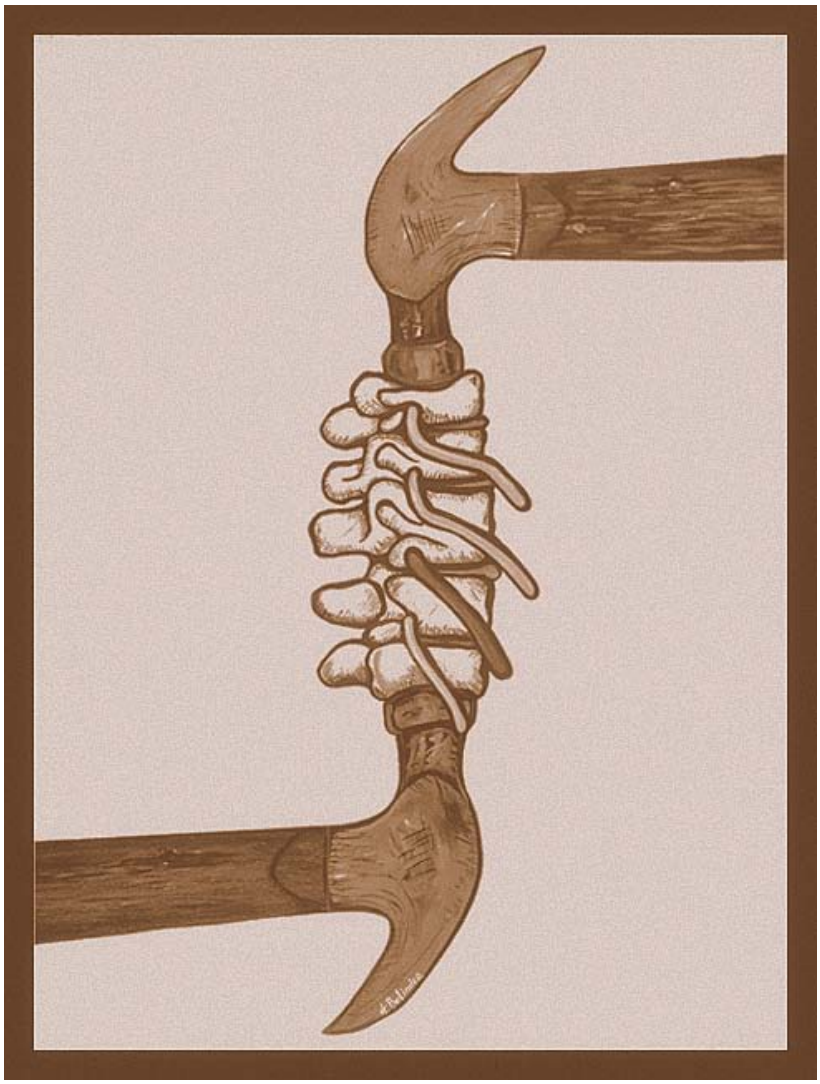
David B. Morris

"If you are distressed by anything external, the pain is not due to the thing itself, but to your estimate of it; and this you have the power to revoke at any moment."

Marcus Aurelius

"Pain is the feeling. Suffering is the effect the pain inflicts. If one can endure pain, one can live without suffering. If one can withstand pain, one can withstand anything. If one can learn to control pain, one can learn to control oneself. "

James Frey



© Heather Bolinder. “Crushing Spine” (Painting pain: http://www.paintingpain.com/)

INTRODUCTION

1. INTRODUCTION

1.1. Musculoskeletal pain, disability and work

In Europe, musculoskeletal disorders, especially of the back and upper limb, are a major cause of incapacity for work, with direct costs between 0.5% and 2% of gross domestic product [1]. In Spain, it has been estimated that more than 39 million working-days were lost due to musculoskeletal disorders in 2007 [2], representing a cost of 1700 million euros [3], and temporary work disability related to such disorders represents 20 percent of sick leave days [4].

Since the beginning of the 18th century, occupational factors have been linked to musculoskeletal disorders [5]. However, it was not until the 1970s that these factors were assessed using epidemiologic methods, and the work-relatedness of these conditions began appearing regularly in the international scientific literature [6]. The National Institute for Occupational Safety and Health (NIOSH) define musculoskeletal disorders as the conditions or health problems that involve the nerves, tendons, muscles, and supporting structures of the body [6]. Acute damage or dysfunction of any of the nerve-tendon-muscle unit, will activate free nerve endings of the A delta and C-fibres types, known as nocireceptors, which in turn will allow the activation of pain sensations [7]. In some cases pain arise from identifiable pathology in the spine or upper limb, such as a herniated inter-vertebral disc or peripheral nerve compression in the carpal tunnel. However, most often, the underlying pathology is unclear, and pain is classed as non-specific [8,9].

Musculoskeletal pain is one of the most common complaints in people of working age, affecting over 40 million workers in western European countries [1]. It includes several forms of ill-health ranging from acute and transitory to chronic and disabling. Almost all individuals will experience at least one episode of musculoskeletal pain at some point in their lives and most of them will recover without residual functional loss [10]. Nevertheless, in some cases, the symptom is recurrent or persistent [11,12]. For example, an Australian study in primary care patients, found that approximately a third of acute episodes of musculoskeletal pain progressed to become chronic and disabling [13].

Overall, in the working-age population the prevalence of musculoskeletal pain is high and appears to be increasing over time [14]. However, the main economic impact is attributable to a small proportion of persistent cases with more severe disability [15]. Moreover, the economic, social and functional consequences for an individual who has disabling musculoskeletal pain are greater than those for an individual whose pain is not disabling. For instance, workers with disabling low back pain restrict their participation in all aspects of social and family activities, and also find it more difficult to return to work after long periods of sickness absence [16]. This is consistent with the most recent Global Burden of Disease Study (2010), which estimated that low back pain is the leading cause of disability-adjusted life years (DALY's) in Western Europe [17].

Frequently, epidemiologic studies on musculoskeletal pain have focused on occupational populations. A high prevalence of low back pain and upper limb pain has been reported in nurses [18,19] and office workers [20,21]. In both groups, pain is often attributed to occupational physical activities, in particular heavy lifting, awkward postures, bending and twisting of the trunk, [22,23] or repetitive movements of the wrist or hand [24]. However, the occurrence and persistence of pain symptoms and associated disability are not a simple consequence of harmful physical exposures and mechanical stresses to tissues. There is evidence that they might be influenced also by culturally determined health beliefs and by individual psychological factors such as low mood and a general tendency to worry about common somatic symptoms [25,26,27,28,29,30,31,32,33]. This is not to say that common musculoskeletal symptoms never arise from mechanical injury to tissues in the spine and upper limb. However, such injuries would be expected to heal spontaneously over a period of days or weeks.

1.2. Pain expectations and culturally-influenced health beliefs.

Health beliefs can be defined as those individual ideas or attitudes that influence the experience and behaviours of health and illness [34]. Those beliefs, developed during lifetime as a result of individual's learning history, may vary according to the social and cultural circumstances in which individuals find themselves. Negative beliefs about musculoskeletal pain and attitudes to illness such as, the belief that pain produced by minor physical stresses (e.g. use of a keyboard) can be seriously harmful or potentially disabling, or that rest or prolonged inactivity rather than active participation will improve pain, seem to be important from pain inception to its chronic stage [35].

The "social pathway model", proposed by Pincus et al., postulates that pain-coping behaviours are influenced by a combination of a macrosystem of cultural health beliefs prevalent in the society in which the individual lives, with a microsystem of individual health beliefs [36]. This theoretical model might explain, at least partially, striking temporal changes that have occurred in the United Kingdom (UK) between 1953 and 1992 in rates of incapacity for work (an increased of sevenfold) attributed to back disorders at a time when the physical demands of work were generally reducing [37] or why marked variations in the prevalence of common musculoskeletal complaints and associated disability have been reported among workers carrying out similar jobs but in dissimilar cultural settings [38]. For example, the 12-month prevalence of disabling arm pain in workers carrying out repetitive tasks on an assembly line in Mumbai, India was less than one fifth of that found using the same questions among manual workers in the UK, including also those who were of Indian origin [39].

Due to this cultural influence, it is possible that even in pain-free individuals, personal health beliefs about pain causation and prognosis could be importantly influenced by beliefs and behaviours that are prevalent in the society in which an individual lives. Individuals with strong beliefs that musculoskeletal pain commonly arises from mechanical injury to tissues and they often have a poor prognosis are prone to dwell on pain that others would dismiss. This on its own might produce maladaptive pain-coping behaviours, in ways that promote pain

persistence and disability. Likewise, it is highly possible that in those individuals, future painful experiences will be accompanied by stronger pessimistic beliefs and expectations about pain, which could lead to more catastrophizing cognitions, avoidance behaviours, and reduced activity. This might explain at least partly why the history of previous episodes of musculoskeletal pain is considered a predictor of the occurrence of future episodes of pain [18,40].

Some epidemiologic studies have started to explore the role of culturally determined health beliefs in generating and maintaining musculoskeletal symptoms. From the research that has been conducted, it might be expected that exposure to fear-avoidance beliefs might be associated with new onset of low back pain [41], and with worse prognosis in patients with established low back pain [42,43] and upper limb pain [33]. Likewise, randomised controlled trials have shown that musculoskeletal pain resolves faster with continued activity rather than rest [44]. Also, in Victoria, Australia, a media campaign with the message that back pain normally resolves quickly, and encouraging people with the symptom to remain active, was followed by a reduction of disability and workers' compensation costs related to back pain [45].

Confirmation that culturally-influenced health beliefs and pain expectations have a role in the occurrence and chronicity of musculoskeletal pain and the resultant disability could have important implications for preventive strategies, and for the management and prognosis of established pain. There might be scope for interventions aimed at modifying beliefs and expectations (similar to the successful campaign in Victoria Australia) which complement the current preventive efforts focused largely on reduction of physical stresses to the upper limb or back in order to minimise the risk of injury. Good ergonomic practice to reduce physical stresses that can trigger pain is necessary, but presented in a wrong way it could reinforce an exaggerated irrational belief among workers that they are exposed to serious risk of injury (catastrophizing) and therefore, lead to a paradoxical increase in pain perception and disability. An effect of this sort might explain why randomised controlled trials of ergonomic interventions to prevent low back pain have tended to demonstrate an absence of benefit [46].

1.3. Individual psychological factors and musculoskeletal pain

It is generally agreed that musculoskeletal pain is of multi-factorial origin. However, the causal role of occupational physical activities in the incidence and persistence of non-specific musculoskeletal pain and resultant disability remains controversial. From the research that has been conducted, it might be expected that exposure to activities that stress the spine would be associated with low back pain [23]. However, it has been estimated that only a small proportion of the total burden of low back pain (less than 15% in a population based study in the UK) is explained by the exposure to activities such as occupational lifting, remaining the aetiology unexplained in a substantial proportion of cases [47].

It has also been suggested that non-specific musculoskeletal pain arises from lower pain tolerance among subjects with altered pain perception [48,49]. However, a population study in the UK showed that pain tolerance in subjects with non-specific upper limb pain was equal to that of individuals without pain and actually higher, compared to individuals with specific pain disorders, such as rotator cuff tendinitis, epicondylitis or carpal tunnel syndrome [50]. It is highly possible that pain tolerance might have a part in the mechanisms of the development and chronicity of non-specific pain; nevertheless, the reasons why this occurs in some individuals and not in others needs to be clarified.

Especially in culturally predisposed populations, a growing body of evidence is emerging that the occurrence and persistence of musculoskeletal pain and associated disability are strongly influenced, in addition to occupational physical activities and adverse health beliefs, by individual psychological characteristics, such as poor personal mental health and a general tendency to report and worry about common somatic symptoms [33,39,51]. Most evidence concerning the role of psychological risk factors in the causation and prognosis of musculoskeletal pain comes from studies focused on low back pain, and to a lesser extent on upper limb pain. However, there are reasons to expect similar associations for pain at other anatomical sites. A longitudinal study among working-age subjects found that psychological risk factors, such as adverse beliefs, low mood, and somatising tendency, were similar for different sites of

musculoskeletal pain, including the knee as well as the back and upper limb [51]. Classically, individual psychological factors have been associated with chronicity of musculoskeletal pain and disability [52,53]. Nevertheless, their influence may not only be important for the exacerbation or persistence of symptoms, but also for their development. For example, low mood has been related to the incidence of disabling low back pain [18], the persistence of upper limb pain [33], the transition from acute to chronic disabling low back [42,54] and neck pain [55], and the incidence and persistence of knee pain [51].

The presence of depressive symptoms in musculoskeletal pain sufferers is quite common [52,56], but the degree to which poor mental health is responsible for pain persistence or pain amplification is still unclear [57]. When both conditions coexist, the severity of reported symptoms appears to increase. It has been suggested that patients with chronic musculoskeletal pain and depressive symptoms, and who also have history of a previous episode of major depression, tend to report higher levels of pain intensity and disability [58]. Also, the “depression pathway theoretical model” postulates that low mood of itself, and not necessarily as a consequence of musculoskeletal pain, can lead to poor pain recovery [36]. To understand the exact nature of this relationship, several studies have focused on the potential biological link between low mood and musculoskeletal pain. It has been suggested that serotonin and noradrenalin neurotransmitters [52] or changes in interleukin-2 receptor levels [59] might have a role. However, evidence is still unable to demonstrate a specific neurochemical mechanism that operates in the perception of both, pain and depressive symptoms.

Poor mental health might not be the only individual psychological feature that is important in relation to their impact on musculoskeletal pain and associated disability. In the absence of a specific understanding on mechanisms, other psychological factors, such as tendency to report somatic symptoms, have also been studied [60]. Both, poor mental health and high somatising tendency, could be considered persistent and disabling syndromes, and in spite of their psychobiological differences [61], they often coexist.

Previous epidemiological research has indicated that somatising tendency is a risk factor for widespread pain [29]; however, it has recently been also linked to more localized pain. From the limited research that has been conducted, it might be expected that the experience of distressing somatic symptoms would be associated with both the incidence [27,33] and persistence of upper limb pain [33]; the persistence of shoulder/neck pain [62] and the incidence and persistence of knee pain [51].

It has been reported that, compared to non-somatisers, those individuals with a high somatising tendency have higher rates of medical care utilization [63] and more impairment of social and occupational functioning [64]. Somatising tendency is a personal attribute which may differ by cultural setting [64], and could be defined as the predisposition to amplify physiological sensations or to misclassify symptoms of emotional arousal [65]. This amplification of sensations and misclassification of symptoms includes three components [66]: i) a constant scanning of the environment for threats (hypervigilance); ii) a tendency to focus on certain relatively weak and infrequent body sensations; and iii) the predisposition to intensify the reaction to somatic sensations, making them more alarming, noxious, and disturbing. This overall heightened awareness of somatic symptoms and tendency to complain persistently of physical symptoms that have no identifiable medical explanation might be related to the disability that musculoskeletal pain causes rather than pain per se. It is possible that individuals who tend to worry about somatic symptoms and who also focus their attention to painful events, are more prone to avoid daily activities (such as washing, dressing and household chores) and, therefore, are more disabled by them.

1.4. Theoretical framework

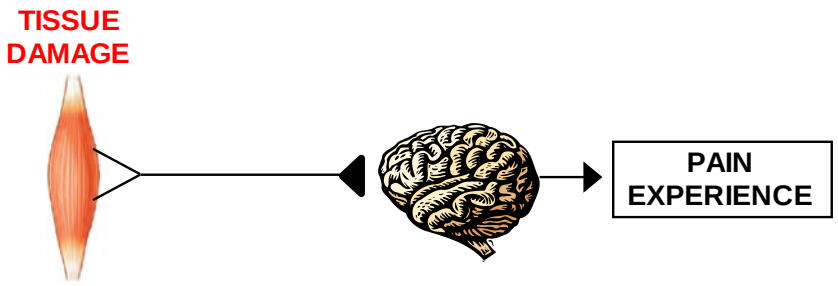
1.4.1. Theories of pain perception

We will discuss here two of the most well known pain theories about pain perception: 1) the specificity theory, and 2) the gate-control theory. Pain perception is a very complex phenomenon and its mechanisms are not fully understood. So far, the gate-control is the most well accepted theory; however, it cannot fully explain all of the phenomena associated with pain perception.

1.4.1.1. The specificity theory of pain

The nineteenth-century “specificity theory” is one of the first modern theories for pain, and it is based on the traditional biomedical model of disease. This theory holds that there are unique receptors and pathways that transmit specific painful signals to a "pain centre" in the brain that produces the perception of pain [67,68]. In consequence, pain experience would simply be the result of a passive transmission of nociceptive impulses to an area of interpretation in the brain (figure 2).

Figure 2. The specificity theory of pain.



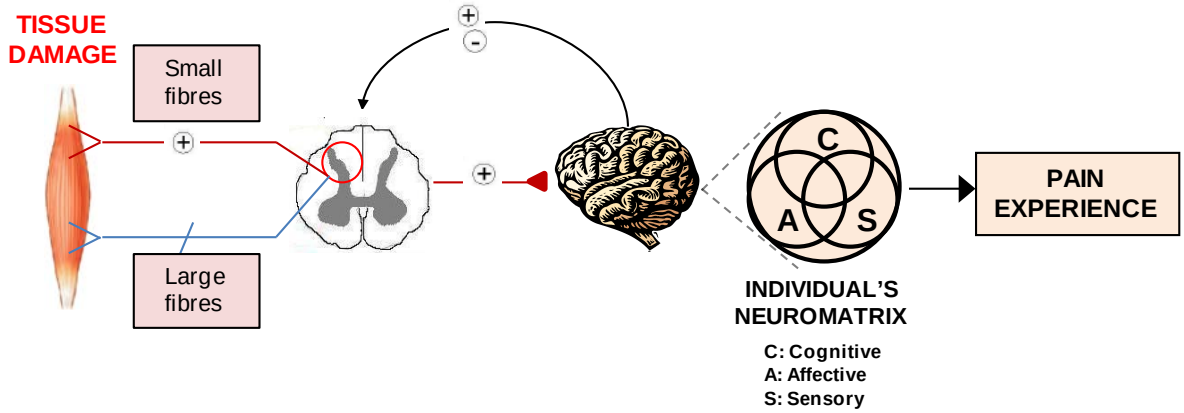
According to this framework, musculoskeletal pain is considered a symptom secondary to the development of tissue damage; consequently, it would be expected that the amount of pain experienced should be comparable to the amount of tissue damage, and, in the same way, once this damage has resolved, pain should improve. In some cases, this “biomedical" point of view is supported by the finding of gross muscle histological changes consistent with a process of wear and tear. Nevertheless, it has been reported that demonstrable pathologies appear to account for only a minority of cases of musculoskeletal

pain [69]. Furthermore, this theory could not explain why in some individuals: i) the location of pain and tissue damage could be different, ii) non-noxious stimuli might cause pain, iii) pain can persist long after tissue healing or iv) pain location may change over time.

1.4.1.2. The gate-control theory of pain

In the mid 1960s, Ronald Melzack and Patrick Wall [70] proposed “the gate-control theory of pain" (figure 3). Contrary to “the specificity theory”, this model hypothesized that pain is not merely the end product of a linear sensory transmission system; it is a dynamic process which is subject to a number of modulations that can influence the experience of pain.

Figure 3. The gate-control theory of pain.



According to this theory, sensory-discriminative stimulus (e.g., tissue damage) may act as a “trigger”, and all information regarding pain must pass a "gate" or control system in the dorsal horn of the spinal before reaching the brain. This “gate” allows pain signals to reach the brain (gate open) when they are travelling on the small nerve fibers (A delta and C fibers types – specific pain receptors), and does not allow pain signals to reach the brain (gate close) when they are travelling on the larger fibers (A beta fibers – other sensory receptors). Once the signal reaches the brain, the thalamus retransmits it to different parts of the brain: the somatosensory cortex (responsible for physical sensation), the frontal cortex (in charge of thinking) and the limbic system (linked to emotions), making up a complex network of neuronal interactions called the body self-neuromatrix [71]. The neuromatrix integrates sensory (S),

affective (A) and cognitive (C) inputs to produce the output pattern of pain experience. To determinate this pattern of pain experience, the brain can send a message down to the spinal cord to close (pain signal blocked, "-" in figure 3) or to open wider (pain signal intensified, "+" in figure 3) the "gate" [70,71]. The gate-control theory holds that the perception of pain can get dampened or aggravated by individual's thoughts and emotions, which in turn might be influenced by learning experiences, culture, and other environmental and individual factors [72].

1.4.2. Conceptual model

The conceptual model that is presented in this dissertation is built upon the biopsychosocial framework [73,74] and it is based on several published theoretical models that have been a focus of research during the last decades, such as the gate-control theory (described above) [70], the fear-avoidance theory [74,75] and the learning pathway model [76]. This conceptual model is depicted in figure 4 and it is focused on the predictive role of health beliefs about pain, low mood and somatising tendency in the occurrence and persistence of musculoskeletal pain and associated disability. It is important to mention that this model does not attempt to analyze the role of psychological factors as a consequence of pain and disability. That is to say, while low mood may predispose to low back or upper limb pain, it is also reasonable to expect that the experience of pain would lower mood.

When tissue damage is produced, pain receptors will be activated. An electrical signal will be sent up the peripheral nerves (A delta and C-fibres types) reaching the dorsal horn of the spinal cord. In the spinal cord, neural mechanisms, influenced by nerve impulses that descend from the brain, act like a gate that can increase (gate open) or inhibit (gate close) the flow of neural messages to the brain. Once the signal reaches the brain, the complex neuronal network ("neuromatrix") is responsible for selecting, filtering and modulating all sensory (S), affective (A) and cognitive (C) inputs to produce the output pattern of pain experience [70,71].

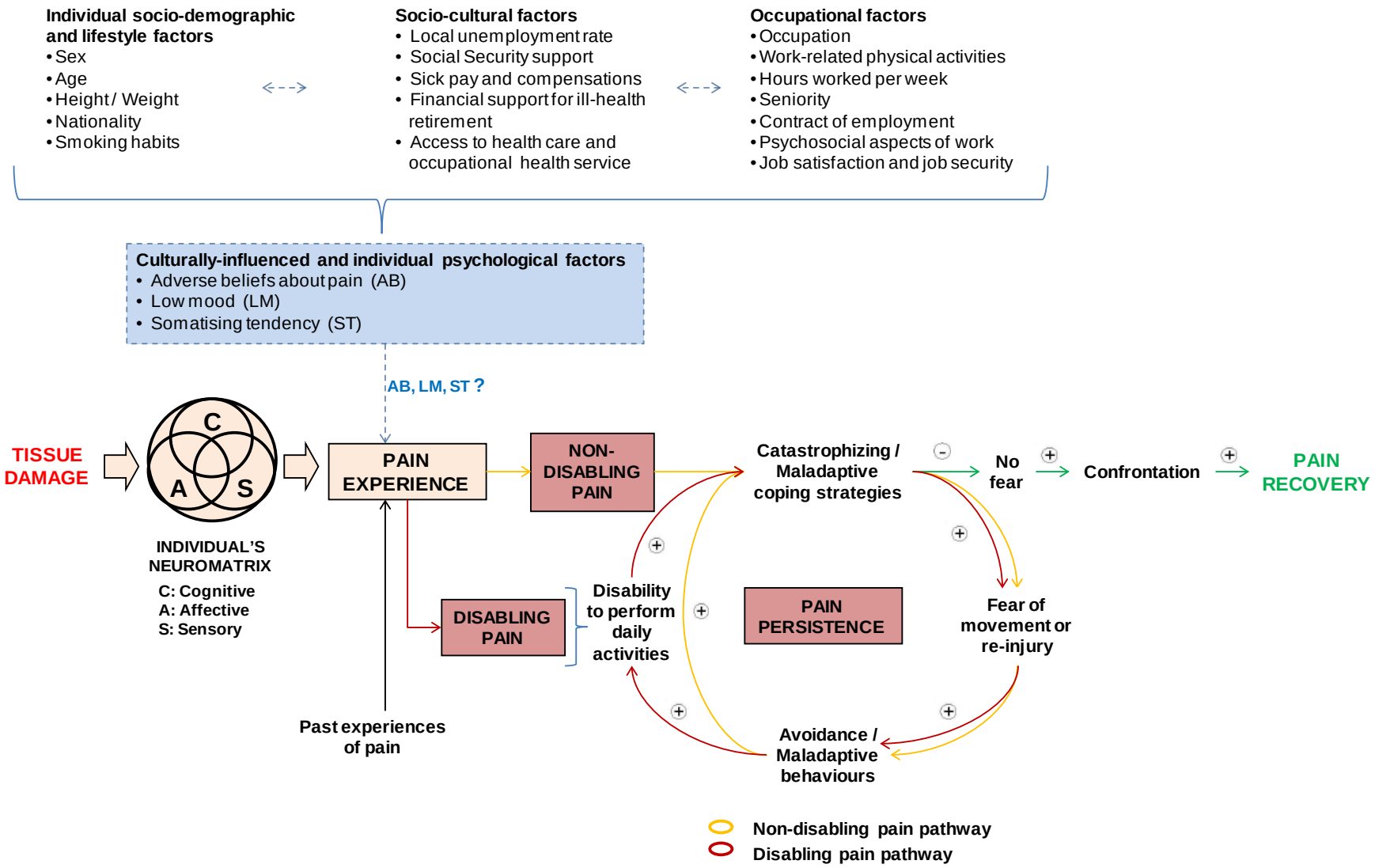
Pain messages are processed depending on the individual's current emotions, state of attention and previous experiences. The integration of all this information will determine how much pain the individual experience and also how he/she responds. The resultant learned behaviour will be a product of individual's psychological state (e.g. mood and tendency to report somatic symptoms) and health beliefs, and may in turn be influenced (reinforced or modulated) by socio-demographic and lifestyle factors (e.g. sex, age and smoking habits), occupational factors (e.g. the exposure to work-related physical activities or job satisfaction), socio-cultural factors (unemployment rate or access to health care) and memories of past pain experiences. All these factors interact with each other, and operate in a complex context that involves different levels, ranging from an individual level (micro-level) to socio-cultural level (macro-level). These factors are depicted in the model in no particular order and the relative importance of these factors would be subject to much debate. However, this is beyond the scope of our aim, which is to focus only on culturally-influenced and individual psychological factors and their relation to pain experience.

The presence of low mood, high tendency to somatise or strong pessimistic beliefs about pain occurrence and prognosis in an individual who experienced pain, could lead to the development of catastrophizing cognitions which may increase avoidance behaviours, which in turn will reinforce the irrational thought that pain is far worse than it actually is, setting in motion a vicious circle where pain persists (Non-disabling pain pathway – "yellow" in figure 4). It is possible that at some point in time, the individual who is absorbed in this vicious circle, notices that pain makes it difficult or impossible to carry out normal jobs around the house or other daily activities. When this occurs, a higher reinforcement of catastrophizing cognitions and avoidance behaviours will be produced, setting in motion a vicious circle of persistent disabling pain (Disabling pain pathway – "red" in figure 4). Accordingly, those individuals would be more inclined to modify their posture or reduce their physical activities to reduce their pain, with adverse consequences for its recovery (Pain recovery pathway – "green" in

figure 4). Contrary to other published models [74,75,76], our model allows that new disabling pain may occur without the transition from non-disabling pain.

The complex sequence of events that links the perception of musculoskeletal pain and disability is not yet fully understood. We hypothesized that different biological, environmental and socio-cultural contributing factors are interacting together and seem that psychological factors are involved at an early stage of pain occurrence, in the transition from new to persistent pain and in the development and persistence of disability. However, the main limitation of this model is the difficulty to determinate in which specific part of this complex sequence of events, the influence of adverse health beliefs, low mood and somatising tendency is stronger. It is unclear whether these psychological risk factors primarily influence the development and persistence of pain, or whether their impact is more on the disability that it causes. This is precisely one of the questions that this dissertation intends to answer.

Figure 4. Conceptual model of the role of culturally-influenced and individual psychological factors in the occurrence and persistence of musculoskeletal pain and associated disability.



Source: Own elaboration based on the gate-control theory (Melzack and Wall 1965; Melzack and Casey 1968), the fear-avoidance theory (Vlaeyen et al. 1995; and Waddell et al. 1993) and the learning pathway model (Crombez et al. 1998).

1.5 Rationale

As it has been mentioned in the introduction section, musculoskeletal pain is a leading cause of morbidity and disability among working age population, producing a considerable social and economic impact especially in western countries. Historically, musculoskeletal pain has been attributed to the exposure to mechanical stresses from occupational activities. Recently, it has been suggested that pessimistic beliefs about pain causation and prognosis, low mood and a high tendency to report distressing somatic symptoms may also play a part in the occurrence and persistence of musculoskeletal pain and resultant disability. However, the extent to which those factors influence musculoskeletal illness and associated disability is not yet conclusive.

Much of the evidence for a role of culturally-influenced and individual psychological factors comes from cross-sectional surveys, making it difficult to discern cause from effect. Besides, most studies to date have been conducted in northern Europe, and few data are available on the impact of psychological risk factors for LBP in southern European countries such as Spain. From the limited research that has been conducted, three earlier studies have suggested that, unlike in northern Europe, adverse fear avoidance beliefs have little influence on disability from low back pain among primary care low back pain patients and elderly Spanish people [77,78,79].

Despite the fact that culturally-influenced and individual psychological risk factors seem to be associated with the incidence and persistence of musculoskeletal pain [27,33,41,42,43,51,55,62], only a few longitudinal studies have explored separately the predictors of its incidence and persistence [33,51]. It is possible that factors leading to the development of new episodes of musculoskeletal pain differ from those that determine its persistence. Confirmation that risk factors for the incidence of musculoskeletal pain differ from those for its persistence, could have important implications for preventive strategies, and for the management and prognosis of established musculoskeletal pain. It would also raise the possibility that in studies which have examined risk factors for prevalent pain without distinguishing between

new and longstanding pain, the effects of some risk factors may have been diluted and perhaps missed.

Furthermore, some longitudinal studies had focused on the association between psychological factors and the incidence and persistence of disabling musculoskeletal pain [18,41,42,54]; however, none has looked at associations specifically with pain that was not disabling. Therefore, it is unclear whether adverse beliefs about musculoskeletal pain, low mood and somatising tendency primarily influence the development and persistence of pain, or whether their impact is more on the disability that musculoskeletal pain causes. If they relate more to the disability that it causes, their effects may be underestimated in analyses that do not distinguish disabling from non-disabling pain in the case definition.

HYPOTHESIS AND OBJECTIVES

2. HYPOTHESIS AND OBJECTIVES

2.1. Hypothesis

Expectations and culturally-influenced health beliefs and individual psychological risk factors, such as somatising tendency and mental health, have a major influence on the occurrence and chronicity of musculoskeletal symptoms and on the extent of associated disability.

2.2. Objectives

Paper 1: "*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*"

- To assess the importance of mental health, somatising tendency and culturally-influenced health beliefs as predictors of incidence and persistence of low back pain in a Spanish working population

Paper 2: "*Are determinants for new and persistent upper limb pain different? An analysis based on anatomical sites*"

- To explore whether biological, lifestyle, occupational and psychological risk factors for the development of new episodes of upper limb pain differ from those for its persistence.

Paper 3: "*Health beliefs, low mood and somatising tendency: their contribution to the incidence and persistence of musculoskeletal pain with and without reported disability*"

- To investigate whether associations of psychological risk factors with the occurrence and persistence of disabling musculoskeletal pain differ from those for non-disabling musculoskeletal pain.

METHODS

3. METHODS

3.1. Study Design

A multicentre prospective cohort study was conducted in a Spanish working population as part of the international CUPID (Cultural and Psychosocial Influences in Disability) study.

3.2. Ethical approval

Before recruitment began, ethical approval was obtained from the Parc de Salut Mar Ethics Committee of Barcelona and the Health and Safety Committee of each participating centre. Detailed information about the study was provided (Appendix 1) and written informed consent (Appendix 2) was obtained from all who agreed to take part. Information was collected for research purposes. Personally identifiable data provided by participants were confidential and the identity of respondents was protected using a serial number.

3.3. Identification and Recruitment of Participants

Identification and recruitment of participants was carried out between November 2007 and February 2010 at four hospitals and a university in Barcelona:

- *Badalona Serveis Assistencials (BSA):* a municipal health organization created on 1932, which provides health care to 435.000 people from Barcelonès Nord y Baix Maresme counties. It has a workforce of around 1000 professionals and includes one acute care hospital (Hospital Municipal de Badalona), from which participants were recruited, and nine primary health care centres.
- *Consorci Sanitari Integral (CSI):* a public health care institution, created in 2000 from the former Red Cross hospitals in Barcelona, which has a workforce of around 3500 workers allocated in three acute care hospitals (Hospital Dos de Mayo, Hospital de Sant Joan Despí Moisès Broggi, Hospital General de l'Hospitalet), one long-term care centre (Hospital

Sociosanitari de l'Hospitalet), and eleven primary health care centres located in the cities of Barcelona and l'Hospitalet de Llobregat, and Baix Llobregat county. Participants were recruited from the Hospital Dos de Mayo in Barcelona.

- *Consorci Hospitalari Parc Taulí (CSPT):* a public health consortium created in 1986 under the guidance of the Health Department of the Generalitat de Catalunya and the Town Council of Sabadell, which provides health care to 394.070 people from Vallés Occidental county. Its workforce includes around 3400 workers distributed in one acute care hospital (Hospital de Sabadell), one long-term care centre (Albada Centre Sociosanitari), one image diagnostic centre (UDIAT), one centre for health care of the elderly (Sabadell Gent Gran centre), one psychiatric centre and one primary health care centre. Participants were recruited from the Hospital de Sabadell.
- *Parc de Salut Mar (PSMAR):* it is an integrated health care system, created in 2010 from the former Institut Municipal d'Assistància Sanitària (IMAS), which provides health care to the population from Barcelona Litoral Mar, and the city of Santa Coloma de Gramanet. PSMAR workforce includes around 3600 professionals who work at two acute care hospitals (Hospital del Mar and Hospital de L'Esperança), one emergencies centre (Centre Peracamps), one long-term and psychiatric centre (Centre Fòrum), one psychiatric long-term care centre in Santa Coloma de Gramanet (Centre Assistencial Dr. Emili Mira), one research institute (IMIM) and two health care teaching centres (Institut Bonanova and Escola Superior d'Infermeria del Mar). Participants were recruited from the Hospital del Mar and Centre Fòrum.
- *Universitat Pompeu Fabra (UPF):* it is a public university in Barcelona, created in 1990. UPF structures its studies on three main fields of knowledge, closely interconnected and structured under three campuses: Social sciences and humanities (Ciutadella campus), Health and life sciences (Mar campus) and Communication and information

technologies (Poblenou campus). Around 1200 professionals (research/teaching and administrative staff) work at UPF and it has more than 16000 undergraduate and postgraduate (PhD and Master Degree) students. Participants were recruited from the three campuses.

From employment records, we identified all permanently and temporarily full- and part-time workers from two occupational groups: nursing staff (including nurses and nursing aides) and office workers who regularly used a computer keyboard and/or mouse. Workers eligible to participate were those between 20 and 59 years of age who had worked in their current job at least 12 months before enrolment. Staff nurses from paediatric ward and out-patient clinics were not eligible because they were exposed to different musculoskeletal risk factors. At each centre, a trained member of the staff, with flexible timetable and well accepted by co-workers, contacted these individuals to explain the study and invited them to take part in the study. Those who agreed were then interviewed at their workplace by a trained interviewer, who administered a computer-assisted baseline questionnaire. At the time of answering the baseline questionnaire, participants were asked whether they were willing to be re-contacted in the future, and those who consented, were subsequently re-interviewed at their workplace after an interval of 12 months using a shorter follow-up questionnaire.

3.4. CUPID Questionnaire

A standardised questionnaire was specifically created to be used in all participanting countries. It is based on other questionnaires that have been successfully used in earlier studies, and incorporates elements from validated instruments. The CUPID questionnaire has three parts: 1) the baseline questionnaire; 2) the follow-up questionnaire; and 3) the socioeconomic questionnaire.

3.4.1. Baseline CUPID questionnaire

The baseline questionnaire (Appendix III) asked about: demographic and lifestyle characteristics; current working conditions; health beliefs concerning

upper limb and low back musculoskeletal pain; somatising tendency; mental health; and pain in six different anatomical regions and associated disability for tasks of daily living. The baseline CUPID questionnaire also asked about: nationality; age that finished full time education; awareness of others with musculoskeletal pain; awareness of repetitive strain injury (RSI) or similar terms; and sickness absence in the past year due to musculoskeletal disorders and other types of illness. However, those variables were not considered for the analysis of the papers that are part of this dissertation.

3.4.1.1. Socio-demographic and lifestyle characteristics

Demographic and lifestyle characteristics included sex; age (classified in four ten-year bands), height (dichotomized at the median for each sex according to the Spanish average height) [80]; nationality (Spanish or other) and smoking habits (grouped in three categories: never smoked, former smoker and current smoker)

3.4.1.2. Current working conditions

The questions about current working conditions covered occupation (nurse or office worker); number of working hours per week (dichotomized at 37 hours per week which was the median of the overall distribution); years in current job (dichotomized in 5 years or less and more than 5 years); whether the job involved each of a specified list of work-related physical activities and psychosocial aspects of employment such as job satisfaction and job security.

The baseline CUPID questionnaire also included questions about other psychosocial aspects of employment, such as, time pressures at work, control over work organisation and support from workers' colleagues or supervisors; and also about the total sickness absence duration in the past year (0, 1–5, 6–30 and >30 days) because of pain in each of the six specified anatomical regions, and because of other illness. Nevertheless, these variables were not considered in the papers that are part of this dissertation because those variables are currently being assessed in another PhD thesis, which also uses the Spanish sample CUPID database.

Participants were asked whether in an average working day, they: (i) used a keyboard or a typewriter for more than 4 hours in total; (ii) carried out other tasks involving repeated movements of the wrist or fingers more than 4 hours in total; (iii) repeatedly bent and straightened the elbow for more than 1 hour in total; (iv) worked with their hands above shoulder height for longer than 1 hour in total; (v) lifted weights of ≥25 Kg by hand; (vi) climbed up or down ≥30 flights of stairs a day; and (vii) knelt or squatted for longer than one hour in total. Specific anatomical sites were classed as exposed to relevant work-related physical activity if the participant reported lifting weights of ≥25 Kg by hand at work (low back), work with hands above shoulder height (neck and shoulders), repeated bending of the elbow (elbows), either use of a computer keyboard or other repeated movements of the wrist or fingers for longer than four hours (wrists/hands), and either climbing up or down ≥30 flights of stairs a day or kneeling/squatting for longer than one hour in total (knees).

Subjects were classed as dissatisfied with their job if they reported that overall they were dissatisfied or very dissatisfied, and were considered exposed to job insecurity if they felt that their employment would be rather or very unsafe if they had a significant illness that kept them off work for three months.

3.4.1.3. Health beliefs concerning upper limb and low back pain

Questions about health beliefs were adapted from the Fear-Avoidance Beliefs Questionnaire [81] and grouped into three domains concerning the effects of physical activity, work-relatedness and prognosis. Health beliefs about physical activity were considered adverse if, either for someone with low back pain or for someone with upper limb pain, participants completely agreed or tended to agree both that physical activity should be avoided as it might cause harm, and that rest was needed in order to get better. Health beliefs about the work-relatedness of musculoskeletal pain were considered adverse if participants completely agreed or tended to agree that either low back pain or upper limb pain is commonly caused by people's work. Participants were classed as having adverse health beliefs about prognosis if, either for someone with low back pain or for someone with upper limb pain, they completely agreed

or tended to agree that neglecting such problems could cause permanent health problems, and also they completely disagreed or tended to disagree that such pain usually gets better within three months. Essentially a health belief about musculoskeletal pain was classed as adverse if it was reported either for low back pain or for upper limb pain.

3.4.1.4. Somatising tendency

Somatising tendency was explored using elements of the Brief Symptom Inventory (BSI) [82]. Participants were classified to three categories according to the reported number of common somatic symptoms from a total of five (faintness or dizziness, pains in the heart or chest, nausea or upset stomach, difficulty breathing, and hot or cold spells) that had been at least moderately distressing in the week before the baseline interview: (i) “no distressing somatic symptoms”, (ii) “one distressing somatic symptom” and (iii) “two or more distressing somatic symptoms”. The number of reported distressing somatic symptoms was chosen to provide a measure of the subject’s tendency to somatise. A high somatising tendency was considered if participants reported two or more distressing somatic symptoms.

3.4.1.5. Mental health

Mental health was assessed through the relevant section of the SF-36 questionnaire [83]. Participants were asked five questions about how they had felt and how things had been with them during the month before the baseline interview: (i) “Were you a happy person?”; (ii) “Have you felt calm and peaceful?”; (iii) “Have you been a very nervous person?”; (iv) “Have you felt downhearted and low?”; and (v) “Have you felt so down that nothing could cheer you up?”. Each item was scored on a 6-point scale (all of the time, most of the time, a good bit of the time, some of the time, a little of the time, none of the time). Scores were then summed (taking into account whether more of the time was better or worse), and grouped in approximate thirds of the overall distribution in the study sample (good, intermediate and poor).

3.4.1.6. Musculoskeletal pain and associated disability

Musculoskeletal pain was ascertained using a similar style of questions to those in the Nordic questionnaire [84]. At baseline, participants were asked whether, during the past 12 months, pain had been present for a day or longer in ten different anatomical sites belonging to six anatomical regions (see figure 5): low back (anatomical site located between the twelfth ribs and the gluteal folds); neck (anatomical site that distinguishes the head from the torso); right and left shoulder (anatomical sites that connect the upper limb with the torso); right and left elbows (the bends of the upper limb between the forearm and the upper arm); right and left hand/wrist (the terminal part of the upper limb consisting of the wrist, metacarpal area, fingers, and thumb); and right and left knee (the central area of the leg between the thigh and the lower leg). To avoid possible misunderstanding about pain location, anatomical sites were depicted in diagrams (Appendix III and IV).

Figure 5. Anatomical sites and regions related to pain location.

Those who answered yes, to having history of musculoskeletal pain for a day or longer in the past year at any anatomical site, were asked whether the pain had been present for more than four weeks in total, whether it had been present in the past month, and whether during the past month the pain had made it difficult or impossible to do normal jobs around the house or to carry out any of a specified list of other everyday activities: for low back: getting dressed or cutting toe nails; for neck: getting dressed; for shoulders: combing/brushing

hair, bathing/showering or getting dressed; for elbows: opening bottles/jars/taps or getting dressed; for wrists/hands: writing, locking/unlocking doors, opening bottles/jars/taps or getting dressed; and for knees: walking up and down stairs/on level ground or getting dressed. For each anatomical site, pain was classed as disabling if it had made it difficult or impossible to carry out normal jobs around the house or any of these other activities. Otherwise, it was classed as non-disabling.

3.4.2. Follow-up CUPID questionnaire

The follow-up questionnaire (Appendix IV) was answered by participants who consented at baseline and the wording of questions was identical to that used in the baseline questionnaire. The questionnaire asked about: any change of job since baseline interview and the reasons for this change; the presence of musculoskeletal pain for a day or longer in the past month before the follow-up interview at the same six different anatomical regions (10 anatomical sites) and associated disability for the same specified list of daily living activities assessed at baseline; the reported number of common somatic symptoms from a total of five in the in the week before the follow-up interview (somatising tendency); how they had felt and how things had been with them during the month before the follow-up interview (mental health); and sickness absence in the past 12 months (during follow-up interval) for musculoskeletal and other reasons.

3.4.3. Socio-economic questionnaire

Standardised information about the socio-economic circumstances was provided for each of the two occupational groups (nursing staff and office workers) (Appendix V). This included the local unemployment rate at the time of the survey, availability of social security support for the unemployed, entitlement to sick pay in the first three months of absence, entitlement to compensation for work-related musculoskeletal disorders, special financial support for ill-health retirement, fees paid for primary healthcare, and access to an occupational health service. This information was collected to facilitate a cross-cultural comparison between groups of workers carrying out similar occupational activities in different social and cultural environments.

Table 1. Economic aspects of employment and access to healthcare in nursing staff and office workers.

	Nursing staff	Office workers
Local unemployment rate (%)	5-9	5-9
Availability of social security provision for unemployed	Yes	Yes
Sick pay in first three months absence	Usually	Usually
Compensation for work-related musculoskeletal disorders	Usually	Usually
Special financial support for ill-health retirement	Sometimes	Sometimes
Access to primary care doctor	Free/insured	Free/insured
Access to hospital doctor	Free/insured	Free/insured
Access to other practitioner	Free/insured	Free/insured
Access to occupational health service	Through employer	Through employer

Source: Coggon et al. The CUPID (Cultural and Psychosocial Influences on Disability) Study: Methods of Data Collection and Characteristics of Study Sample. PLoS One 2012;7:e39820.

Table 1 summarises the economic aspects of employment and access to different source of healthcare for both occupational groups studied [85]. The data collection of the study started at the end of November 2007. At that time, the local rate of unemployment ranged from 5% to 9% for both occupational groups. Workers of both groups would be eligible for social security provision if they become unemployed, they normally would receive sick pay during the first three months of sickness absence and compensation for work-related musculoskeletal disorders is usually available. Workers would be eligible for special financial support for ill-health if they had been affiliated to the social security system for a specific number of years and have suffered either an injury or a disease which is permanently reducing their work functional capacity. In Spain almost all workers have free access to primary care doctors, hospital

doctors and other health practitioners who worked for the public health-care system; and in general, workers from both occupational groups had access to an occupational health service through their employers. This thesis included only participants from the Spanish sample of the CUPID study; therefore, the information obtained by the socio-economic questionnaire was not used in none of the three papers that are part of this dissertation.

3.5. Questionnaire Translation, Interviewing and Pilot Study

Baseline and follow-up questionnaires were originally drafted in English, and then translated into Spanish; also, the accuracy of the translation was checked by independent back-translation. Due to the presence in Spain of a considerable number of migrant workers from diverse ethnic origins, the question of the original questionnaire in English: “How would you best describe your ethnic origin?” was replaced by: “What is your nationality?” in the Spanish version of the translated questionnaire.

Once appropriate amendments were made and the final version of the Spanish questionnaire was approved, the suitability of two methods of data collection (interview and self-completion) was tested on a sample of 33 health care workers of the prison of Can Brians 1 between April and June 2006. Workers were randomly allocated in two groups: 15 of them provided information at interview and 18 workers by self-completion of questionnaires. The average length of the interview was 25 minutes for the first group while the average length to send back the questionnaires was 10 days for workers who answered it by self-completion. Table 2 compares the characteristics of those workers who answered the questionnaire at interview and by self-completion. Participation rates were slightly higher among those invited to interview but there were no consistent differences in the prevalence of reported musculoskeletal pain according to the method of data collection. Based on the average length to answer and return the questionnaire and the response rates, the research team concluded that the best method to collect participants’ information would be at interview.

Table 2. Comparison of health care workers of Can Brians prision who provided information by interview and by self-administered questionnaire.

	Interview	Self-completion
Number selected	15	18
Number (%) participated	15 (100.0)	15 (83.3)
Sex		
Male	7	3
Female	7	11
Missing	1	1
Age (years)		
<30	1	2
30-45	10	9
>45	3	3
Missing	1	1
Nationality		
Spanish	14	14
Other	0	0
Missing	1	1
Contract of employment		
Permanent	11	10
Temporary	4	4
Missing	0	1
Seniority		
5 years or less	3	6
More than 5 years	11	9
Missing	1	0
Prevalence (%) of pain in past year		
Low back	60.0	86.7
Neck	66.7	66.7
Shoulder	6.7	6.7
Wrist / hand	13.3	13.3
Knee	13.3	13.3
Prevalence (%) of pain in past month		
Low back	40.0	46.7
Neck	46.7	60.0
Shoulder	6.7	0.0
Wrist / hand	0.0	6.7
Knee	13.3	13.3

A pilot study was carried to evaluate the feasibility and applicability of the methodology for data collection. Thirty nursing staff and office workers from BSA were randomly selected and invited to take part in the pilot study. All interviews were conducted at the workplace, during the first 3 weeks of November 2007 by a member of the BSA nursing staff with flexible timetable and well accepted by co-workers. Usable information was obtained for all workers who were invited (response rate of 100%). Biological and occupational characteristics of the participants at the pilot study are summarised in Table 3.

Due to logistic reasons, the first 15 interviews were conducted using a computer-assisted questionnaire and the rest of interviews were performed using a paper version of the same questionnaire. The average length of the interview was 19 minutes (minimum length: 7 minutes; maximum length: 37 minutes); and the average length since the worker was invited to take part until the interview was completed was 51 minutes (including the study explanation). In relation to the quality of the interviews, wrong answers were recognized in 2 interviews, one or more missing answers were detected in 6 interviews, and one respondent refused to answer questions related to his/her mental health.

Table 3. Characteristics of participants (n=30) included in the pilot study.

Characteristic	n	%
Sex		
Male	27	90.0
Female	3	10.0
Age in years [median (P25 – P75)]	40 (25 – 45)	
Occupation		
Office worker	13	43.3
Nurse	17	56.7
Unit		
Hospitalization	13	43.3
Home visit program	6	20.0
Administration	11	36.7
Shift		
Morning	15	50.0
Afternoon	15	50.0
Contract of employment		
Permanent	27	90.0
Temporary	3	10.0
Seniority		
5 years or less	5	16.7
More than 5 years	25	83.3
Working hours per week		
37 hours or less	14	46.7
More than 37hours	16	53.3
Job dissatisfaction		
No	28	93.3
Yes	2	6.7
Job insecurity		
No	27	90.0
Yes	3	10.0
Physical activity (average working day)		
Use of keyboards >4h	14	46.7
Hand/wrist repeated movements >4h	19	63.3
Elbow repeated movements >1h	25	83.3
Hands above shoulder height > 1h	10	33.3
Lifting >25 kg by hand	11	36.7
Kneeling/squatting >1 hr	3	10.0
Climbing up or down ≥30 flights of stairs	11	36.7

3.6. Characteristics of Study Sample

A total of 1199 subjects (716 nursing staff and 483 office workers) from four hospitals and one university in Barcelona were invited to take part in the study. From those potentially eligible subjects, 1158 (687 nursing staff and 471 office workers) agreed to participate (96.6%). However, 53 were subsequently excluded because they were found not to meet all of the inclusion criteria (10 subjects fell outside the considered age range and 43 subjects had not worked in their current job for as long as 12 months). Thus, the baseline study sample comprised 1105 participants (a participation rate of 92.2%), of whom 667 were nursing staff and 438 office workers. Usable follow-up information was obtained for 971 (87.9%) of these subjects (578 nursing staff and 393 office workers). The number of baseline and follow-up participants and response rates at each centre are shown in figure 6.

Figure 6. Number of participants and response rates at each centre.

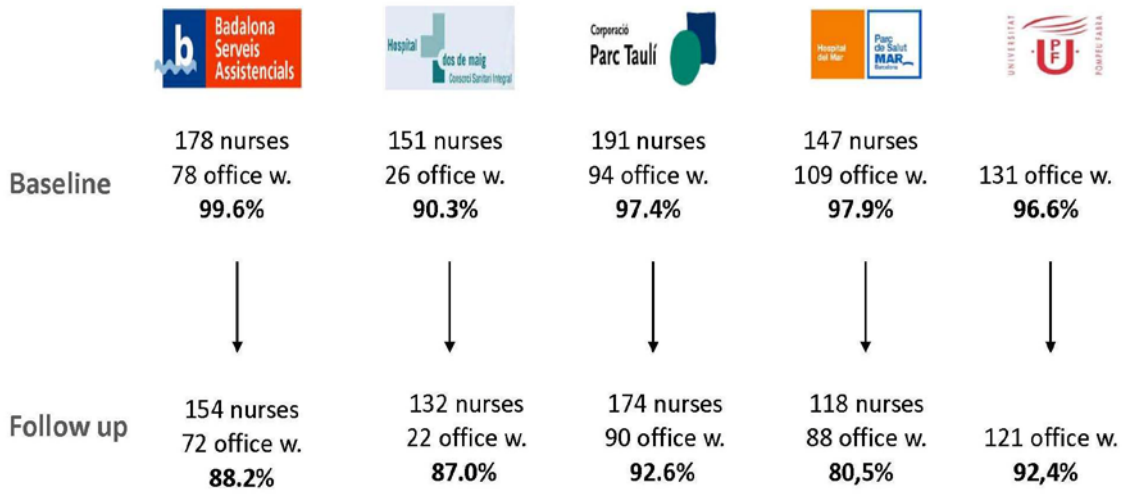


Table 4 shows the comparison of participants at baseline and those subjects who were identified from employment records but decline the invitation or it was impossible to contact them during recruitment (non-participants). Compared to non-participants, participants at baseline were similar for sex and occupation, but, were younger (median age of participant was 38 years compared with 46 years among non-participants; p value =0.013) and different in terms of work centre (p value <0.001).

Table 4. Comparison of participants and non-participants in the study.

	Participants		Non-participants		
	n	%	n	%	p value[a]
Sex					
Male	136	12.3	3	7.3	0.336
Female	969	87.7	38	92.7	
Age in years[b] [median, (P25 - P75)]	38 (30-45)		46 (33-55)		0.013
Occupation					
Office workers	438	39.6	12	29.3	
Nurses	667	60.4	29	70.7	0.182
Centre					
BSA	256	23.2	1	2.4	<0.001
CSI	177	16.0	19	46.3	
CSPT	285	25.8	8	19.5	
PSMAR	256	23.2	8	19.5	
UPF	131	11.9	5	12.2	
Total	1105	100.0	41	100.0	

[a] p value: chi-squared test (for sex, occupation and centre) and median regression (for age)
[b] It was not possible to collect age information in 12 non-participants.

The main reasons for refusal to participate in the study were decline the invitation to participate without giving a specific reasons and having no time to answer. Only one subject was at prolonged sick leave during the time the recruitment of participants was performed (see Table 5).

Table 5. Reasons for refusal to participate in the study at baseline.

	n	%
Decline the invitation to participate without specific reasons.	16	39.0
No time to answer / too much work	11	26.8
Lack of motivation and interest	8	19.5
Do not want to collaborate with their employer	2	4.9
Prolonged sick leave	1	2.4
Maternity leave	1	2.4
Dislike surveys	1	2.4
Total	41	100.0

Table 6 gives information about the socio-demographic and lifestyle characteristics of participants. Nurses and office workers were predominantly female, and in both groups younger (<30 years) and older (>50 years) workers, were less well represented. Most participants had the Spanish citizenship, the proportion of participants who were taller than the median for his/her sex (according to the Spanish population) was slightly higher in office workers, and more than 30% of participants in each group reported to be current smokers.

Table 6. Socio-demographic and lifestyle characteristics of nursing staff and office workers.

	Nursing staff		Office workers	
	n	%	n	%
Sex				
Male	64	9.6	72	16.4
Female	603	90.4	366	83.6
Age (years)				
20-29	167	25.0	73	16.7
30-39	195	29.2	165	37.7
40-49	196	29.4	152	34.7
50-59	109	16.3	48	11.0
Height				
≥ median for sex	335	50.2	251	57.3
< median for sex	332	49.8	187	42.7
Nationality				
Spanish	659	98.8	436	99.5
Other	8	1.2	2	0.5
Smoking habits				
Never smoked	284	42.6	207	47.3
Former smoker	120	18.0	96	21.9
Current smoker	263	39.4	135	30.8
Total	667	100.0	438	100.0

Table 7 shows the occupational characteristics of participants. In both groups most subjects had been in their current job for longer than five years and were permanent employees. Moreover, half of participants worked more than 37 hours per week, and the number of subjects who were dissatisfied or unsecured about his/her job was quite low. As it could be expected, a high proportion of office workers reported using a computer keyboard for longer than four hours per day, while manual lifting of weights >25 kg in an average working day was most common in nursing staff. Also, both groups reported a high prevalence of elbow repeated movements for longer than one hour. Likewise, the 12-month prevalence of sickness absence >5 days in total for musculoskeletal pain and

for other illness tended to be higher in nurses than in office workers. However, in both occupational groups those prevalences were lower than 15%.

Table 7. Occupational characteristics of nursing staff and office workers.

	Nursing staff		Office workers	
	n	%	n	%
Contract of employment				
Permanent	576	86.4	352	80.4
Temporary	91	13.6	86	19.6
Seniority				
5 years or less	184	27.6	143	32.6
More than 5 years	483	72.4	295	67.4
Working hours per week				
37 hours or less	343	51.4	223	50.9
More than 37hours	324	48.6	215	49.1
Job dissatisfaction				
No	587	88.0	409	93.4
Yes	80	12.0	29	6.6
Job insecurity				
No	557	83.5	378	86.3
Yes	110	16.5	60	13.7
Physical activity (average working day)				
Use of keyboards >4h	126	18.9	424	96.8
Hand/wrist repeated movements >4h	396	59.4	311	71.0
Elbow repeated movements >1h	625	93.7	402	91.8
Hands above shoulder height > 1h	350	52.5	120	27.4
Lifting >25 kg by hand	548	82.2	9	2.1
Kneeling/squatting >1 hr	86	12.9	22	5.0
Climbing up or down ≥30 flights of stairs	470	70.5	65	14.8
> 5 days sickness absence in past year				
For musculoskeletal pain	88	13.2	26	5.9
For other illness	96	14.4	42	9.6
Total	667	100.0	438	100.0

Table 8 summarises the psychological characteristics of participants by occupational group. Overall, potentially adverse health beliefs about back and upper limb pain seem to be stronger in nursing staff than in office workers. More than 80% of nurses believed that low back and upper limb pain are commonly caused by people's work. Likewise, the distribution between nursing staff and office workers was similar in terms of mental health and the number of reported distressing somatic symptoms.

Table 8. Psychological characteristics of nursing staff and office workers.

	Nursing staff		Office workers	
	n	%	n	%
Adverse beliefs about low back pain				
Physical activity	311	46.6	139	31.7
Work-relatedness	565	84.7	299	68.3
Prognosis	307	46.0	180	41.1
Adverse beliefs about upper limb pain				
Physical activity	237	35.5	102	23.3
Work-relatedness	535	80.2	277	63.2
Prognosis	235	35.2	143	32.6
Mental health				
Good	241	36.1	129	29.5
Intermediate	196	29.4	160	36.5
Poor	230	34.5	149	34.0
Number of distressing somatic symptoms in past week				
0	398	59.7	234	53.4
1	173	25.9	121	27.6
≥2	96	14.4	83	18.9
Total	667	100.0	438	100.0

Table 9 presents the prevalence of musculoskeletal pain by anatomical region of both occupational groups. Although prevalence of musculoskeletal pain seems to be higher in nurses, the pattern was similar for both groups.

Low back and neck pain were the two main complaints compared to other anatomical regions. However, the prevalence of pain that make difficult or impossible to carry out everyday activities in both regions was not much different from that in other anatomical regions such as shoulder or hand/wrist.

Table 9. Prevalence (%) of musculoskeletal pain by anatomical region for both occupational groups.

	Pain >1 day in the past year	Pain > 1 month in the past year	Pain > 1 day in the past month	Disabling pain in the past month
Nursing staff (n=667)				
Back	70.3	27.0	46.9	24.0
Neck	67.3	29.2	47.4	20.8
Shoulder	35.1	15.1	24.1	15.4
Elbow	7.8	4.5	5.2	3.7
Hand/Wrist	23.8	7.5	15.1	11.5
Knee	23.1	8.8	16.2	12.1
Office workers (n=438)				
Back	53.4	17.6	33.6	15.1
Neck	66.2	28.5	45.9	16.4
Shoulder	35.4	16.0	26.7	15.5
Elbow	9.6	4.6	6.6	4.1
Hand/Wrist	23.3	6.2	16.7	12.6
Knee	16.7	5.5	12.1	8.4

Table 10 shows how often pain was reported at different numbers of anatomical sites for nursing staff and office workers. Again, the pattern of reported pain by number of anatomical sites was similar for both occupational groups. Almost 50% of participants in each group reported musculoskeletal pain in two or more anatomical sites. Nevertheless, only 3.5% of nurses and 2.1% of office workers reported pain at six or more anatomical sites.

Table 10. Distribution of participants according to number of painful anatomical sites in the past month before baseline by occupational group.

Number of anatomical sites	Nursing staff		Office workers	
	n	%	n	%
0	153	22.9	133	30.4
1	190	28.5	99	22.6
2	156	23.4	96	21.9
3	82	12.3	59	13.5
4	47	7.0	30	6.8
5	15	2.2	12	2.7
6	8	1.2	6	1.4
7	9	1.3	2	0.5
8	4	0.6	1	0.2
9	1	0.1	0	0.0
10	2	0.3	0	0.0
Total	667	100.0	438	100.0

As previously mentioned, usable information was obtained at follow-up for 971 (87.9%) participants of those initially recruited (1105 subjects). Table 11 compares the characteristics of participants who remained in the study and those who were lost to follow-up.

Participants lost to follow-up were younger (median age was 33 years compared with 39 years among those who remained in the study; p value <0.001) but no significant differences were detected for sex and occupation. The distribution of subjects at each work centre was different between both groups (p value <0.001); near 40% of subjects who were lost to follow-up came from Parc de Salut Mar. Overall, there were no consistent differences in the prevalence of reported musculoskeletal pain and disabling pain between both groups of subjects. Only the prevalence of low back pain was significantly higher in those who were lost to follow-up (p value =0.022). However, their prevalence of disabling low back pain was not different from that to those who remained in the study. Moreover, ten participants who remained in the study changed job at follow-up, but only one of them left the job because of medical problems related to musculoskeletal pain (data not shown in tables).

Table 11. Comparison between participants who remained in the study after 1 year and those who were lost to follow-up.

	Participants who remained in the study (n=971)		Lost to follow-up (n=134)		
	n	%	n	%	p value[a]
Sex					
Male	124	12.8	12	9.0	0.208
Female	847	87.2	122	91.0	
Age in years [median, (P25 - P75)]	39 (31-46)		33 (28-45)		<0.001
Occupation					
Office workers	393	40.5	45	33.6	
Nurses	578	59.5	89	66.4	0.126
Centre					
BSA	226	23.3	30	22.4	<0.001
CSI	154	15.9	23	17.2	
CSPT	264	27.2	21	15.7	
PSMAR	206	21.2	50	37.3	
UPF	121	12.5	10	7.5	
Prevalence (%) of pain in the past month at baseline					
Low back	40.4		50.8		0.022
Neck	46.3		50.0		0.427
Shoulder	25.3		23.9		0.716
Elbow	5.7		6.7		0.625
Hand / Wrist	15.7		16.4		0.820
Knee	14.0		18.7		0.153
Prevalence (%) of disabling pain in the past month at baseline					
Low back	19.7		26.1		0.083
Neck	19.0		20.2		0.740
Shoulder	15.6		14.9		0.851
Elbow	3.8		4.5		0.708
Hand / Wrist	12.1		11.2		0.775
Knee	10.2		14.2		0.162

[a] p value: chi-squared test (for sex, occupation, centre and prevalence of pain and disabling pain) and median regression (for age)

The reasons why participants were lost to follow-up are listed in Table 12. Voluntary change of job was the main reason why the research team could not contact the participant after one year from baseline. Sick leave accounted for the loss of 29 of the 134 participants who failed to answer the follow-up questionnaire.

Table 12. Reasons why participants were lost to follow-up.

	n	%
Voluntary change job	31	23.1
Prolonged sick leave	29	21.6
Not reported	27	20.1
Maternity leave	25	18.7
Annual leave	11	8.2
Leave of absence	6	4.5
No time to answer / too much work	4	3.0
Early retirement	1	0.7
Total	134	100.0

Table 13 shows the number and percentage of participants who were lost to follow-up according to the number of painful anatomical sites reported at baseline. Lost to follow-up was somewhat higher (12.2%) in the 278 subjects with three or more anatomical sites at baseline than in the 286 without pain at baseline (9.1%). However, lost to follow-up among those who reported pain in three or more anatomical sites at baseline was slightly lower compared to those with one (13.8%) and two painful anatomical sites at baseline (13.7%).

Table 13. Lost to follow-up according to the number of painful sites at baseline.

Number of anatomical sites	n	Lost to follow-up	% dropout
0	286	26	9.1
1	289	40	13.8
2	252	34	13.7
3	141	11	7.8
4	77	12	15.6
5	27	2	7.4
6	14	5	35.7
7	11	1	9.1
8	5	2	40.0
9	1	0	0.0
10	2	1	50.0
Total	1105	134	100.0

3.7. Statistical Analysis

For the International CUPID study, initial power calculations indicated that a sample size of 200 workers per occupational group would be enough to detect differences between countries in the prevalence of symptoms and disability of the magnitude that was anticipated, and to analyse important risk factors for the incidence and persistence of pain at different anatomical sites at follow-up. In our particular case, the number of recruited subjects was 667 in the nursing staff and 438 in the office workers; fulfilling the number of participants initially required.

This section describes the statistical analyses performed in each of the three papers which are part of this dissertation.

3.7.1. Paper 1

Log-binomial regression was used to explore risk factors, such as mental health, somatising tendency and culturally-influenced health beliefs about low back pain, for: (i) the presence of low back pain in the past month at follow-up among subjects who had been free from low back pain in the past month at

baseline (development of new low back pain); (ii) the presence of disabling low back pain in the past month at follow-up among subjects who had been free from low back pain in the past month at baseline (development of new disabling low back pain); (iii) the presence of low back pain in the past month at follow-up among subjects who had low back pain in the past month at baseline (persistence of low back pain); and (iv) the presence of disabling low back pain in the past month at follow-up among subjects who had disabling low back pain in the past month at baseline (persistence of disabling low back pain).

Associations were adjusted for potential confounding variables (sex, age in four 10-year bands, occupation, occupational lifting, smoking habits and past history of low back pain in the past year) and summarised by prevalence rate ratios (PRRs) and associated 95% confidence intervals (95% CIs). Statistical analysis was carried out with Stata Version 11.1 software [86].

3.7.2. Paper 2

Multilevel logistic regression modelling was used to explore biological (sex; age in four 10-year bands; and height), lifestyle (smoking habits), occupational (occupation; type of contract; years in current job; working hours per week; job satisfaction; job security; occupational activities performed with the upper limb in an average working day) and psychological risk factors (health beliefs about pain in the upper extremity; mental health; somatising tendency) for: (i) development of new upper limb pain; and (ii) persistence of upper limb pain.

Analysis was based on anatomical sites. A site that had been pain-free in the month before baseline was “at risk” of having new pain at follow-up, and was included in the analyses for this outcome. Sites which had been painful in the month before baseline were “at risk” for persistence of pain, and were included in analyses of that outcome. For most analyses, we employed two-level models in which anatomical sites were clustered by person. However, in analyses which included work-related physical activities, we used three-level models that clustered the six anatomical sites within three anatomical areas (right or left shoulder, right or left elbow, right or left wrist/hand), which in turn were clustered

by person. We elected to do this because the questions about work-related physical activities did not distinguish which side(s) of the body was involved.

Associations were summarised by odds ratios (ORs) with their 95% confidence intervals (95% CIs). Initial models included each risk factor separately, together with sex, age (in four ten-year bands) and occupation. Risk factors that were significantly associated with at least one of the two outcomes (i.e. the 95% CI excluded the null value of one) in these first analyses, were then analysed together in a multivariate regression model. For each association, the logarithm of the odds ratio and its standard error were estimated. We then used the Wald test to assess whether the differences between corresponding risk estimates for development of new upper limb pain and persistence of upper limb pain were statistically significant ($p<0.05$)(Altman and Bland, 2003). Statistical analysis was carried out with the Generalized Linear Latent and Mixed Models (GLLAMM) program [87] in Stata 11.1 software [86].

3.7.3. Paper 3

Analysis was based on anatomical sites. In defining whether pain was incident or persistent, we considered the part of the body affected and the laterality of symptoms. For example, hand/wrist pain (non-disabling or disabling) was considered to be new (at follow-up) if it had not previously been present in the same hand/wrist in the month before baseline, even if the other hand/wrist had been affected.

Multilevel multinomial logistic regression modelling was used to explore the role of health beliefs about musculoskeletal pain, mental health and somatising tendency as predictors for: (i) non-disabling pain in the past month at follow-up; and (ii) disabling pain in the past month at follow-up. Anatomical sites that had been pain-free in the month before baseline were “at risk” of having new non-disabling pain and new disabling pain at follow-up. Anatomical sites with non-disabling pain in the month before baseline were “at risk” for persistence of non-disabling pain and for development of new disabling pain at follow-up (worsening pain). Anatomical sites with disabling pain in the month before

baseline were “at risk” for development of non-disabling pain at follow-up (improving pain) and for persistence of disabling pain. In each case, the comparator was having no pain in the past month at follow-up.

To assess the effect of potential confounders, three types of model were fitted. In the first (model 1), each of the exposures was analysed separately with adjustment for sex, age (in four ten-year bands) and occupation. In the second (model 2), each exposure was analysed separately, with adjustment for the same variables as in model 1, and also for job satisfaction and exposure to relevant work-related physical activity. In the third (model 3), all risk factors were included in a single model, together with the variables of adjustment from model 2. For anatomical sites that had been pain-free in the month before baseline, history of pain at the same anatomical site in the past year was also considered a potential confounder, and therefore was also included in the three models described above. For model 1, we used two-level logistic regression with a random intercept, in which anatomical sites were clustered by person. For models 2 and 3, which included work-related physical activities as potential confounders, we employed three-level modelling with clustering of the ten anatomical sites in six anatomical regions (low back, neck, right or left shoulder, right or left elbow, right or left wrist/hand, right or left knee), which in turn were clustered by person. We did this because questions about physical activities did not distinguish which side(s) of the body was involved. Associations were summarised by odds ratios (ORs) with their 95% confidence intervals (95% CIs). Statistical analysis was carried out using the Generalized Linear Latent and Mixed Models (GLLAMM) program [87] in Stata 11.1 software [86].

RESULTS

4. RESULTS

The three papers that are part of this PhD thesis are:

Paper 1. Vargas-Prada S, Serra C, Martínez JM, Ntani G, Delclos GL, Palmer KT, Coggon D, Benavides FG. 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 2013;70:57-62

Paper 2. Vargas-Prada S, Serra C, Coggon D, Martínez JM, Ntani G, Delclos G, Palmer KT, Benavides FG. Are determinants for new and persistent upper limb pain different? An analysis based on anatomical sites. (submitted for peer-review)

Paper 3. Vargas-Prada S, Martínez JM, Coggon D, Delclos G, Benavides FG, Serra C. Health beliefs, low mood and somatising tendency: their contribution to the incidence and persistence of musculoskeletal pain with and without reported disability. Scand J Work Environ Health. 2013;39:589-98.

4.1 Paper 1. Vargas-Prada S, Serra C, Martínez JM, Ntani G, Delclos GL, Palmer KT, Coggon D, Benavides FG. 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 2013;70:57-62. doi: 10.1136/oemed-2011-100637

4.2 Paper 2. Vargas-Prada S*, Serra C, Coggon D, Martínez JM, Ntani G, Delclos G, Palmer KT, Benavides FG. Are determinants for new and persistent upper limb pain different? An analysis based on anatomical sites. (submitted for peer-review)

Are determinants for new and persistent upper limb pain different? An analysis based on anatomical sites.

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ABSTRACT

Purpose: To investigate whether biological, lifestyle, occupational and psychological risk factors for the development of new episodes of upper limb pain (ULP) differ from those for its persistence.

Methods: 1105 Spanish nurses and office workers were asked at baseline about biological, lifestyle, occupational and psychological risk factors and pain in the past month at six anatomical sites in the upper limb (left and right shoulder, elbow and wrist/hand). At follow up, 12 months later, pain in the past month was again ascertained. Analysis was based on anatomical sites clustered by person. Pain-free and painful sites in the month before baseline were included in the analyses for new ULP and persistent ULP respectively. Associations were assessed by multilevel logistic regression models, and characterised by odds ratios (ORs) with associated 95% confidence intervals (CIs).

Results: 971 participants (87.9%) completed follow-up. Among 5234 pain-free anatomical sites at baseline, 355(6.8%) developed new ULP at follow-up. Job dissatisfaction (OR 1.7, 95%CI 1.1-2.7) and older age carried higher risk of new ULP. Somatising tendency (OR 2.3, 95%CI 1.6-3.3) was the strongest predictor of new ULP, with a risk estimate which differed significantly from that for the same exposure and persistence of ULP. Among 592 painful anatomical sites at baseline, 242(40.9%) still had pain 1 year later. Having adverse beliefs about the work-relatedness of ULP carried a significantly reduced risk for persistence of ULP (OR 0.5; 95%CI 0.3-0.9).

Conclusions: Our study provides only limited evidence that risk factors predicting new ULP differ from those predicting its persistence.

Key words: Upper extremity, musculoskeletal pain, risk factors, body regions

INTRODUCTION

Upper limb pain (ULP) is one of the most common complaints in people of working age, and a major cause of sickness absence with substantial economic impact in industrialised countries (Bernard 1997; Karels et al. 2010). It can arise from various specific disorders of the arm or neck, but often there is no identifiable underlying pathology (Ryall et al. 2007a). In many cases, the symptom is recurrent or persistent (Ryall et al. 2007b). Its occurrence has been linked with occupational physical activities (in particular repetitive movements and awkward postures); psychosocial aspects of work (Bongers et al. 2006); various biological factors (Roquelaure et al. 2009); and with psychological factors such as, low mood, tendency to somatise and negative beliefs about its causation and prognosis (Macfarlane et al. 2000; Palmer et al. 2008).

As with low back pain (Vargas-Prada et al. 2013), it is possible that factors leading to the development of new episodes of ULP differ from those that determine its persistence. However, only a few longitudinal studies have explored separately the predictors of its incidence and persistence (Miranda et al. 2001; Palmer et al. 2008). From the limited research that has been conducted, it might be expected that exposure to repetitive movements of the arm or wrist would be associated with a higher incidence of ULP (Macfarlane et al. 2000); that having strong adverse beliefs about the prognosis of ULP would be associated with its persistence (Palmer et al. 2008); and that somatising tendency would relate to both the incidence and persistence of ULP (Palmer et al. 2008).

Confirmation that risk factors for the incidence of ULP differ from those for its persistence, could have important implications for preventive strategies, and for the management and prognosis of established ULP. It would also raise the possibility that in studies which have examined risk factors for prevalent ULP without distinguishing between new and longstanding pain, the effects of some risk factors may have been diluted and perhaps missed.

We conducted a prospective cohort study in which we explored whether biological, lifestyle, occupational and psychological risk factors for the development of new episodes of ULP differ from those for its persistence. The investigation was

part of the international CUPID (Cultural and Psychosocial Influences in Disability) study (Coggon et al. 2012). Unlike some previous studies (Miranda et al. 2001; Palmer et al. 2008), in defining whether pain was new or persistent, our study considered not only the part of the arm affected (shoulder, elbow or wrist/hand), but also the laterality of symptoms. Thus, for example, shoulder pain was considered to be new if it had not previously been present in the same shoulder, even if the other shoulder had been affected.

METHODS

Study population and recruitment of participants

Between November 2007 and February 2010, nursing staff (excluding those from out-patient clinics and paediatric wards) and office workers aged 20-59 years, who had been in their current job for at least 12 months, were recruited from four hospitals and a university in Barcelona. Before recruitment began, approval for the study was obtained from the Parc de Salut Mar Ethics Committee of Barcelona and the Health and Safety Committee of each participating centre. At each centre, a trained member of the staff contacted eligible workers and invited them to take part in the study. Those who agreed gave written informed consent and were then interviewed at their place of work by a member of the research team, who administered a computer-assisted baseline questionnaire. Earlier, this questionnaire had been piloted in a separate group of 30 nurses to ensure that it was understandable and easy to complete.

The questionnaire was a Spanish translation, checked by independent back-translation, of a survey instrument originally drafted in English for use in the CUPID study (Coggon et al. 2012). Among other things, it asked about sex; age (in four ten-year bands); height (subsequently dichotomized at the median for each sex); smoking habits; occupation; type of contract (permanent or temporary); years in current job; working hours per week; job satisfaction; job security; occupational activities performed with the upper limb in an average working day; health beliefs about pain in the upper extremity; mental health; somatising tendency; and upper limb pain.

Work-related physical activity, job dissatisfaction and job insecurity

Subjects were asked whether in an average working day, they: (i) used a keyboard or a typewriter for more than 4 hours in total; (ii) carried out other tasks involving repeated movements of the wrist or fingers more than 4 hours in total; (iii) repeatedly bent and straightened the elbow for more than 1 hour in total; and (iv) worked with their hands above shoulder height for longer than 1 hour in total. Anatomical sites were classed as exposed to relevant work-related physical activity if

the subject reported work with hands above shoulder height (shoulders), repeated bending of the elbow (elbows), or either use of a computer keyboard or other repeated movements of the wrist or fingers for longer than four hours (wrist/hand).

Subjects were classed as dissatisfied with their job if they reported that overall they were dissatisfied or very dissatisfied, and were considered exposed to job insecurity if they felt that their employment would be rather or very unsafe if they had a significant illness that kept them off work for three months.

Health beliefs, mental health and somatising tendency

Questions about health beliefs were adapted from the Fear-Avoidance Beliefs Questionnaire (Waddell et al. 1993), and grouped into three domains concerning the effects of physical activity, work-relatedness and prognosis. Participants were considered to have adverse beliefs about physical activity if they completely agreed or tended to agree that, for someone with arm pain, physical activity should be avoided as it might harm the arm, and also that rest was needed in order to get better. They were classed as having adverse beliefs about work-relatedness if they completely agreed or tended to agree that arm pain was commonly caused by people's work. And they were deemed to have adverse beliefs about prognosis if they completely agreed or tended to agree that neglecting problems such as arm pain can cause permanent health problems, and also completely disagreed or tended to disagree that arm pain usually gets better within three months.

Mental health was evaluated through the relevant section of the SF-36 questionnaire (Ware and Sherbourne 1992), and scores were grouped in approximate thirds of the overall distribution in the study sample (good, intermediate, poor). Somatising tendency was assessed using a subset of elements from the Brief Symptom Inventory (Derogatis and Melisaratos 1983), and participants were classified according to the number of common somatic symptoms from a total of five (faintness or dizziness, pains in the heart or chest, nausea or upset stomach, difficulty breathing, and hot or cold spells) that had been at least moderately distressing during the seven days before the baseline interview.

Upper limb pain

The baseline questionnaire asked about pain in the past month at each of six anatomical sites in the upper limb (right and left shoulder, elbow and wrist/hand), which had lasted for a day or longer. The sites of interest were illustrated in diagrams and the style of questions was similar to that of the Nordic questionnaire (Kuorinka et al. 1987).

Follow-up questionnaire

After an interval of 12 months, participants recruited at baseline were re-interviewed with a follow-up questionnaire which used identical questions to ask about pain in the past month at each anatomical site in the upper limb.

Statistical analysis

Statistical analysis was carried out with the Generalized Linear Latent and Mixed Models (GLLAMM 2010) program in Stata 11 software (StataCorp. 2009). Multilevel logistic regression modelling was used to explore biological, lifestyle, occupational and psychological risk factors for: (a) development of new ULP; and (b) persistence of ULP.

Analysis was based on anatomical sites. A site that had been pain-free in the month before baseline was “at risk” of having new pain at follow-up, and was included in the analyses for this outcome. Sites which had been painful in the month before baseline were “at risk” for persistence of pain, and were included in analyses of that outcome.

For most analyses, we employed two-level models in which anatomical sites were clustered by person. However, in analyses which included work-related physical activities, we used three-level models that clustered the six anatomical sites within three anatomical areas (right or left shoulder, right or left elbow, right or left wrist/hand), which in turn were clustered by person. We elected to do this because the questions about work-related physical activities did not distinguish which side(s) of the body was involved.

Associations were summarised by odds ratios (ORs) with their 95% confidence intervals (95% CIs). Initial models included each risk factor separately, together with sex, age (in four ten-year bands) and occupation. Risk factors that were significantly associated with at least one of the two outcomes (i.e. the 95% CI excluded the null value of one) in these first analyses, were then analysed together in a multivariate regression model.

For each association, the logarithm of the odds ratio and its standard error were estimated. We then used the Wald test to assess whether the differences between corresponding risk estimates for development of new ULP and persistence of ULP were statistically significant ($p<0.05$)(Altman and Bland, 2003).

RESULTS

At baseline, response rates among those invited to take part in the study were 96% (687) in nurses and 98% (471) in office workers; but, 53 participants were excluded because they fell outside the prescribed age range (Coggon et al. 2012). After these exclusions, usable information at follow-up was obtained for 971 (87.9%) of the 1105 subjects recruited at baseline. Table 1 shows response rates at follow-up according to various characteristics of participants at baseline. Response rates were consistently greater than 80%, except in subjects who had a temporary employment contract (79%) and those who originally reported pain in the past month at three or more sites in the upper limb (68%).

Among the 5234 anatomical sites which had been free from pain in the past month at baseline, new pain had developed at follow-up in 355 (6.8%). And among the 592 anatomical sites for which pain was reported in the month before baseline, 242 (40.9%) remained painful after 12 months.

Table 2 presents the associations of new ULP and persistence of ULP with biological and lifestyle risk factors assessed at baseline. For new pain, risk was higher in women than in men (OR 1.8, 95%CI 1.1-3.0), increased significantly with age (OR 2.4, 95%CI 1.5-4.0, in the oldest compared with the youngest age bands), and was elevated in former smokers (OR 1.8, 95%CI 1.2-2.5, in comparison with never smokers). However, risks in current smokers were lower than in former smokers. In contrast, no significant association was apparent between persistence of ULP and any of the biological or lifestyle risk factors examined. However, the differences between risk estimates for development of ULP and those for its persistence were not statistically significant.

Associations of the same pain outcomes with occupational risk factors are shown in Table 3. The development of new ULP was associated with job dissatisfaction (OR 1.7, 95%CI 1.1-2.7) and weakly with being a nurse (OR 1.4, 95%CI 1.0-1.9, in comparison with being an office worker). No statistically significant association was observed between development of ULP and exposure to work-related physical activity. As with biological and lifestyle risk factors, none of the occupational risk factors analyzed was significantly associated with ULP persistence. Again, the

differences between corresponding risk estimates for the two outcomes were not statistically significant.

Table 4 summarises the relation of psychological risk factors at baseline to subsequent pain outcomes. After adjustment for sex, age and occupation, development of new ULP was strongly associated with somatising tendency (OR 2.3, 95%CI 1.6-3.3, for those reporting multiple distressing somatic symptoms as compared with none), and was more weakly associated with adverse beliefs about the work-relatedness (OR 1.4, 95%CI 1.0-2.0) and prognosis (OR 1.4, 95%CI 1.0-1.8) of ULP. ref1In contrast, adverse beliefs about the work-relatedness of ULP carried a significantly reduced risk for the persistence of ULP. The associations with adverse beliefs about the work-relatedness of ULP, and with report of one or more distressing somatic symptoms, differed significantly between the two outcomes.

In the absence of more than one significant association with persistence of ULP, a multivariate model was developed only for new ULP. Table 5 shows mutually adjusted risk estimates for all risk factors that had shown significant associations in the univariate analyses presented in Tables 2 to 4. The associations of new ULP with age and somatising tendency both remained highly significant, and weaker associations were still discernible for being a woman, being a former smoker, work as a nurse, job dissatisfaction, adverse beliefs about the work-relatedness of ULP and adverse beliefs about ULP prognosis.

DISCUSSION

Our study gives only limited support to the hypothesis that risk factors for incident ULP differ from those for its persistence. We found that tendency to somatise was the strongest predictor of new onset of ULP, with a risk estimate which differed significantly from that for the same exposure and persistence of ULP. Likewise, having strong beliefs about the work-relatedness of ULP was differentially associated with the incidence of ULP as compared with its persistence. However, no significant differences in association were found for the other risk factors examined. It is possible that this partly reflected a lack of statistical power.

To address our aim we based our analysis on anatomical sites rather than on individuals. We looked separately at associations with new ULP among those anatomical sites which had been free from pain at baseline for at least one month, and with the continuing presence of ULP in those anatomical sites which had been painful in the month before baseline. As we had observed previously for low back pain (Vargas-Prada et al. 2013), somatising tendency was more strongly associated with the incidence of ULP than with its persistence. Most of the evidence that is available on the role of somatising tendency in non-specific musculoskeletal illness comes from cross-sectional studies (Palmer et al. 2005), making it difficult to discern cause from effect. However, our finding that somatising tendency was a risk factor for subsequent ULP incidence is consistent with two other longitudinal studies (Macfarlane et al. 2000; Palmer et al. 2008). It has been shown that individuals with a tendency to somatise consult a doctor more frequently when they have a new episode of ULP (Ryall et al. 2006), and it seems plausible that people who tend to worry about other common physical symptoms would also have a heightened awareness of, and be more likely to report, ULP.

We also observed that the development of ULP was rather more common in workers who had adverse beliefs about its causation by work and prognosis. Previously, adverse health beliefs about ULP, and especially those concerning prognosis, have been linked with the persistence of pain (Palmer et al. 2008) rather than incidence of new pain. Whether the relationship is with incidence, persistence, or both, it is likely to arise through a nocebo effect (Colloca et al. 2008), analogous to

the analgesic effects of a placebo, in which a belief that the treatment will be effective causes it to reduce pain. Pain which is perhaps triggered by physical activities may be rendered more prominent and troublesome in individuals who are concerned that it is being caused by their work or has a poor prognosis. More difficult to explain is the inverse association which was observed between strong beliefs about work-relatedness and persistence of ULP. A careful search of the available literature did not reveal any similar findings in previous studies. It might be that individuals with strong beliefs about the work-relatedness of ULP selectively modify their occupational activities in a way that promotes resolution of symptoms (possibly through a placebo effect). However, there is little evidence to suggest that altering occupational activities can importantly reduce arm symptoms among nurses or office workers. Alternatively, this may have been a chance observation.

The absence of associations with persistence of pain in this cohort of Spanish workers might reflect cultural differences between Spain and other countries where such associations have been observed. It is possible that the effects of negative beliefs about musculoskeletal pain are importantly modified by the behaviours and attitudes that are prevalent in the society in which an individual lives (Main and Watson 1999; Bongers et al. 2006; Karels et al. 2007). If so, exposure to such risk factors might produce different coping strategies in relation to pain causation and prognosis which would not necessarily be the same across different cultural settings. We are not suggesting that underlying mechanisms differ between countries, but, that the nature and consequences of health beliefs, and perhaps also somatising tendency, might be different. Theoretical models have postulated that avoidance behaviours related to low back pain are influenced by personal and cultural health beliefs (Pincus et al. 2006); and we have no reason to believe that for ULP it would be different.

Despite consistent evidence from elsewhere that repetitive work and awkward postures are risk factors for upper limb disorders (Bernard 1997; Macfarlane et al. 2000; Miranda et al. 2001; Roquelaure et al. 2009), we found no significant association of work-related physical activity with either the development or persistence of ULP, after adjustment for occupation. This may be explained by

limited heterogeneity of exposure to relevant physical activities within each of the two occupational groups assessed. Use of keyboards and exposure to repetitive movements and awkward postures were quite common in both groups.

Women had a significantly higher incidence of new ULP than men, and the risk of developing ULP increased significantly with age. These findings are in agreement with previous studies (Miranda et al. 2001; Feleus et al. 2008; Roquelaure et al. 2009). Another earlier study suggested that current smoking was associated with the persistence of ULP (Ryall et al. 2007b). However, we were unable to confirm this. We found an increased risk of new ULP among former smokers, but only a weak association was discernible for current smokers. The absence of clear trends in risk across the smoking categories suggests that this could be a chance observation. Nevertheless, it has been postulated that, even in former smokers, tobacco smoking can cause damage to musculoskeletal tissues through reduced blood flow and hypoxia (Palmer et al. 2003). If so, this might account for the increased risk of new ULP in ex-smokers. We also found that job dissatisfaction was significantly associated with the development of ULP, although a systematic review by Bongers et al. (2002) concluded that job dissatisfaction was not a consistent risk factor for shoulder, elbow or hand/wrist symptoms. Job satisfaction is an attitudinal variable which is influenced, among other things, by workers' expectations about what their job should provide (Spector 1997), and it is possible that in some circumstances, failure to achieve job expectations produces stress leading to increased musculoskeletal tone, and subsequently to pain (Bonde et al. 2005).

In interpreting our findings, certain strengths and limitations of our study should be considered. As far as we know, this is the first study in a large sample of Spanish workers, which has examined the role of lifestyle, biological, occupational and psychological risk factors for the incidence and persistence of ULP. The longitudinal design, with collection of information at baseline about pain at each of six anatomical locations within the upper limb, allowed us to distinguish new from persistent pain more reliably than in some previous investigations (Miranda et al. 2001; Palmer et al. 2008). Also, the response rates, both at baseline (Coggon et al. 2012) and follow-up, were high, and response at follow-up differed little in relation to the baseline risk

factors of interest. A slightly lower response rate in temporary workers was to be expected, since some temporary contracts would have come to an end during the follow-up period. However, because the number of non-responders was small, this seems unlikely to be an important cause of bias.

The items from the CUPID questionnaire (Coggon et al. 2012), concerning mental health, tendency to somatise and adverse health beliefs, were based on instruments which have previously shown predictive validity (Derogatis and Melisaratos 1983; Ware and Sherbourne 1992; Waddell et al. 1993), and have been used successfully in earlier longitudinal studies related to back (Vargas-Prada et al. 2013) and arm pain (Palmer et al. 2008). Also, questions about upper limb musculoskeletal complaints were similar to those in the Nordic questionnaire (Kuorinka et al. 1987), which has been considered a useful screening tool with acceptable reliability (Dawson et al. 2009) and sensitivity (Crawford 2007).

Against these strengths, it is possible that workers prone to persistent or recurrent ULP tend to be selected out of work, and therefore were under-represented in our baseline sample. If so, the absolute risks of pain at follow-up may have been underestimated. Although the validity of internal comparisons and associations with risk factors should not have been compromised by healthy worker selection at baseline, bias could have occurred if participants who were both exposed to risk factors and experienced pain over the study period, were selectively lost to follow-up. As Table 1 indicates, loss to follow-up was somewhat higher (32.2%) among the 59 subjects with pain at three or more anatomical sites at baseline. On the other hand, it was lower in the 339 subjects with pain at one or two sites (1.8%) than in the 707 with no pain at all (15.4%). Nor was attrition substantially higher among workers who were exposed to risk factors at baseline. Thus, we think any such bias will have been minimal.

Also, our definition of a new episode of ULP required that an anatomical site had been free from pain for at least one month before baseline. However, it may be that some of the incident ULP at follow-up was not the first occurrence of pain at the anatomical site in question. It is also possible that some sites which were classed as having persistent pain were free from pain for part of the time between baseline and

follow-up, while others with long-term recurrent pain happened not to be painful in the month before follow-up. This may have somewhat obscured associations with persistence of pain. In addition, the information that was collected about pain was not supported by any form of clinical examination or investigation. However, there is evidence that more complex case definitions for upper limb disorders, which include physical findings, produce similar associations with occupational risk factors as simpler definitions based only on symptoms (Palmer et al. 2012).

Our sample was predominantly female, and although risk estimates were adjusted for sex, it is possible that findings would have been different in a largely male population. However, we are not aware of any evidence that sex differentially modifies associations of other risk factors with incidence as compared with persistence of musculoskeletal pain.

Another limitation was the statistical power to detect differences in associations with incidence as compared with persistence of pain. Although the study sample was quite large and we looked at multiple anatomical sites for each participant, confidence intervals indicate that in many cases there was substantial uncertainty in risk estimates, especially for persistence of pain.

The 370 individuals with pain at baseline in 1-5 anatomical sites would have contributed to analyses both of incidence and persistence of pain. While this would not be expected to bias risk estimates, it may have caused slight overestimation of the statistical significance of differences in associations with risk factors for the two outcomes. However, it would not be expected to obscure differences in association.

In conclusion, our findings provide limited evidence that risk factors predicting the new development of ULP differ from those predicting its persistence. However, the differences observed are not consistent with the limited evidence that is available from elsewhere, and further research is needed to resolve the outstanding uncertainties. This may be possible using data from the CUPID study that have been collected in other countries. If it is correct that predictors for onset of ULP differ from those for its persistence, there could be important practical implications for primary and secondary prevention. Unlike for low back pain, evidence of the effectiveness of work-related interventions to prevent ULP is scarce (Kennedy et al.

2010). Looking separately at predictors of new and persistent ULP may allow potential targets for workplace preventive interventions to be identified more reliably.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

ETHICAL STANDARDS

Subjects' written consent was obtained prior to their inclusion in the study according to the Declaration of Helsinki (updated 2008), and the study has been approved by Parc de Salut Mar Ethics Committee of Barcelona and the Health and Safety Committee of each participating centre approved this study.

AUTHORS' CONTRIBUTIONS

All authors jointly participated in the design of the study and data interpretation. SV-P was responsible of the data collection and wrote the first draft of the manuscript. SV-P, DC, JMM and GN were responsible for the statistical analysis. All authors discussed the results, commented on the manuscript and approved the final version of the manuscript.

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Table 1. Characteristics of participants at baseline and response rates at follow-up

Characteristic	Number who completed baseline questionnaire	Number who completed follow-up	Response rate (%)
Sex			
Male	136	124	91.2
Female	969	847	87.4
Age (years)			
20-29	240	196	81.7
30-39	360	318	88.3
40-49	348	315	90.5
50-59	157	142	90.4
Height			
≥ median for sex	589	510	86.6
< median for sex	519	461	88.8
Smoking habits			
Never smoked	491	434	88.3
Former smoker	216	193	90.5
Current smoker	398	344	90.4
Occupation			
Nurse	667	578	86.7
Office worker	438	393	89.7
Contract of employment			
Permanent	928	831	89.6
Temporary	177	140	79.1
Seniority			
5 years or less	327	272	83.2
More than 5 years	778	699	89.9
Working hours per week			
37 hours or less	566	505	89.2
More than 37hours	539	466	86.5
Job dissatisfaction			
No	996	878	86.7
Yes	109	93	89.7
Job insecurity			
No	935	831	88.2
Yes	170	140	82.4
All subjects	1105	971	87.9

Table 1. Continued

Characteristic	Number who completed baseline questionnaire	Number who completed follow-up	Response rate (%)
Adverse beliefs about upper limb pain			
Physical activity	339	294	86.7
Work-relatedness	812	708	87.2
Prognosis	378	323	85.4
Mental Health			
Good	370	323	87.3
Intermediate	356	314	88.2
Poor	379	334	88.1
Number of distressing somatic symptoms in past week			
0	632	556	88.0
1	294	264	89.8
≥2	179	151	84.4
Physical activity in an average working day			
Use of keyboards >4h	550	493	89.6
Hand/wrist repeated movements >4h	707	621	87.8
Elbow repeated movements >1h	1027	905	88.1
Hands above shoulder height > 1h	470	409	87.0
Number of anatomical sites with pain in the upper limb in the last month at baseline			
0	707	598	84.6
1	213	210	98.6
2	126	123	97.6
3	36	27	75.0
4	14	8	57.1
5	3	2	66.7
6	6	3	50.0
All subjects	1105	971	87.9

Table 2. Baseline biological and lifestyle risk factors for new upper limb pain and persistence of upper limb pain. Analysis based on anatomical sites.

	New upper limb pain				Persistence of upper limb pain				
	N[a]	n[b]	OR	(95% CI) [c]	N[a]	n[b]	OR	(95% CI) [c]	p value [d]
Sex									
Male	683	26	1		61	18	1		
Female	4551	329	1.8	(1.1-3.0)	531	224	2.1	(0.9-5.1)	0.79
Age									
20-29	1105	49	1		71	25	1		
30-39	1749	106	1.5	(1.0-2.3)	159	55	1.1	(0.5-2.5)	0.49
40-49	1662	132	2.0	(1.3-3.1)	228	99	1.5	(0.7-3.4)	0.53
50-59	718	68	2.4	(1.5-4.0)	134	63	1.7	(0.7-4.1)	0.48
Height									
≥ median for sex	2802	176	1		258	96	1		
< median for sex	2432	179	1.1	(0.8-1.4)	334	146	1.2	(0.7-2.1)	0.64
Smoking habits									
Never smoked	2384	134	1		220	93	1		
Former smoker	1021	94	1.8	(1.2-2.5)	137	52	0.8	(0.4-1.6)	0.10
Current smoker	1829	127	1.4	(1.0-1.9)	235	97	1.1	(0.6-1.9)	0.40
Total	5234	355			592	242			

[a] Number of "at-risk" anatomical sites with exposure to the risk factor.
[b] Number of exposed anatomical sites in which the outcome occurred.
[c] Each risk factor analysed in a separate two-level (anatomical sites nested within persons) random intercept model that included sex, age (in four ten-year bands) and occupation.
[d] Wald test to compare odds ratios between the two outcomes.

Table 3. Baseline occupational risk factors for new upper limb pain and persistence of upper limb pain. Analysis based on anatomical sites.

	New upper limb pain				Persistence of upper limb pain				
	N[a]	n[b]	OR	(95% CI) [c]	N[a]	n[b]	OR	(95% CI) [c]	p value [d]
Occupation									
Office workers	2108	118	1		250	90	1		
Nurses	3126	237	1.4	(1.0-1.9)	342	152	1.3	(0.8-2.2)	0.87
Employment contract									
Permanent	4460	312	1		526	219	1		
Temporary	774	43	1.1	(0.7-1.7)	66	23	0.9	(0.4-2.0)	0.63
Seniority									
≤5 years	1514	78	1		118	47	1		
>5 years	3720	277	1.1	(0.8-1.6)	474	195	0.7	(0.3-1.4)	0.20
Working hours per week									
≤37 hours	2743	198	1		287	134	1		
>37hours	2491	157	0.8	(0.6-1.1)	305	108	0.6	(0.4-1.0)	0.33
Job dissatisfaction									
No	4768	306	1		500	199	1		
Yes	466	49	1.7	(1.1-2.7)	92	43	1.5	(0.8-3.0)	0.73
Job insecurity									
No	4459	308	1		527	216	1		
Yes	775	47	1.0	(0.7-1.5)	65	26	1.0	(0.5-2.2)	0.95
Work-related physical activity									
Not exposed	1497	101	1		189	78	1		
Exposed	3737	254	0.9	(0.6-1.3)	403	164	0.9	(0.4-1.9)	0.96
Total	5234	355			592	242			

Table 3. Continued.

[a] Number of “at-risk” anatomical sites with exposure to the risk factor.
[b] Number of exposed anatomical sites in which the outcome occurred.
[c] Each risk factor analysed in a separate two-level (anatomical sites nested within persons) or three-level (anatomical sites nested within anatomical areas and persons) random intercept models that included sex, age (in four ten-year bands) and occupation.
[d] Wald test to compare odds ratios between the two outcomes.

Table 4. Baseline psychological risk factors for new upper limb pain and persistence of upper limb pain. Analysis based on anatomical sites.

	New upper limb pain				Persistence of upper limb pain				
	N[a]	n[b]	OR	(95% CI) [c]	N[a]	n[b]	OR	(95% CI) [c]	p value [d]
Adverse beliefs about upper limb pain									
Physical activity	1622	108	0.9	(0.7-1.3)	142	57	1.0	(0.6-1.7)	0.86
Work-relatedness	3793	280	1.4	(1.0-2.0)	455	176	0.5	(0.3-0.9)	0.00
Prognosis	1686	134	1.4	(1.0-1.8)	252	110	1.2	(0.7-2.0)	0.64
Mental health									
Good	1799	113	1		139	63	1		
Intermediate	1687	100	1.0	(0.7-1.4)	197	80	0.9	(0.5-1.7)	0.79
Poor	1748	142	1.4	(1.0-2.0)	256	99	0.7	(0.4-1.3)	0.06
Number of distressing somatic symptoms in past week									
0	3045	157	1		291	122	1		
1	1395	119	1.9	(1.3-2.6)	189	74	0.8	(0.5-1.4)	0.01
≥2	794	79	2.3	(1.6-3.3)	112	46	0.9	(0.5-1.8)	0.02
Total	5234	355			592	242			

[a] Number of "at-risk" anatomical sites with exposure to the risk factor.
[b] Number of exposed anatomical sites in which the outcome occurred.
[c] Each risk factor analysed in a separate two-level (anatomical sites nested within persons) random intercept model that included sex, age (in four ten-year bands) and occupation.
[d] Wald test to compare odds ratios between the two outcomes.

Table 5. Multivariate models for new upper limb pain. Analysis based on anatomical sites.

	New upper limb pain	
	OR	**(95% CI) [a]**
Sex		
Male	1	
Female	1.6	(1.0-2.6)
Age		
20-29	1	
30-39	1.5	(1.0-2.3)
40-49	2.0	(1.3-3.1)
50-59	2.6	(1.6-4.2)
Smoking habits		
Never smoked	1	
Former smoker	1.6	(1.1-2.3)
Current smoker	1.3	(0.9-1.8)
Occupation		
Office workers	1	
Nurses	1.3	(1.0-1.8)
Job dissatisfaction		
No	1	
Yes	1.5	(1.0-2.4)
Adverse beliefs about upper limb pain		
Work-relatedness	1.4	(1.0-2.0)
Prognosis	1.3	(1.0-1.7)
Number of distressing somatic symptoms in past week		
0	1	
1	1.8	(1.3-2.4)
≥2	2.1	(1.4-3.1)

[a] All risk factors analysed together in a two-level (anatomical sites nested within persons) random intercept model.

4.3 Paper 3.

Vargas-Prada S, Martínez 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 Nov;39(6):589-98. doi: 10.5271/sjweh.3377

GENERAL DISCUSSION

5. GENERAL DISCUSSION

In this chapter the main findings of this dissertation are summarised, methodological considerations are discussed, a reflection on the main findings is provided, implications for practise are presented and recommendations and future lines of research are proposed.

5.1. Main findings

In this cohort of Spanish nurses and office workers, culturally-influenced health beliefs about musculoskeletal pain, poor mental health and the tendency to report somatic distressing symptoms are important predictors of the incidence and persistence of musculoskeletal pain.

We found that low mood and somatising tendency predicted subsequent incidence of low back pain and associated disability. Likewise, low mood was significantly associated with the persistence of disabling low back pain, and somatising tendency was also a risk factor for both, the incidence of upper limb pain and the persistence of low back pain.

Incidence of disabling low back pain was also predicted by adverse beliefs about work as a cause of back pain, and we also observed that the development of upper limb pain and the persistence of low back pain were slightly more common in workers who had adverse beliefs about its causation by work and prognosis. In contrast, adverse beliefs about the work-relatedness of pain carried a significantly reduced risk for the persistence of upper limb pain.

Although these findings suggest that risk factors for incident musculoskeletal pain may differ from those for its persistence, our findings give only limited support to that hypothesis. We found that only somatising tendency and having strong beliefs about the work-relatedness of pain were differentially associated with the incidence of upper limb pain as compared with its persistence.

Furthermore, when we investigated whether associations of psychological risk factors with the occurrence and persistence of disabling musculoskeletal pain differ from those for non-disabling musculoskeletal pain, we found that the

development of disabling musculoskeletal pain was associated with somatising tendency, low mood and health beliefs about the work-relatedness of pain and prognosis, and its persistence was predicted by adverse beliefs about prognosis. In addition, adverse beliefs about prognosis were also associated with the transition from non-disabling to disabling musculoskeletal pain. In contrast, associations with the development and persistence of non-disabling musculoskeletal pain were weaker, only somatising tendency was significantly associated with the occurrence of non-disabling musculoskeletal pain and persistence of such pain tended to be more common among people with adverse beliefs about prognosis. Overall, the psychological risk factors that we examined showed stronger and more consistent associations with disabling than non-disabling pain.

5.2. Methodological considerations: strengths and limitations

In interpreting our findings, certain strengths and limitations of the methodology used in the three papers of this dissertation should be considered.

As far as we know, the Spanish sample of the CUPID study is the first study that examined the role of culturally-influenced and individual psychological risk factors on symptoms and disability for musculoskeletal disorders among a substantial sample of people of working-age in Spain.

The longitudinal design indicates that the observed associations between psychological risk factors and musculoskeletal pain would not be a consequence of reverse causation. Moreover, the way pain information was collected at baseline (separate analysis for anatomical sites with and without pain at baseline), allowed us to distinguish more reliably incident from persistent pain. In defining whether musculoskeletal pain (non-disabling or disabling) was incident or persistent, our study considered not only the part of the body affected (low back, neck, shoulder, elbow, wrist/hand or knee), but also the laterality of symptoms (right, left or both - if applicable). Thus, for example, right elbow pain was considered to be incident at follow-up if it had not previously been present in the same elbow (right) at baseline, even if the other elbow (left)

had been affected; while, right elbow pain was considered to be persistent at follow-up if it (right elbow) had been painful in the month before baseline.

The response rates, both at baseline and follow-up, were high, and response at follow-up differed little in relation to the baseline risk factors of interest. Only a slightly lower response rate in younger subjects and temporary workers were found. Almost 30% of the 134 participants who failed to answer the follow-up questionnaire had a temporary contract, and from those, near 50% were between 20 and 29 years-old. Thus, this finding was not unexpected, since it is possible that some temporary contracts would have come to an end during the follow-up period. However, because the number of non-responders was small, this seems unlikely to be an important cause of bias.

The items from the CUPID questionnaire [85], concerning mental health, tendency to somatise and adverse health beliefs, were based on validated instruments [81,82,83] which have previously shown predictive validity for the incidence and persistence of musculoskeletal symptoms in longitudinal studies [33,51]. Moreover, there is no reliable standard against which to assess the accuracy with which subjective symptoms such as pain are reported, but questions about pain and disability had again been used successfully in earlier studies [33,51,60,88,89,90]. Likewise, the style of our questions about pain symptoms was similar to that of the Nordic questionnaire [84], which has been considered a useful screening tool with acceptable reliability [91] and sensitivity [92]. Each anatomical area (low back, neck, shoulder, elbow, wrist/hand and knee) was depicted in diagrams (appendices III and IV) to avoid possible misunderstanding about musculoskeletal pain location.

Against these strengths, several limitations should be considered. The definition of a new episode of musculoskeletal pain required that an anatomical site had been free from pain for at least one month before baseline. However, it may be that some of the incident musculoskeletal pain at follow-up was not necessarily the first occurrence of pain at the anatomical site in question. Likewise, it is also possible that some sites which were classed as having persistent pain were free from pain for part of the time between baseline and

follow-up, while others with long-term recurrent pain happened not to be painful in the month before follow-up. This may have somewhat obscured associations with persistence of low back and upper limb pain. In addition, the information that was collected about disabling and non-disabling musculoskeletal pain was self-reported and not supported by any form of clinical examination or investigation. Nevertheless, as we already mentioned, there is no reliable standard against which to assess the accuracy of reported pain, and it has been observed that case definitions based only on musculoskeletal symptoms generate similar associations with occupational risk factors to more complex case definitions that include findings from clinical examination [93].

Similarly, the nature of the psychological risk factors, such as health beliefs about pain, mental health and somatising tendency, was such that they could only be ascertained by self-report. This raises the possibility that the observed associations, even though predictive and not simply cross-sectional, might reflect differences in propensity to report health problems when they occur rather than true differences in the risks of symptoms and disability. We cannot rule this out, but to account for the observed pattern of results in paper 3, the higher propensity for reporting in, say, somatisers would have to relate specifically to the reporting of disability, and not to reporting of non-disabling pain. Moreover, cross-sectional analyses have indicated that somatising tendency is an important risk factor for report not only of disabling pain, but also of prolonged sickness absence [94]. It seems unlikely that major differences in propensity to report would extend to a more concrete outcome such as sickness absence.

It is possible that workers prone to persistent and disabling musculoskeletal pain at baseline tend to be selected out of work due to healthy worker selection, and therefore were under-represented in our baseline sample. If so, the absolute risks of persistent and disabling musculoskeletal pain at follow-up may have been underestimated. It is unlikely that this healthy worker selection would have caused spurious differential associations of baseline psychological risk factors with disabling pain at follow-up (paper 3). Sick leave accounted for the loss of only 29 of the 134 participants who failed to answer the follow-up

questionnaire (table 12 in the methods section) and even if disabling musculoskeletal pain was responsible for the absence in most of these 29 participants, there is no reason to expect that it would be substantially less associated with psychological risk factors than disabling pain that did not cause sickness absence. Besides, the threshold that we applied in classifying pain as disabling (making at least one of a specified set of activities difficult or impossible) was the same as has been applied in previous studies [33,88]. In some cases, the disability may have been rather minor, but this would not account for the differences that were observed between disabling and non-disabling pain in associations with risk factors (paper 3). If anything, it would be expected to obscure differences.

Although the validity of internal comparisons and associations with psychological risk factors should not have been compromised by this healthy worker selection at baseline, bias could have occurred if participants who were both exposed to psychological risk factors and experienced pain over the study period, were selectively lost to follow-up. Loss to follow-up was somewhat higher (12.2%) among the 278 subjects with pain at three or more anatomical sites at baseline compared to those without pain (9.1%). However, no differences in the percentage of participants lost to follow-up were observed between those subjects who had pain at one, two or three or more anatomical sites at baseline (table 13 in the methods section). Moreover, among the 819 subjects who reported pain in at least one anatomical site (low back, neck, shoulders, elbows, hands/wrists or knees) at baseline, only 108 (13.2%) were lost at follow-up. Although dropout was a little more common among those with high exposure to psychological risk factors than in those with low exposure (the highest odds ratio was 1.7 for having strong adverse beliefs about the work-relatedness of musculoskeletal pain - see appendix VI) we believe that any resultant bias would be minimal.

The unit of analysis was anatomical sites (nested within persons, if applicable); therefore, for those body areas that have right and left side (shoulder, elbow, wrist/hand and knee) some participants were included in the analysis of pain incidence and pain persistence; this means, that it is possible

that one individual could be included within the analysis more than once. For example, 589 participants included in the analysis of upper limb pain (table1, paper 2) had no pain at any site at baseline and contributed only to the analysis of pain incidence. A further 3 had pain at all six sites, and contributed only to the analysis of pain persistence. The remaining 370 (with pain at baseline in 1-5 anatomical sites) contributed to both analyses. Exposures by anatomical site among the last group would have been the same in both analyses, except perhaps for occupational physical activity, which was more site-specific. However, this would only lead to similarity of associations with risk factors for the two outcomes (incidence and persistence of pain) to the extent that risk factors for the two outcomes were the same (the question that paper 2 was designed to address). It is possible that because some individuals contributed to both analyses, the statistical significance of differences in associations with risk factors for incidence as compared with persistence of pain was slightly over-estimated. However, it would not be expected to obscure differences in association.

It is plausible that the extent to which a risk factor has prognostic effect for any specific pain site may depend on the number and pattern of co-morbid pain sites; thus, we believe that this issue would be interesting to explore using the longitudinal analysis of the full CUPID data set, when we will have larger numbers. Another limitation related to paper 2 was the lack of statistical power to detect differences in associations with incidence as compared with persistence of pain. Although the study sample was quite large and we looked at multiple anatomical sites for each participant, confidence intervals indicate that in many cases there was substantial uncertainty in risk estimates, especially for persistence of pain.

The CUPID study did not collect information about co-morbidity or the exposure to physical activities outside work. Co-morbid disorders would have to have been associated with a higher prevalence of psychological risk factors at baseline, and independently to carry a higher risk of new development and persistence of disabling pain at follow-up, in order to cause a spurious association with disabling as compared with non-disabling pain (paper 3). It is

possible that some progressive diseases of the musculoskeletal system make disability more likely to develop or persist. However, evidence to date suggests that associations with psychological risk factors are stronger for non-specific pain than for specific diseases such as osteoarthritis [95] or carpal tunnel syndrome [96]. In the same way, physical activities outside work do not appear to have as much influence on musculoskeletal pain as occupational activities [97,98].

Despite consistent evidence that work-related physical activities are risk factors for musculoskeletal pain [6,8,23,27,99], we found no significant association of work-related physical activity with either the development or persistence of low back and upper limb pain, even after adjustment for occupation. This may be explained by limited heterogeneity of exposure to relevant physical activities within each of the two occupational groups assessed. For example, use of keyboards and exposure to repetitive movements and awkward postures were quite common in nurses and office workers. Occupational groups included in the CUPID study had been chosen with the intention that their exposure to physical risk factors should be fairly uniform.

Finally, our sample was predominantly female, and although risk estimates were adjusted for sex, it is possible that findings would have been different in a largely male population. However, we are not aware of any evidence that sex differentially modifies associations of other risk factors with incidence as compared with persistence of musculoskeletal pain. The current study was unable to analyse the role of lifestyle factors as potential confounders. The only variable related to lifestyle assessed in the CUPID questionnaire was smoking habits, but we decided not to include it as a potential confounding factor in paper 3 because we did not regard it as a well established, important risk factor for disabling musculoskeletal pain.

5.3. Reflection on main findings

Culturally-influenced health beliefs and expectations about musculoskeletal pain

It has been postulated that adverse beliefs and expectations about musculoskeletal pain (especially those concerning prognosis) may have stronger influences in the persistence of pain and associated disability [33,81,100,101,102,103] rather than incidence of new pain [41]. However, contrary to what we expected, we observed that both, the development of upper limb and disabling musculoskeletal pain, was more common in workers who had adverse beliefs about its causation by work and prognosis; and also having adverse beliefs about the work-relatedness of upper limb pain carried a significantly reduced risk for persistence of upper limb pain.

Whether the relationship is with incidence, persistence or both, it is likely to arise through a nocebo effect [104], analogous to the analgesic effects of a placebo, in which a belief that the treatment will be effective causes it to reduce pain. Therefore, it is plausible that individuals who are concerned that pain is being caused by their work or strongly believe that musculoskeletal disorders are long-term health problems which carry a poor prognosis could perceive musculoskeletal pain (triggered perhaps by physical activities) to be more prominent, troublesome and disabling. The observed inverse association between strong beliefs about work-relatedness and persistence of upper limb pain is more difficult to explain. A careful search of the available literature did not reveal any similar findings in previous studies. It might be that individuals with strong beliefs about the work-relatedness of upper limb pain selectively modify their occupational activities in a way that promotes resolution of symptoms. However, there is little evidence to suggest that altering occupational activities can importantly reduce arm symptoms among nurses or office workers. Alternatively, this may have been a chance observation.

As we already pointed out in our introduction, most of the studies which explored the influence of adverse beliefs on pain persistence were performed in

northern European countries and the Unites States of America. Therefore, the absence of strong associations with persistence of low back and upper limb pain (without distinguishing disabling from non-disabling pain) in this cohort of Spanish workers might reflect cultural differences between Spain and other countries where such associations have been observed. According to a theoretical model proposed by Pincus et al [36], it is possible that the effects of negative beliefs about musculoskeletal pain are importantly modified by the behaviours and attitudes that are prevalent in the society in which an individual lives [105,106,107]. It is important to mention that we are not suggesting that underlying mechanisms differ between countries; but, the nature and consequences of health beliefs might differ substantially between them, with different cultural attitudes to illness.

Despite that potential cultural influences might explain variations in the report and prognosis of pain symptoms between different settings; it was unclear whether adverse beliefs primarily influence the development and persistence of pain or whether their impact is more on the disability that musculoskeletal pain causes. Our prior suspicion was that their impact would relate more to the disability that musculoskeletal pain causes and this was supported by our findings. Therefore, it was not surprising to observe that incidence of disabling low back pain or musculoskeletal pain was predicted by adverse beliefs about the work-relatedness of pain, or that adverse beliefs about pain prognosis were associated with the persistence of disabling musculoskeletal pain and the transition from non-disabling to disabling musculoskeletal pain. The exposure to pessimistic beliefs might produce different coping strategies in relation to pain causation and prognosis (which would not necessarily be the same across different cultural settings) that encourage maladaptive and avoidance pain behaviours and attitudes to illness in such a way that promote pain chronicity and disability. It is curious that we did not observe an increased risk of disabling pain in relation to adverse health beliefs about physical activity. This seems to be a fairly consistent finding in cross-sectional data from the CUPID study more widely [88] and accords also with three studies of low back patients from primary care and in older subjects in Spain [77,78,79]. In the future, it will be

interesting to check this observation through analysis of longitudinal data from the CUPID study in other countries.

Individual psychological factors: low mood and somatising tendency

As we had previously observed for adverse beliefs, low mood and somatising tendency also tended to be more strongly associated with incidence of symptoms (without distinguishing disabling from non-disabling) than on its persistence. We observed that the incidence of low back pain was predicted by a high somatising tendency and low mood, and the development of upper limb pain was associated only with a high tendency to somatise. Only a weak association was found between a high tendency to somatise and the persistence of low back pain. These findings accord with results from longitudinal studies in other countries [27,33,54,55]. Although associations with these individual psychological risk factors were reduced after adjustment for past history of musculoskeletal pain in the year before baseline, this does not necessarily argue against their having a causal role. If they are persistent characteristics, they may also have contributed to the earlier occurrence of pain symptoms.

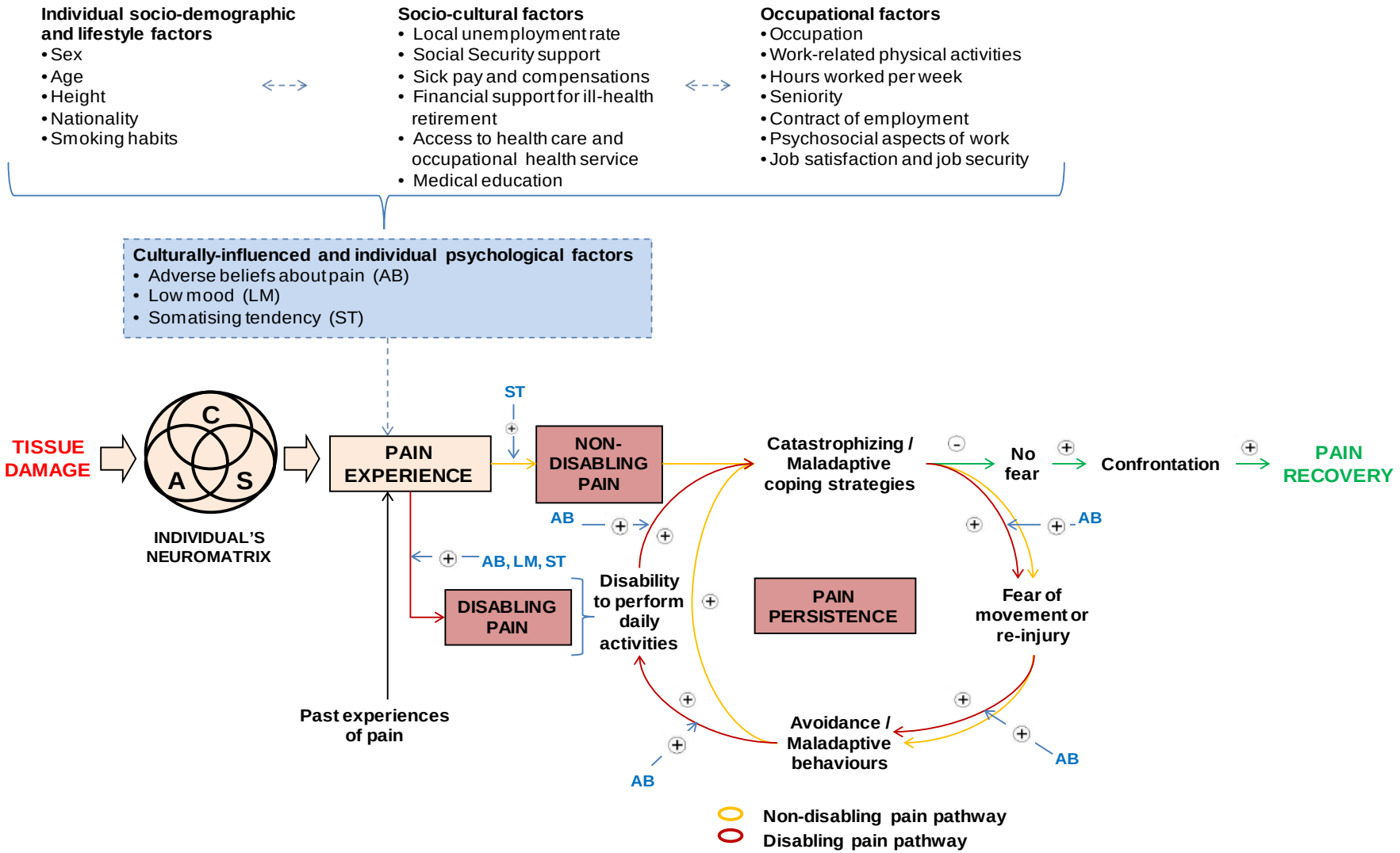
The fact that a tendency to somatise and poor mental health were more related to disabling than non-disabling pain was not surprising. As with adverse beliefs, our prior hypothesis was that established individual psychological risk factors would relate principally to the disability that arises from musculoskeletal pain, and again, our findings support this. From all the psychological risk factors assessed, only somatising tendency was weakly associated with new onset of non-disabling pain.

The report of distress from somatic symptoms was a stronger predictor of the occurrence of disabling musculoskeletal pain. It has been shown that individuals who tend to worry about common physical symptoms consult a doctor more frequently when they have a new episode of musculoskeletal pain [108]. Based on this, it seems plausible that those individuals would also be more likely to report pain symptoms, reinforcing maladaptive cognitions which might make

them feel the need to modify their activities to minimise symptoms and avoid exacerbating perceived pain, which might lead to higher levels of disability [60,109]. Low mood was also a predictor of the incidence of disabling pain and this finding is consistent with experimental research which has indicated that induction of negative mood has a powerful effect on acute pain, reducing pain tolerance and leading to higher levels of self-reported pain severity [110]. Contrary to what we expected, we found a weak association between low mood and the transition from non-disabling to disabling musculoskeletal pain. Two possible interpretations for this finding are that the progression from pain to disability is only partially explained by poor mental health [111], or our study sample may have been unrepresentative simply by chance.

Our findings provide limited evidence that risk factors predicting the new development of pain differ from those predicting its persistence. However, low mood, somatising tendency and culturally-influenced adverse beliefs seem to be important predictors of the incidence and persistence of musculoskeletal pain in people of working-age in Spain. A new conceptual model is proposed (figure 7) to determinate in which part of the complex sequence of events that link the perception of pain and disability (explained in chapter 1.4.2.) the influence of culturally-influenced and individual psychological factors are stronger. We observed that the development of disabling musculoskeletal pain was associated with most of the psychological factors examined, and its persistence was predicted by adverse beliefs about pain. In contrast, associations with the onset and persistence of non-disabling pain were weaker, only the incidence of such pain tended to be more common among people with a high somatising tendency. This suggests that the influence of established psychological risk factors is less on occurrence and awareness of pain symptoms and more on the disability they cause (Disabling pain pathway – “red” in figure 7).

Figure 7. New conceptual model of the role of culturally-influenced and individual psychological factors in the occurrence and persistence of musculoskeletal pain and associated disability.



Source: Own elaboration based on the gate-control theory (Melzack and Wall 1965; Melzack and Casey 1968), the fear-avoidance theory (Vlaeyen et al. 1995; and Waddell et al. 1993) and the learning pathway model (Crombez et al. 1998).

5.4. Implications for practice

Occupational health professionals have spent decades trying different strategies for preventing and managing musculoskeletal pain and associated disability. Understanding the underlying mechanisms of a condition is a prerequisite for designing cost-effective interventions. However, this might be difficult and challenging when the topic of interest is musculoskeletal pain, where its nature and the resultant disability is a complex and dynamic interaction between biological, psychological and social (or cultural) factors.

The biopsychosocial model proposed by Engel in 1977 [73] and adapted to musculoskeletal pain (low back pain) by Waddell in 1987 [74], has been the dominant framework in the conceptualization of aetiology and prognosis of musculoskeletal pain [112]. However, although this model has lead to the development of many non-pharmacological interventions at the workplace and community settings, musculoskeletal pain remains as one of the principal causes of disability worldwide [17,113]. Moreover, it is estimated that rates of disability due to musculoskeletal pain will rise even more in the years to come due to the increasingly sedentary and aging societies [17,114]. This fact, from a public health perspective, could be a potential issue in western European countries like Spain, where life expectancy is very high.

Our findings suggest that established psychological risk factors are important predictors of the incidence and persistence of musculoskeletal pain. However, their influence is less on occurrence and awareness of symptoms and more on the disability that they cause. Based on these findings, adverse beliefs about pain causation and prognosis, low mood, and somatising tendency might be considered potential targets for interventions to prevent disability due to musculoskeletal pain that could be helpful to physicians in the management and prognosis of patients with non-specific musculoskeletal pain. Furthermore, if it is correct that predictors for onset of musculoskeletal pain differ from those for its persistence, there could be important practical implications for primary and secondary prevention.

Although our findings may provide interesting contributions to practice, the utilization of the biopsychosocial framework in clinical practice is far from being considered a public health success. Findings from most randomized controlled trials aimed to modify individual psychological factors to prevent pain persistence and disability have been disappointing, the benefits small and their cost-effectiveness uncertain [115,116].

The potential obstacles to the effective implementation of the biopsychosocial model in clinical practice have been discussed in the XII International Forum of Low Back Pain Research in Primary Care (Odense, Denmark – October 2012). They conclude that there is good evidence for the role of biological, psychological and social/cultural factors in the aetiology and prognosis of low back pain; but, synthesis of the three components of the model in clinical practice has been suboptimal [112]. Most pain related disability interventions that have been developed and tested, rarely integrate all three components of the biopsychosocial model together in a multi-component intervention; despite, this type of intervention has shown a greater chance of success [117].

We observed that the development and persistence of pain that make it difficult or impossible to perform daily activities were predicted by pessimistic beliefs related to pain prognosis. Interventions to change beliefs in pain sufferers might be beneficial in the management and prognosis of individual cases who report disability due to musculoskeletal pain. However, how this is undertaken by health professionals, might be beneficial or counter-productive. It is not infrequent in pain sufferers the presence of strong preconceptions about the causes and prognosis of their pain (probably influenced by beliefs and behaviours prevalent in the society which the individual lives). Therefore, an unskilled attempt to modify individuals' beliefs and expectations might lead to the extinction of patient's trust which might motivate them to seek care from other health professional who is more “empathic” [88].

Evidence is increasing related to the beneficial role of remaining active and continuing with daily activities rather than prolonged rest to prevent disability in low back pain sufferers. However, there are indications that a proportion of

health professionals still have fear-avoidance beliefs related to the management of pain. In Sweden, a survey performed by Linton et al. [118] found that more than two-thirds of general practitioners and physical therapists reported that they would advise a patient to avoid painful movements, more than one-third believed that a reduction in pain is a prerequisite for return-to-work and more than 25% reported that they believe sick leave is a good treatment for back pain. Likewise, in another survey in British chiropractors, osteopaths, and physiotherapists, 80% of participants reported recommending work absence to patients with low back pain “sometimes”, and 14% recommended a work absence “often” or “always”; however, 70% of those participants reported never have visited the patient's workplace [119]. These findings are not fully unexpected, because in most parts of the world the medical training is mainly bio-medically focused [120]. The potential role of medical education has been added to our conceptual model in figure 7.

There is a possibility that health professional are unconsciously playing an important role in maintaining patients’ disability [112]. It is possible that physicians' behaviours may be influenced by beliefs and behaviours prevalent in the society where they live; but also by patients' expectations, and social factors such as the availability of compensation systems or free access to health care. This fact might also contribute why the biopsychosocial framework has not been as effective to prevent disability due to musculoskeletal disorders in clinical practise as we expected. In Australia, an innovative media campaign performed to give explicit advice related to the management of low back pain, demonstrated that altering societal beliefs and health professionals' attitudes towards patients seem to be a potentially highly effective strategy to reduce disability that arises from musculoskeletal pain [45].

A proportion of musculoskeletal pain might be related to tasks carried out at work and the environment where they are carried out [121], but, overall, work seems to be beneficial for workers’ health. Work constitutes an important part of social life [122] and improves workers' confidence and self-esteem [94]. The workplace is considered an appropriate locus for improving workers’ well-being and to carry out interventions to facilitate early and safe return to work for

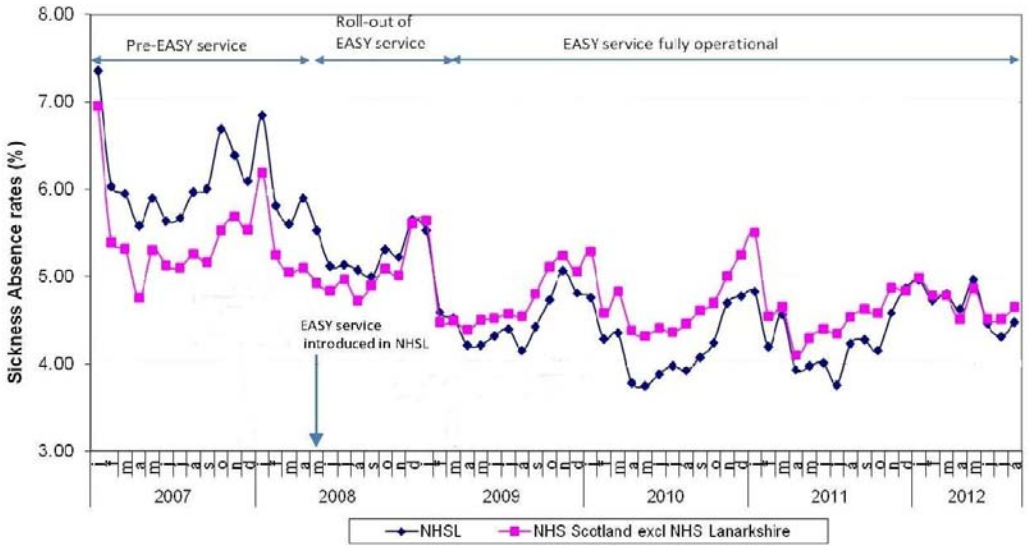
people with health problems [123,124]. However, sometimes the implementation and evaluation of interventions on workplaces tend to be complex and difficult [125], because they must co-exist with the daily activities in the workplace, implicate changes in work organization and the collaboration of key stakeholders is not always easy to achieve [126,127].

Recently, a systematic review assessed the effects of various types of workplace (and community) based interventions on sickness absence, return to work and job retention related to musculoskeletal disorders. Authors conclude that the effects were generally modest, the benefits small and only few have proven to be cost-effective [128]. Nevertheless, there is some evidence that participatory interventions where a consensus-based return to work plan between stakeholders was made, may facilitate work resumption and reduce sickness absence in temporary and unemployed workers sick-listed due to musculoskeletal disorders [129].

The biopsychosocial framework has also been employed in programmes to reduce sickness absence based on “case management”, where the aim is to optimize communication and participation between workers, occupational health departments and managers to minimize both the adverse impact on workers’ well-being and the financial cost of long-term sickness absence for employers and social security systems. Case managers are professionals (not necessarily health workers) whose aim is to support people’s health problems (medical, social, familiar etc) helping them to return to work safely as soon as possible.

Some of these sickness absence case management programmes have shown to be cost-effective. The “Early Access to Support to you” (EASY) service, implemented by NHS Lanarkshire in 2008, is an innovative programme that intervenes from day 1 of sick leave. It has been effective in reducing sickness absence in terms of hours lost and clients satisfaction [130]. This early intervention has enabled NHS Lanarkshire to become the leader in the management of sickness absence rates in Scotland (see figure 8).

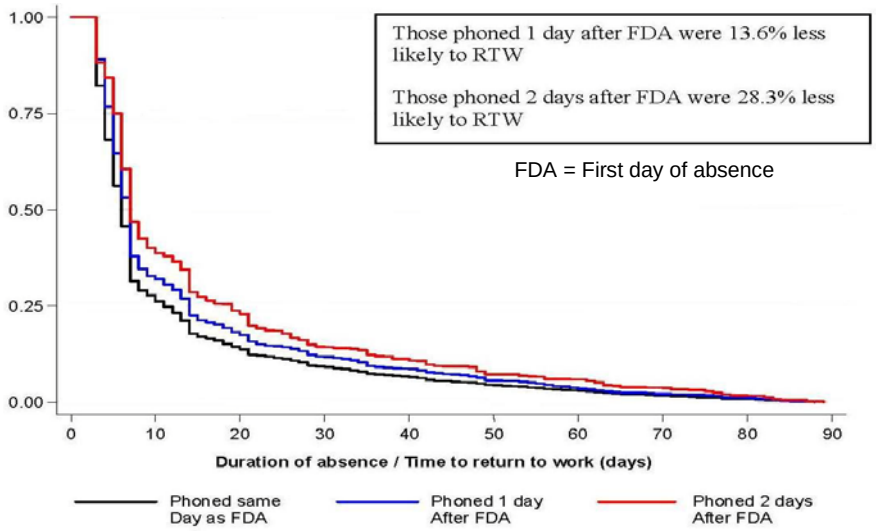
Figure 8. Pre and post EASY Intervention: Sickness absence rates in NHS Lanarkshire (NHSL) and rest of NHS Scotland (excluding NHSL)



Source: Brown et al. Reducing sickness absence in Scotland – applying the lessons from a pilot NHS intervention. University of Glasgow; 2013.

The EASY service highlights the importance of early interventions for sickness absence management. Those absentees who were phoned on the first day of absence were more likely to return to work than those phoned in the subsequent days (figure 9), and the estimated financial savings over the 4 years (2008-2012) was 87600 hours saved, equivalent to 44.71 years saved.

Figure 9. Return to work according to the time of initial telephone contact.



Source: Brown et al. Reducing sickness absence in Scotland – applying the lessons from a pilot NHS intervention. University of Glasgow; 2013.

The EASY service provides interesting findings that agree with other early interventions performed in sick-listed patients with musculoskeletal disorders [131,132,133]. However, it has been suggested that in the first weeks of sickness absence the likelihood of recovery and return to work rate is high with or without interventions [134,135]. The “Return2Health” programme [136], funded by the University Hospital Southampton NHS (National Health System) Foundation Trust and focused on workers sick-listed for longer than 4 weeks, managed to reduce by more than 5% the proportion of 4-week absences that continued beyond 8 weeks in the intervention hospital between 2008 and 2010. This contrasted with the increase of 4% in the same time period in a neighbouring hospital trust which was used as a control group. Regardless of the intervention time, case management programmes for sickness absence presented promising findings. However, further research is required to test whether the findings can be replicated on a larger scale.

These are only some examples on how the biopsychosocial framework (including our findings) could be adopted in clinical practice. In spite of the discussed limitations in relation to the implementation of the model, we agree with Pincus et al. when they conclude that "the biopsychosocial model has not failed to explain musculoskeletal pain - what has failed is the mostly restrictive way it has been understood and applied" [112]. Due to the high cost of disability for workers, employers and social security systems, the use of evidence-based practice should be considered a priority.

5.5. Recommendations and future lines of research

Some important recommendations might be addressed in order to undertake further research in relation to the role of psychological risk factors in the incidence and persistence of musculoskeletal pain and associated disability.

Epidemiological research focused on musculoskeletal pain and disability has used a wide variety of pain case definitions that may difficult the comparison of findings between studies [137]. This fact might explain, at least in part (other factors such as populations studied, methodologies and psychological and

cultural factors are also important), the marked differences in the report of pain prevalence in the literature [14].

For future studies designed to examine risk factors for musculoskeletal pain is necessary to use clear and understandable case definitions of musculoskeletal pain, and try as far as possible, to distinguish: "new" from "longstanding pain"; "pain with clear underlying pathology" from "pain where underlying pathology is unclear"; and "pain that makes it difficult or impossible to carry out everyday activities" from "not-disabling pain". Failure to do so might cause the effects of some risk factors to be diluted and perhaps missed. Likewise, the use of similar case definitions would promote the use of a common language among pain researchers.

In most studies (including the three papers of this thesis) the case definition of musculoskeletal pain is based only on self-reported pain. This approach can be easily used in large community-based and occupational cohorts, and has been supported by validated instruments such as the Nordic questionnaire [84]. Although some limitations (discussed in 5.2. Methodological considerations), self-report of pain has been considered the most valuable approach to measuring pain outcomes in population-based surveys [138]. However, to refine the definition of case, it would be necessary to refer other characteristics related to pain such as, pain location in a specific anatomical site(s), time period, pain duration, pain severity and its impact on sickness absence [137]. We will use an example to illustrate the importance of pain case definitions in the classification of participants within a study. Let's say that we have two bricklayers with similar tasks at the same building site. "Worker 1" has intense low back pain that makes it impossible to perform his daily activities at work (disabling pain) and "Worker 2" has an equal level of low back pain intensity, but he continues to have an active life without any difficulties to do his job tasks. Thus, in a study that "disabling pain" is used as the outcome, "Worker 1" would be classed as having a poor outcome, while in contrast, in a study where the outcome is "intense pain", both "Worker 1" and "Worker 2" would be classed as having a poor outcome [112].

In the absence of more objective diagnostic criteria for case definitions, several attempts have been done to determinate the potential value of medical imaging techniques such as Magnetic Resonance Imaging (MRI). However, demonstrable pathologies in the spine such as herniated inter-vertebral disc or nerve compressions did not provide strong indications that low back pain is attributable to underlying pathology [69].

Well designed prospective longitudinal studies with longer follow-up are needed to confirm that psychological risk factors for the incidence of musculoskeletal pain differ from those for its persistence. Also, it would be important to carry out cross-cultural comparisons among workers carrying out similar jobs but in dissimilar cultural settings, and to quantify if the variation rates across countries of, say, disabling musculoskeletal pain or sickness absence, might be explained by biological, psychological, occupational or social risk factors. As far as we know, this has not been assessed in longitudinal studies; only cross-sectional analyses based on the full CUPID study baseline dataset, has been used to explore this possibility. However, we intend to explore that in future papers based on the full CUPID study follow-up dataset. Based on CUPID cross-sectional studies, it has been suggested that the exposure to individual and socio-economic risk factors only partially explain the large international variations in the prevalence of disabling musculoskeletal pain [88] and rates of sickness absence [94] observed between countries. It is still not clear what else could explain the residual and substantial variations between dissimilar cultural settings. It has been suggested that maybe a more detailed description of occupational factors and longitudinal comparative studies with population-based samples might help to explain those differences between occupational groups and countries [139].

Longitudinal studies are important to minimise uncertainties about the direction of cause and effect; but, in relation to this, intervention studies could be even more convincing. We already discussed (5.4 Implications for practice) the importance in clinical practice of interventions aimed to modify psychological risk factors, individuals' beliefs and expectations about pain and other interventions based on the biopsychosocial model such as case management

programmes to reduce sickness absence. More research is needed to evaluate the many interventions based on the biopsychosocial model (especially those related to the psychological and social components of the model) that have already been conducted with the aim of preventing musculoskeletal pain and associated disability. Overall, these interventions have shown contradictory findings and no type of intervention has been clearly identified as better than others.

Our findings suggest that psychological risk factors are more related to the disability that arises from musculoskeletal pain than pain per se. Therefore, future studies which aim to modify psychological factors or pessimistic beliefs should be predominantly focused on individuals with a high risk of disability. However, to do that, it is also necessary to know how the social (and cultural) context influences on individuals` psychological factors. As we depicted in our conceptual model (see figure 7), the influence of this social context might also have a strong impact on disability that arises from musculoskeletal pain. Among the three components of the biopsychosocial model, the social factors are those which have received less attention [112]. However, recently, it has been observed that differences in eligibility criteria for long term disability benefits were more important than medical interventions and individual factors in explaining the large differences in return to work rates (due to chronic low back pain) observed between six different countries [140]. It is true that the measurement of social and cultural factors in occasions could be very difficult, but the study of these factors is currently considered one of the most promising research areas for the next few years [112].

On the other hand, there is a lack of qualitative studies. Most of the evidence related to the influence of psychological and cultural factors comes from quantitative studies. It may appear that quantitative and qualitative methods are very different and are difficult to combine. Nevertheless, used properly, both methods might counterbalance for each other's limitations and potentiate each other`s strengths. To provide effective care and support to pain sufferers is essential to understand people’s experiences of living with disability due to

musculoskeletal pain, and the meaning of those experiences will be strongly determinate by people's cultural and social contexts [141].

Two other research lines might be interesting to explore in the near future. Firstly, it would be the stability over time of distressing somatic symptoms and low mood. It is possible that both factors might change during the study period. The CUPID study collected information about somatising tendency and low mood at both, baseline and follow-up. Thus, it was feasible to assess if changes in psychological risk factors are associated with the incidence and persistence of pain. Nevertheless, the main problem with this is the interpretation of the findings, because, an analysis of this kind loses one of the main benefits of the longitudinal design. That is to say, if we find an association between an increase in mental health symptoms and incidence of pain, we will not be able to determinate whether changes in mental health symptoms predisposes to pain onset or the development of pain leads to a deterioration in mental health.

Secondly, as we pointed out earlier in this discussion (see 5.2. Methodological considerations), the interrelation of disability and multisite pain need to be explored. This thesis did not examine to what extent the number of painful sites per person affected the associations between psychological risk factors and disabling pain. A previously published longitudinal analysis based on the CUPID study in Greece explored occupational and psychological risk factors for the incidence and persistence of multisite musculoskeletal pain [142]; and more recently the full CUPID study baseline cross-sectional dataset has been used to explore possible definitions for multisite pain, and to compare associations with risk factors for different patterns of musculoskeletal pain [143]. However, neither of these studies looked at the interrelation of disability and number of sites with pain. This would be an interesting and important question to explore it in a future paper based on the full CUPID study.

Finally, we believe that there is a clear need to develop new conceptual models that attempt to integrate recent findings from studies related to the role of psychological and cultural factors to the classic models related to pain experience. Moreover, in the literature appears to be an overlap among different

psychological concepts that are closely related to each other, such as catastrophizing, low mood, anxiety, or somatising tendency. There is a lack of knowledge related to which of these psychological factors are most important in relation to musculoskeletal pain and disability or about the temporal relationship between them (for example, it is possible that catastrophizing causes anxiety, but it is also plausible that high levels of anxiety may reinforce catastrofizing thoughts). Thus, it would be appropriate, whenever is possible, to measure this potential overlapping to determine the unique explanatory nature of the psychological factor that is subject of study [53]. We believe that the availability of new conceptual models could guide researchers to develop good hypothesis and research questions in the field.

CONCLUSIONS

6. CONCLUSIONS

Based on our findings, we have reached the following conclusions:

1. In Spain, as in northern European countries, culturally-influenced and individual psychological factors have an important role in musculoskeletal pain development and persistence.

2. Our findings provide limited evidence that risk factors predicting the new development of pain differ from those predicting its persistence. Further research is needed to resolve the outstanding uncertainties.

3. Looking separately at predictors of new and persistent pain may allow potential targets for workplace preventive interventions to be identified more reliably.

4. Culturally-influenced and individual psychological risk factors have shown to be important not only for pain perception, but also for the subsequent development and persistence of pain-related disability.

5. Pessimistic beliefs about pain causation and prognosis, low mood and somatising tendency showed stronger and more consistent associations with disabling than non-disabling musculoskeletal pain.

6. Established culturally-influenced and individual psychological factors relate more to the disability that musculoskeletal pain causes than to pain per se.

7. Future studies of psychological risk factors should focus particularly on risks for disabling musculoskeletal pain, which may be diluted if non-disabling pain is included in the case definition.

8. Interventions to prevent musculoskeletal disorders in the workplace should not necessarily be limited to the control of physical risk factors. A more holistic approach is needed for effective prevention.

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APPENDICES

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Appendix I. Study overview note

Unidad de Investigación
en Salud Laboral
Departamento de Ciencias
Experimentales y de la Salud

Estudio internacional sobre trabajo y salud - CUPID

NOTA EXPLICATIVA

El presente cuestionario estandarizado consiste en evaluar los datos sobre su trabajo actual, molestias físicas durante el tiempo de trabajo, si le impidieron o no realizar sus tareas, su opinión sobre las causas y la prevención del dolor y su opinión sobre su salud en general.

Con su colaboración está ayudando a determinar el papel de los factores psicosociales y culturales en los síntomas y la incapacidad laboral por trastornos músculo esqueléticos. Se trata de un proyecto internacional que se realizará al menos en 203 países en todo el mundo.

El estudio consta de dos fases. Esta es la primera fase. La siguiente será dentro de un año en que haremos un seguimiento y le pediremos que vuelva a contestar a un cuestionario parecido.

Gracias por su tiempo y colaboración.

Atentamente,

Dra. Consol Serra
Unidad de Investigación en Salud Laboral
Universidad Pompeu Fabra
Barcelona
Tel. 93 3160875

Barcelona, Noviembre del 2007

Appendix II. Written informed consent form

Unidad de Investigación
en Salud Laboral
Departamento de Ciencias
Experimentales y de la Salud

Estudio internacional sobre trabajo y salud – CUPID

CONSENTIMIENTO INFORMADO

La Universidad Pompeu Fabra está realizando un estudio sobre trabajo y salud, que forma parte de un proyecto internacional. **Su participación en este proyecto es muy importante** y consiste en responder las preguntas de un cuestionario elaborado con el fin de identificar aspectos que ayuden a mejorar las condiciones de trabajo. El tiempo que necesita para completarlo es aproximadamente 30 minutos, algunas preguntas son sobre datos personales, aspectos sobre su trabajo actual y molestias físicas en general.

La Universidad Pompeu Fabra se compromete a tratar esta información con estricta confidencialidad, de acuerdo al cumplimiento de las previsiones de la ley Orgánica de protección de datos (Ley Orgánica 15/1999) y demás legislación vigente en materia de protección de datos.

Los datos serán analizados exclusivamente por el personal investigador del estudio y con una finalidad puramente científica. La información se tratará de forma numérica y no se utilizarán sus datos individualmente en ningún caso.

Si decide no tomar parte del estudio, esto no le afectará en ningún aspecto laboral. Si decide colaborar con nosotros nos ayudará a avanzar en el conocimiento de la relación entre los aspectos del trabajo y la salud de los trabajadores.

Por favor, si ACEPTA PARTICIPAR voluntariamente en este estudio, firme a continuación e indíquenos su nombre y apellidos, la provincia y fecha actual.

Firma del trabajador/a: Firma del investigador principal,

Nombres y apellidos: Dra. Consol Serra

Provincia y fecha actual: _____

Appendix III. Baseline CUPID Questionnaire

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ESTUDIO INTERNACIONAL DE TRABAJO Y SALUD

ANEXO A

CUESTIONARIO BASAL

Número de serie ☐☐ ☐ ☐☐ ☐☐ ☐☐

Por favor, rellene la fecha en que cumplimentó éste cuestionario

fecha: ☐☐ ☐☐ ☐☐
día *mes* *año*

SECCIÓN UNO: DATOS PERSONALES

1.	Por favor rellene su fecha de nacimiento		☐☐ ☐☐ ☐☐ *día* *mes* *año*	
2.	Su sexo		Hombre ☐	Mujer ☐
3.	¿Es zurdo o diestro?	Diestro ☐	Zurdo ☐	Ambidiestro ☐
4.	¿Cuál es su nacionalidad? Española ☐		Otra:	

5. ¿Qué edad tenía cuando finalizó totalmente sus estudios?

   Menos de 14 años ☐ 14 a 16 años ☐ 17 a 19 años ☐ 20 años o más ☐

6. ¿Cuánto es su altura? ☐☐☐ en centímetros

7a) ¿Ha fumado regularmente, es decir por lo menos una vez al día durante un mes o más? No ☐ Sí ☐

b) Si respondió **Sí** ¿todavía fuma regularmente? No ☐ Sí ☐

SECCIÓN DOS: SOBRE SU TRABAJO ACTUAL

¿Cuál es su principal ocupación? ☐ enfermera ☐ auxiliar de enfermería

8 a)

☐ administrativo ☐ Cartero

b) ¿Qué tipo de contrato tiene? Fijo, indefinido, permanente ☐ Temporal ☐

9. ¿Cuánto tiempo hace que está en este trabajo?

Menos de 1 año ☐ Entre 1 y 5 años ☐ Más de 5 años ☐

10. ¿Cuántas horas por semana trabaja habitualmente en este empleo? ☐☐ horas

11. En un día normal de trabajo ¿desarrolla alguna de estas actividades?*(por favor, marque **Sí** ó **NO**, para cada pregunta)*

	No	Sí
a) ¿Usa algún teclado ó máquina de escribir durante mas de 4 horas al día?	☐	☐
b) ¿Realiza otras tareas que impliquen movimientos repetidos de la muñeca o dedos por más de 4 horas al día?	☐	☐
c) ¿Flexiona y extiende el codo más de una hora al día?	☐	☐
d) ¿Trabaja durante más de 1 hora con las manos sobre el nivel de los hombros?	☐	☐

	No	Si
e) ¿Levanta cargas de más de 25 kilos de peso manualmente?	☐	☐
f) ¿Sube o baja escaleras equivalente a 30 pisos o más al día?	☐	☐
g) ¿Se arrodilla o agacha durante más de una hora al día?	☐	☐
h) ¿El sueldo por su trabajo está acordado según el número de artículos o tareas producidos por usted o su equipo al final del día?	☐	☐
i) ¿Se espera que finalice cada día un número de tareas o artículos?	☐	☐
j) ¿Le pagan un plus si hace o termina en el día mas tareas-productos que lo acordado?	☐	☐
k) ¿Trabajan bajo presión para terminar la tarea en un tiempo fijado?	☐	☐

12. En su trabajo tiene la opción de decidir sobre:

	Siempre	*Algunas veces*	*Pocas veces*	*Nunca o casi nunca*
¿**Cómo** hace su trabajo?	☐	☐	☐	☐
¿**Qué** hace en su trabajo?	☐	☐	☐	☐
Su horario y descansos	☐	☐	☐	☐

13. Cuándo tiene problemas en su trabajo ¿cuántas veces pide ayuda o apoyo a sus colegas o supervisores-jefes?

Siempre ☐ Algunas veces ☐ Pocas veces ☐ Nunca ☐ No es aplicable ☐

14. En general, teniendo en cuenta todas las cosas ¿Cómo de satisfecho se siente con su trabajo?

Muy satisfecho ☐ Satisfecho ☐ Insatisfecho ☐ Muy insatisfecho ☐

15. ¿Cómo de seguro se siente de mantener su trabajo, en el caso de tener una enfermedad importante que lo mantuviera fuera del trabajo por 3 meses?

Muy seguro ☐ Seguro ☐ Bastante inseguro ☐ Muy inseguro ☐

16. ¿Tiene algún otro trabajo? No ☐ Sí ☐

Si respondió **SÍ** ¿Cuál es su otro trabajo(s)?

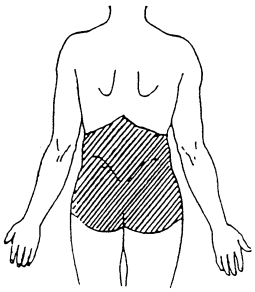
_____

_____

SECCIÓN TRES: MOLESTIAS (ACHAQUES) Y DOLORES

DOLOR DE ESPALDA EN LOS ÚLTIMOS 12 MESES

17a) ¿Ha tenido dolor de espalda (del área abajo mostrada) que haya durado mas de un día en algún momento de los últimos 12 meses? (*No incluye el dolor asociado a la menstruación, embarazo o enfermedades con fiebre.)*



No ☐ Sí ☐

Si respondió **NO**, pase a la pregunta 22. Si respondió **SÍ**, continúe por favor.

b) ¿Durante los últimos 12 meses, el dolor se ha extendido por las piernas hasta la rodilla (ciática)? No ☐ Sí ☐

c) Si sumara todos los días en los que tuvo dolor de espalda en los últimos 12 meses ¿Cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 4 semanas ☐ 1 a 12 meses ☐

d) ¿Ha consultado al médico u otro sanitario (farmacéutico etc) u otro profesional no sanitario (osteópata, homeópata, etc) por su dolor de espalda en los últimos 12 meses? No ☐ Sí ☐

e) Durante los últimos 12 meses ¿cuántos días el dolor de espalda le impidió ir a trabajar?

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

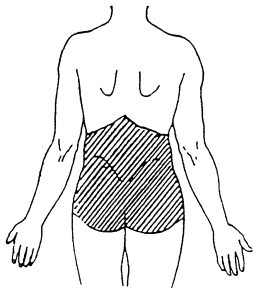
18. ¿Piensa que su dolor de espalda continuará siendo un problema en los próximos 12 meses?

No ☐ Posiblemente ☐ Probablemente ☐ Definitivamente ☐

DOLOR DE ESPALDA DURANTE EL MES PASADO

Nos interesa especialmente si ha tenido algún dolor de espalda durante el mes pasado:

19 a) ¿Ha tenido dolor de espalda (en el área abajo mostrada) el cual haya durado mas de un día en algún momento durante el mes pasado? *(No incluye el dolor asociado a la menstruación, embarazo ni durante el curso de enfermedades con fiebre)*



No ☐ Sí ☐

Si respondió **NO**, pase a la pregunta 22. Si respondió **SÍ**, continúe por favor.

b) ¿Durante el mes pasado el dolor se ha extendido por las piernas hasta la rodilla (ciática)? No ☐ Sí ☐

c) Si sumara todos los días en los que tuvo dolor de espalda en el mes pasado ¿Cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 2 semanas ☐ Más de 2 semanas ☐

20. ¿Durante el mes pasado, el dolor de espalda le ha dificultado o impedido desarrollar alguna de estas actividades?

		No	*Dificultado*	*Impedido*
a)	Cortarse las uñas de los pies	☐	☐	☐
b)	Vestirse	☐	☐	☐
c)	Hacer las tareas domésticas que normalmente realiza.	☐	☐	☐

21. Por favor, recuerde la última vez que estuvo sin dolor de espalda durante un mes o más.Cuando comenzó el episodio más reciente de dolor de espalda ¿cómo empezó?

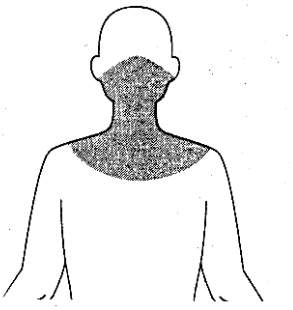
Repentinamente (es decir, en menos de un minuto) cuando estaba en el trabajo ☐

Repentinamente (es decir, en menos de un minuto) pero no estaba en el trabajo ☐

Poco a poco ☐

DOLOR DE CERVICALES EN LOS ÚLTIMOS 12 MESES

22 a) ¿Ha tenido dolor de cervicales (en el área abajo mostrada) el cual haya durado más de un día en los últimos 12 meses?



No ☐ Sí ☐

Si respondió **NO**, pase a la pregunta 26. Si respondió **SÍ,** continúe por favor

b) Si sumara todos los días en los que tuvo dolor de cervicales en los últimos 12 meses ¿cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 4 semanas ☐ 1 a 12 meses ☐

c) ¿Ha consultado al médico u otro sanitario (farmacéutico etc) u otro profesional no sanitario (osteópata, homeópata, etc) por su dolor de cervicales en los últimos 12 meses? No ☐ Sí ☐

d) Durante los últimos 12 meses ¿Cuántos días el dolor de cervicales le impidió ir al trabajo?

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

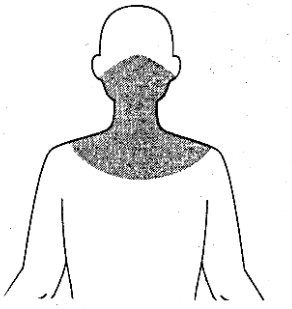
23. ¿Piensa que el dolor de cervicales continuará siendo un problema en los próximos 12 meses?

No ☐ Posiblemente ☐ Probablemente ☐ Definitivamente ☐

DOLOR DE CERVICALES EN EL MES PASADO

Nos interesa especialmente si ha tenido algún dolor de cervicales durante el mes pasado:

24a) ¿Ha tenido dolor de cervicales (en el área abajo mostrada) el cual haya durado más de un día en algún momento del mes pasado?



No ☐ Sí ☐

Si respondió **NO**, pase a la pregunta 26. Si respondió **SÍ** por favor continúe.

b) Si sumara todos los días en los que tuvo dolor de cervicales durante el mes pasado ¿Cuánto tiempo habría estado con dolor?

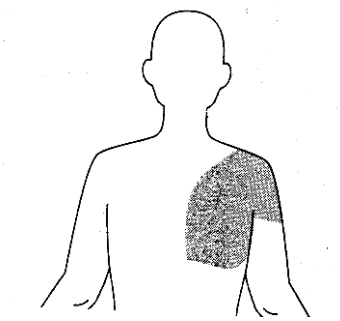
1 a 6 días ☐ 1 a 2 semanas ☐ Más de dos semanas ☐

25. ¿Durante el mes pasado, el dolor de cervicales le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

	No	*Dificultado*	*Impedido*
a) Vestirse	☐	☐	☐
b) Hacer las tareas domésticas que normalmente realiza	☐	☐	☐

DOLOR EN EL HOMBRO EN LOS ULTIMOS 12 MESES

26a) ¿Ha tenido dolor de hombro (en el área abajo mostrada) el cual haya durado más de un día durante los últimos 12 meses?



No ☐ Sólo hombro derecho ☐

Sólo hombro izquierdo ☐ Ambos hombros ☐

Si respondió **NO** pase a la pregunta 30. Si respondió **SÍ**, continúe por favor.

b) Si sumara todos los días en los cuales tuvo dolor de hombro en los últimos 12 meses ¿cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 4 semanas ☐ 1 a 12 meses ☐

c) ¿Ha consultado al médico u otro sanitario (farmacéutico etc) u otro profesional no sanitario (osteópata, homeópata, etc) por su dolor de hombro en los últimos 12 meses? No ☐ Sí ☐

d) En los últimos 12 meses ¿cuántos días el dolor de hombro le impidió ir a trabajar?

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

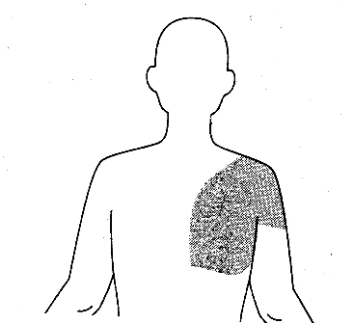
27. ¿Piensa que el dolor de hombro continuará siendo un problema en los próximos 12 meses?

No ☐ Posiblemente ☐ Probablemente ☐ Definitivamente ☐

DOLOR EN EL HOMBRO EL MES PASADO

Nos interesa especialmente si ha tenido algún dolor de hombro durante el mes pasado:

28. ¿Ha tenido algún dolor de hombro (en el área abajo mostrada) el cual haya durado más de un día durante el mes pasado?



No ☐ Sólo el hombro derecho ☐

Sólo el hombro izquierdo ☐ Ambos hombros ☐

Si respondió **NO**, pase a la pregunta 30, si respondió **Sí**, continúe por favor.

b) Si sumara todos los días en los cuales tuvo dolor de hombro en el mes pasado ¿cuánto tiempo habría estado con dolor?

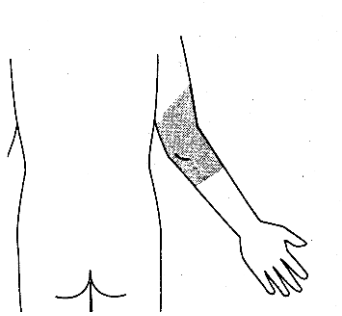
1 a 6 días ☐ 1 a 2 semanas ☐ Más de 2 semanas ☐

29. ¿Durante el mes pasado, el dolor de hombro le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

	No	*Dificultado*	*Impedido*
a) Peinar o cepillar su cabello	☐	☐	☐
b) Bañarse-ducharse	☐	☐	☐
c) Vestirse	☐	☐	☐
d) Realizar las tareas domésticas que normalmente realiza.	☐	☐	☐

DOLOR EN EL CODO EN LOS ÚLTIMOS 12 MESES

30. ¿Ha tenido dolor de codo (en el área abajo mostrada) por más de un día en algun momento durante los últimos 12 meses?



No ☐ Sólo codo derecho ☐

Sólo codo izquierdo ☐ Ambos codos ☐

Si respondió **NO**, pase a la pregunta 34.Si respondió **SÍ**, continúe por favor.

b) Si sumara todos los días en los que tuvo dolor de codo en los últimos 12 meses ¿Cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 4 semanas ☐ 1 a 12 meses ☐

c) ¿Ha consultado al médico u otro sanitario: farmacéutico etc u otro profesional no sanitario (osteópata, homeópata, etc) por su dolor de codo en los últimos 12 meses? No ☐ Sí ☐

d) Durante los últimos 12 meses ¿Cuántos días el dolor de codo le ha impedido ir a trabajar?

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

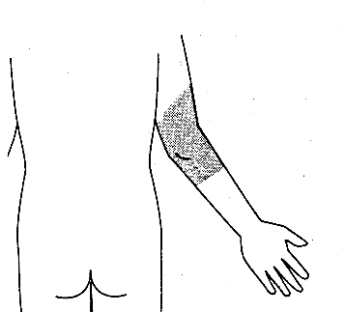
31. ¿Piensa que el dolor de codo continuará siendo un problema en los próximos 12 meses?

No ☐ Posiblemente ☐ Probablemente ☐ Definitivamente ☐

DOLOR EN EL CODO EL MES PASADO

Nos interesa especialmente si ha tenido algún dolor de codo durante el mes pasado:

32. ¿Ha tenido dolor de codo (en el área abajo mostrada) que haya durado más de un día en algún momento durante el mes pasado?



No ☐ Sólo codo derecho ☐

Sólo codo izquierdo ☐ Ambos codos ☐

Si respondió **NO** pase a la pregunta 34. Si respondió **SÍ,** continue por favor.

b) Si sumara todos los días en los que tuvo dolor dolor en el codo durante el mes pasado ¿Cuánto tiempo habría estado con dolor?

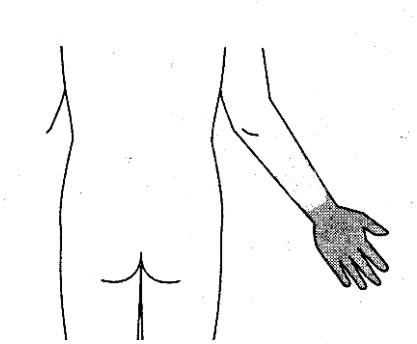
1 a 6 días ☐ 1 a 2 semanas ☐ Más de dos semanas ☐

33. ¿Durante el mes pasado, el dolor de codo le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

	No	*Dificultado*	*Impedido*
a) Abrir botellas, recipientes o grifos	☐	☐	☐
b) Vestirse	☐	☐	☐
c) Realizar las tareas domésticas que normalmente realiza	☐	☐	☐

DOLOR EN LA MANO Y MUÑECA EN LOS ÚLTIMOS 12 MESES

34. ¿Ha tenido dolor en la mano ó muñeca (en el área abajo mostrada) que haya durado más de un día en algun momento durante los últimos 12 meses?



No ☐ Sólo mano ó muñeca derecha ☐

Sólo mano o muñeca izquierda ☐ Ambas manos ó muñecas ☐

Si respondió **NO** pase a la pregunta 38, si respondió **SÍ,** continúe por favor.

b) Si sumara todos los días en los que tuvo dolor de mano o muñeca, en los últimos 12 meses ¿Cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 4 semanas ☐ 1 a 12 meses ☐

c) ¿Ha consultado al médico u otro sanitario: farmacéutico etc u otro profesional no sanitario (homeópata, etc) por su dolor de mano-muñeca en los últimos 12 meses? No ☐ Sí ☐

d) ¿Durante los últimos 12 meses, cuántos días el dolor de mano–muñeca le impidió ir a trabajar?

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

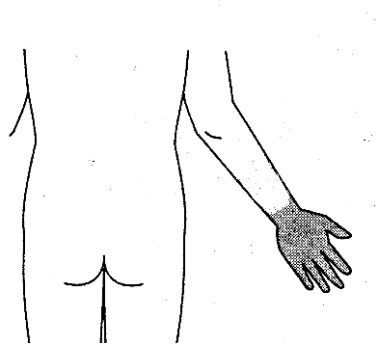
35. ¿Piensa que el dolor de mano-muñeca continuará siendo un problema en los próximos 12 meses?

No ☐ Posiblemente ☐ Probablemente ☐ Definitivamente ☐

DOLOR EN LA MANO-MUÑECA EN EL MES PASADO

Nos interesa especialmente si ha tenido algún dolor de mano – muñeca durante el mes pasado:

36. ¿Ha tenido dolor en la mano-muñeca (en el área abajo mostrada) el cual haya durado más de un día en algun momento durante el mes pasado?



☐ No

☐ Sólo mano o muñeca derecha

☐ Sólo mano o muñeca izquierda

☐ Ambas manos o muñecas

Si respondió **NO**, pase a la pregunta 38.Si respondió **SÍ**, continúe por favor.

b) Si sumara todos los días en los que tuvo dolor de mano-muñeca, durante el mes pasado, ¿cuánto tiempo habría estado con dolor?

☐ 1 a 6 días ☐ 1 a 2 semanas ☐ Más de dos semanas

37. ¿Durante el mes pasado el dolor de mano-muñeca le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

	No	*Dificultado*	*Impedido*
a) Escribir	☐	☐	☐
b) Abrir y cerrar puertas	☐	☐	☐
c) Abrir botellas, recipientes o grifos.	☐	☐	☐
d) Vestirse	☐	☐	☐
e) Realizar las trareas domésticas que normalmente realiza.	☐	☐	☐

DOLOR DE RODILLA EN LOS ÚLTIMOS 12 MESES

38. ¿Ha tenido dolor de rodilla (en el área abajo mostrada) que haya durado más de un día en algún momento durante los últimos 12 meses?

No ☐ Sólo rodilla derecha ☐

Sólo rodilla izquierda ☐ Ambas rodillas ☐

Si respondió **NO**, pase a la pregunta 42. Si respondió **SÍ**, continúe por favor.

b) Si sumara todos los días en los que tuvo dolor de rodilla, en los últimos doce meses, ¿cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 4 semanas ☐ 1 a 12 meses ☐

c) ¿Ha consultado al médico u otro sanitario (farmacéutico etc) u otro profesional no sanitario (homeópata, etc) por su dolor de rodilla en los últimos 12 meses? No ☐ Sí ☐

d) Durante los últimos 12 meses ¿Cuántos días el dolor de rodilla le impidió ir a trabajar?

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

39. ¿Piensa que el dolor de rodilla continuará siendo un problema en los próximos 12 meses?

No ☐ Posiblemente ☐ Probablemente ☐ Definitivamente ☐

DOLOR EN LA RODILLA EL MES PASADO

Nos interesa especialmente si ha tenido algún dolor de rodilla durante el mes pasado:

40. ¿Ha tenido dolor de rodilla (en el área abajo mostrada) el cual haya durado más de un día en algún momento del mes pasado?

No ☐ Sólo rodilla derecha ☐

Sólo rodilla izquierda ☐ Ambas rodillas ☐

Si respondió **NO**, pase a la pregunta 42, si respondió **SÍ**, continue por favor.

b) Si sumara todos los días en los cuales tuvo dolor de rodilla durante el mes pasado, ¿Cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 2 semanas ☐ Más de 2 semanas ☐

41. ¿Durante el mes pasado el dolor de rodilla le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

	No	*Dificultado*	*Impedido*
a) Subir y bajar escaleras	☐	☐	☐
b) Caminar sobre desniveles	☐	☐	☐
c) Vestirse	☐	☐	☐
d) Realizar las tareas domésticas que normalmente realiza?	☐	☐	☐

SECCIÓN CUATRO: DOLOR EN OTRAS PERSONAS

DOLOR DE ESPALDA

42. ¿Conoce a alguien que haya tenido dolor de espalda en los últimos 12 meses?

a) En el trabajo No ☐ Sí ☐

b) Fuera del trabajo No ☐ Sí ☐

DOLOR EN LAS CERVICALES

43. ¿Conoce a alguien que haya tenido dolor de cervicales en los últimos 12 meses?

a) En el trabajo No ☐ Sí ☐

b) Fuera del trabajo No ☐ Sí ☐

DOLOR EN BRAZO, HOMBRO O MANO

44. ¿Conoce a alguien que haya tenido dolor de brazo, hombro ó mano en los últimos 12 meses?

a) En el trabajo No ☐ Sí ☐

b) Fuera del trabajo No ☐ Sí ☐

DOLOR DE RODILLA

45. ¿Conoce a alguien que haya tenido dolor de rodilla en los últimos 12 meses?

a) En el trabajo No ☐ Sí ☐

b) Fuera del trabajo No ☐ Sí ☐

SECCIÓN CINCO: SU OPINIÓN SOBRE LAS CAUSAS Y LA PREVENCIÓN DEL DOLOR

46. Basado en sus opiniones o en lo que el médico u otras personas podrían haberle dicho acerca del dolor de brazo, hombro o mano; ¿Qué piensa acerca de cada una de los siguientes afirmaciones? *(escoja un recuadro de cada línea):*

Para cada uno de estos problemas	*Totalmente en desacuerdo*	*Algo en desacuerdo*	*No estoy seguro*	*Algo de acuerdo*	*Totalmente de acuerdo*
La actividad física debería ser evitada ya que puede lesionar el brazo	☐	☐	☐	☐	☐
Estos problemas normalmente mejoran en menos de 3 meses	☐	☐	☐	☐	☐
El descanso es necesario para mejorar	☐	☐	☐	☐	☐
No atender estos problemas, puede causar problemas permanentes de salud	☐	☐	☐	☐	☐
Estos problemas son normalmente causados por el trabajo	☐	☐	☐	☐	☐

47. Basado en sus opiniones o lo que el médico u otras personas podrían haberle dicho acerca del dolor de espalda ¿Qué piensa acerca de cada una de las siguientes afirmaciones? *(Escoja un recuadro para cada línea)*

Para cada uno de estos problemas.	*Totalmente en desacuerdo*	*Algo en desacuerdo*	*No estoy seguro*	*Algo de acuerdo*	*Totalmete de acuerdo*
La actividad física debería ser evitada ya que puede lesionar la espalda	☐	☐	☐	☐	☐
Estos problemas normalmente mejoran en menos de 3 meses	☐	☐	☐	☐	☐
El descanso es necesario para mejorar	☐	☐	☐	☐	☐
No atender este tipo de problemas puede causar problemas de salud permanentes	☐	☐	☐	☐	☐
Estos problemas son normalmente causados por el trabajo	☐	☐	☐	☐	☐

48. ¿Alguna vez ha oido hablar de lesión por movimientos repetitivos (LMR), alteración en miembro superior relacionada con el trabajo (MST) o síndrome por trauma acumulativo (STA)?

No ☐ Sí ☐

SECCIÓN SEIS: SOBRE SU SALUD EN GENERAL

EN LOS ÚLTIMOS 7 DÍAS

49. La de abajo es una lista de problemas que las personas normalmente tienen. Por favor, lea cuidadosamante cada uno y marque el número que mejor describe CUANTO LE HAN MOLESTADO O PREOCUPADO ESOS PROBLEMAS durante los ***ÚLTIMOS 7 DÍAS*****, INCLUYENDO EL DÍA DE HOY.** *Marque un número para cada problema y no se salte ninguno de ellos*

	Nada	*Muy poco*	*Algo*	*Bastante*	*Mucho*
a) Desmayos o mareos	0	1	2	3	4
b) Dolores en el corazón o tórax	0	1	2	3	4
c) Naúsea o molestia en el estómago	0	1	2	3	4
d) Problemas para respirar	0	1	2	3	4
e) Entumecimiento u hormigueo en alguna parte del cuerpo	0	1	2	3	4
f) Siente que en algunas partes del cuerpo está débil	0	1	2	3	4
g) Periodos de frío o calor	0	1	2	3	4

EL MES PASADO

50. Estas preguntas son acerca de como se ha sentido **durante el mes pasado.** Para cada pregunta por favor elija la respuesta que mejor describa la manera en que se ha estado sintiendo ¿cuánto tiempo durante el **último mes**? *Marque **número** para cada linea*

	Todo el tiempo	***La mayor parte del tiempo***	***Una buena parte del tiempo***	***Algo de tiempo***	***Muy poco tiempo***	***Nada de tiempo***
a) ¿Se ha sentido feliz?	1	2	3	4	5	6
b) ¿Se ha sentido tranquilo y en paz?	1	2	3	4	5	6
c) ¿Se ha sentido muy nervioso?	1	2	3	4	5	6
d) ¿Se ha sentido abatido y sin ánimo?	1	2	3	4	5	6
e) ¿Se ha sentido desanimado hasta el punto de no poder salir de ello?	1	2	3	4	5	6

LOS ÚLTIMOS 12 MESES

51. En los últimos 12 meses, ¿cuántos días no ha podido ir a trabajar debido a ?

a) Un problema con su espalda, cervicales, hombros, codo, muñeca, mano o rodilla

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

b) Otras enfermedades

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

Appendix IV. Follow-up CUPID Questionnaire

Unidad de Investigación
en Salud Laboral.
Departamento de Ciencias
Experimentales y de la Salud

ESTUDIO INTERNACIONAL DE TRABAJO Y SALUD

ANEXO B

CUESTIONARIO DE SEGUIMIENTO

Número de Serie ☐☐ ☐ ☐☐ ☐☐ ☐☐

ESTUDIO INTERNACIONAL SOBRE TRABAJO Y SALUD

Por favor rellene la fecha en que cumplimentó éste cuestionario

Fecha: ☐☐ ☐☐ ☐☐
día *mes* *año*

SECCIÓN UNO: DATOS PERSONALES

1. Por favor, confirme su fecha de nacimiento ☐☐ ☐☐ ☐☐
día *mes* *año*

2. y su sexo Hombre ☐ Mujer ☐

SECCIÓN DOS: SU TRABAJO ACTUAL

3 a) ¿Realiza el mismo tipo de trabajo que cuando le preguntamos hace un año? No ☐ Sí ☐

Si respondió SÍ, pase a la pregunta 4. Si respondió **NO**, continue por favor.

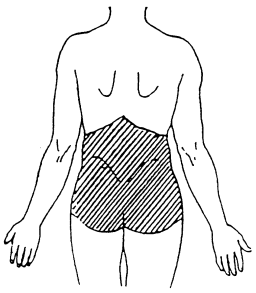
b) ¿Ha dejado ese trabajo debido a problemas médicos con sus cervicales, espalda, codo, hombro, muñeca, mano o rodilla? No ☐ Sí ☐

c) ¿Y tiene algún otro trabajo ahora? No ☐ Sí ☐

SECCIÓN TRES: MOLESTIAS (ACHAQUES) Y DOLORES

DOLOR DE ESPALDA EL MES PASADO

4a) ¿Ha tenido dolor de espalda (en el área abajo mostrada) el cual haya durado más de un día en algún momento durante el mes pasado? (*No incluye el dolor asociado a la menstruación, gestación ni durante enfermedades con fiebre*)



No ☐ Sí ☐

Si respondió **NO** pase ala pregunta 8. Si respondió **SÍ**, continúe por favor.

b) Si sumara todos los días en los que tuvo dolor de espalda durante el mes pasado ¿cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 2 semanas ☐ Más de dos semanas ☐

5. ¿Durante el mes pasado el dolor de espalda le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

	No	*Dificultado*	*Impedido*
a) Cortarse las uñas de los pies	☐	☐	☐
b) Vestirse	☐	☐	☐
c) Hacer las tareas domésticas que normalmente realiza	☐	☐	☐

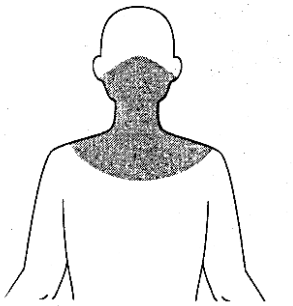
6. Durante el mes pasado ¿cuántos días el dolor de espalda le ha impedido ir a trabajar?

0 días ☐ 1 a 5 días ☐ Más de 5 días ☐ No aplicable porque estoy desempleado ☐

7. ¿Durante el mes pasado el dolor se ha extendido por la pierna, hasta la rodilla (ciática)? No ☐ Sí ☐

DOLOR DE CERVICALES EN EL MES PASADO

8a) ¿Ha tenido dolor de cervicales (en el área abajo mostrada) el cual haya durado más de un día en algún momento del mes pasado?



No ☐ Sí ☐

Si respondió **NO** pase a la pregunta 11.Si respondio **SÍ**, continúe por favor.

b) Si sumara todos los dias en los cuales tuvo dolor de cervicales durante el mes pasado ¿cuánto tiempo habría estado con dolor?

1 a 6 días ☐ 1 a 2 semanas ☐ Más de dos semanas ☐

9. ¿Durante el mes pasado, el dolor de cervicales le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

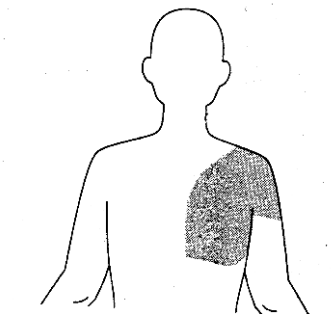
	No	*Dificultado*	*Impedido*
a) Vestirse	☐	☐	☐
b) Realizar las tareas domesticas que normalmente realiza	☐	☐	☐

10. ¿Durante el mes pasado, cuantos dias el dolor de cervicales le impidió ir a trabajar?

0 días ☐ 1 a 5 días ☐ Más de 5 días ☐ No aplicable porque estoy desempleado ☐

DOLOR DE HOMBRO EN EL MES PASADO

11a) ¿Ha tenido dolor de hombro (en el área abajo mostrada) el cual haya durado más de un día en algun momento durante el mes pasado?



☐ No ☐ Sólo hombro derecho

☐ Sólo hombro izquierdo ☐ Ambos hombros

Si respondió **NO**, pase a la pregunta 14.Si respondió **SÍ** por favor continúe.

b) Si sumara todos los días en los que tuvo dolor de hombro durante el mes pasado ¿Cuánto tiempo habría estado con dolor?

☐ 1 a 6 días ☐ 1 a 2 semanas ☐ Más de 2 semanas

12. ¿Durante el mes pasado el dolor de hombro le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

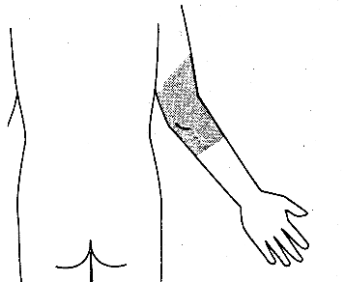
	No	*Dificultado*	*Impedido*
a) Peinarse o cepillarse el cabello	☐	☐	☐
b) Bañarse-ducharse	☐	☐	☐
c) Vestirse	☐	☐	☐
d) Realizar las tareas domésticas que normalmente realiza.	☐	☐	☐

13. Durante el mes pasado, ¿Cuántos días el dolor de hombro le ha impedido ir a trabajar?

☐ 0 días ☐ 1 a 5 días ☐ De 5 días ☐ No aplicable porque estoy desempleado

DOLOR EN EL CODO EL MES PASADO

14a) ¿Ha tenido dolor de codo (en el área abajo mostrada) el cual haya durado más de un día en algún momento del mes pasado?



☐ No ☐ Sólo codo derecho

☐ Sólo codo izquierdo ☐ Ambos codos

Si respondió **NO** pase a la pregunta 17. Si respondió **SÍ,** continúe por favor.

b) Si sumara todos los días en los cuales tuvo dolor de codo durante el mes pasado ¿cuánto tiempo habría estado con dolor?

☐ 1 a 6 días ☐ 1 a 2 semanas ☐ Más de 2 semanas

15. ¿Durante el mes pasado, el dolor de codo le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

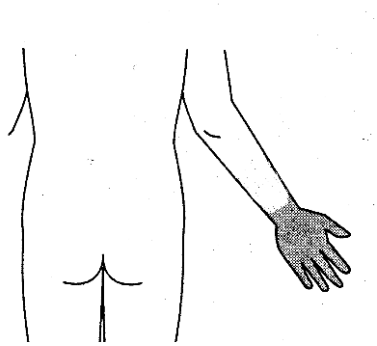
	No	*Dificultado*	*Impedido*
a) Abrir botellas,recipientes o grifos	☐	☐	☐
b) Vestirse	☐	☐	☐
c) Realizar las tareas domésticas que normalmente realiza	☐	☐	☐

16. Durante el mes pasado ¿cuántos días el dolor de codo le ha impedido ir a trabajar?

☐ 0 días ☐ 1 a 5 días ☐ Más de 5 días ☐ No aplicable porque estoy desempleado

DOLOR EN MUÑECA Y MANO EN EL MES PASADO

17a) ¿Ha tenido dolor de muñeca-mano (en el área abajo mostrada) el cual haya durado más de un día en algún momento del mes pasado?



☐ No

☐ Sólo mano-muñeca derecha

☐ Sólo mano-muñeca izquierda

☐ Ambas manos-muñecas

Si respondió **NO**, pase a la pregunta 20. Si respondió **SÍ**, continúe por favor.

b) Si sumara todos los días en los que tuvo dolor de mano-muñeca, durante el mes pasado ¿Cuánto tiempo habría estado con dolor?

☐ 1 a 6 días ☐ 1 a 2 semanas ☐ Más de 2 semanas

18. ¿Durante el mes pasado el dolor de mano-muñeca le ha dificultado o impedido desarrollar alguna de las siguientes actividades?

	No	*Dificultado*	*Impedido*
a) Escribir	☐	☐	☐
b) Abrir y cerrar puertas	☐	☐	☐
c) Abrir botellas, recipientes o grifos	☐	☐	☐
d) Vestirse	☐	☐	☐
e) Realizar las tareas domésticas que normalmente realiza	☐	☐	☐

19. Durante el mes pasado ¿Cuántos días el dolor de mano-muñeca le ha impedido ir a trabajar?

☐ 0 días ☐ 1 a 5 días ☐ Más de 5 días ☐ No aplicable porque estoy desempleado

DOLOR DE RODILLA EN EL MES PASADO

20a) ¿Ha tenido dolor de rodilla (en el área abajo mostrada) el cual haya durado más de un día en algún momento del mes pasado?

☐ No ☐ Sólo rodilla derecha

☐ Sólo rodilla izquierda ☐ Ambas rodillas

Si respondió **NO**, pase a la pregunta 2. Si respondió **SÍ**, continúe por favor.

b) Si sumara todos los días en los que tuvo dolor de rodilla, durante el mes pasado ¿Cuánto tiempo habría estado con dolor?

☐ 1 a 6 días ☐ 1 a 2 semanas ☐ Más de 2 semanas

21. ¿Durante el mes pasado el dolor de rodilla le he dificultado o impedido desarrollar alguna de las siguientes actividades?

	No	*Dificultado*	*Impedido*
a) Subir y bajar escaleras	☐	☐	☐
b) Caminar sobre desniveles	☐	☐	☐
c) Vestirse	☐	☐	☐
d) Realizar las tareas domésticas que normalmente realiza	☐	☐	☐

22. Durante el mes pasado ¿Cuántos dias el dolor de rodilla le impidió ir a trabajar?

☐ 0 días ☐ 1 a 5 días ☐ Más de 5 días ☐ No aplicable porque estoy desempleado

SECCIÓN SEIS: SU SALUD EN GENERAL

EN LOS ÚLTIMOS SIETE DIAS

23. La de abajo es una lista de problemas que la gente normalmente tiene. Por favor, lea cuidadosamente cada uno y marque el número que mejor describe CUANTO LE HA MOLESTADO O PREOCUPADO ESE PROBLEMA durante **LOS ÚLTIMOS 7 DIAS INCLUYENDO EL DÍA DE HOY.** *Marque solamente **un número** para cada problema y no se salte ningún item*

	Nada	*Muy poco*	*Mas o menos*	*Algo*	*Excesivamente*
a) Desmayos o mareos	0	1	2	3	4
b) Dolor de corazón o tórax	0	1	2	3	4
c) Naúsea o malestar estomacal	0	1	2	3	4
d) Diificultad para respirar	0	1	2	3	4
e) Entumecimiento u hormigueo en alguna parte del cuerpo	0	1	2	3	4
f) Sentir que en algunas partes del cuerpo está débil	0	1	2	3	4
g) Periodos de frío o calor	0	1	2	3	4

EL MES PASADO

24. Estas preguntas son acerca de como se ha sentido o como le han ido las cosas **durante el mes pasado**. Para cada pregunta por favor elija la respuesta que mejor describa la manera en que se ha estado sintiendo durante el mes pasado. ¿Cuánto tiempo durante el **mes pasado**?

*Escoja **un número** para cada línea*

	Todo el tiempo	***La mayor parte del tiempo***	***Una buena parte del tiempo***	***Algo del tiempo***	***Muy poco tiempo***	***Nada del tiempo***
a) ¿Se ha sentido feliz?	1	2	3	4	5	6
b) ¿Se ha sentido tranquilo y en paz?	1	2	3	4	5	6
c) ¿Se ha sentido muy nervioso?	1	2	3	4	5	6
d) ¿Se ha sentido abatido y sin ánimo?	1	2	3	4	5	6
e) ¿Cuando se siente desanimado, siente que nada lo va a sacar de esa situación?	1	2	3	4	5	6

LOS ÚLTIMOS 12 MESES

25. En los últimos 12 meses ¿Cuántos días no ha podido ir a trabajar debido a:?

a) Un problema con su espalda, nuca,hombro,codo, mano, muñeca o rodilla:

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

b) Otras enfermedades:

0 días ☐ 1 a 5 días ☐ 6 a 30 días ☐ Más de 30 días ☐

Appendix V. Socio-economic Information Questionnaire

Unidad de Investigación
en Salud Laboral.
Departamento de Ciencias
Experimentales y de la Salud

ESTUDIO INTERNACIONAL DE TRABAJO Y SALUD

ANEXO C

INFORMACION SOBRE EL CONTEXTO DE LA COHORTE

ANTECEDENTES DE LA COHORTE

1. País ☐☐

2. Colaborador local ☐

3. Grupo ocupacional _____ ☐☐

Tasas de desempleo

4. ¿Cuál es la mejor estimación de la tasa de desempleo del área donde se ha obtenido la muestra?

<5% ☐ 5-9% ☐ 10-14% ☐ ≥15% ☐

5. ¿Los beneficios (prestaciones) de la seguridad social están normalmente disponibles para los trabajadores cuando están desempleados?

No ☐ Si, pero sólo a largo plazo ☐ Sí, desde el corto plazo ☐

Ausencia por enfermedad

6 a) ¿El grupo estudiado tiene derecho a un subsidio si está de baja por enfermedad?

No ☐ Algunos del grupo ☐ Todo el grupo ☐

Si respondió **NO**, pase a la pregunta 7

a) ¿Quién realiza el pago? (señale a todos los que lo realicen)

Empresario ☐ Gobierno ☐

Sindicato ☐ Seguro Privado ☐ Otro ☐

b) ¿El subsidio compensa totalmente la pérdida de ganancias desde los siete primeros dias de ausencia?

No ☐ Sí ☐

a) ¿El subsidio compensa totalmente la pérdida de ganacias desde los primeros siete dias hasta los tres meses de ausencia?

No ☐ Sí ☐

Compensación por daños a la salud

7. ¿Tienen los trabajadores derecho a una compensación económica por problemas en la espalda relacionados con el trabajo?

a) Desde la seguridad social

Nunca ☐ Algunas veces ☐ Usualmente ☐

b) Desde empresario

Nunca ☐ Algunas veces ☐ Usualmente ☐

c) Desde poder judicial (tras un juicio)

Nunca ☐ Algunas veces ☐ Usualmente ☐

d) Desde otras fuentes

Nunca ☐ Algunas veces ☐ Usualmente ☐

8. ¿Tienen los trabajadores derecho a una compensación económica por problemas en las cervicales realcionadas con el trabajo?

a) Desde la seguridad social

Nunca ☐ Algunas veces ☐ Usualmente ☐

b) Desde el empresario

Nunca ☐ Algunas veces ☐ Usualmente ☐

c) Desde el poder judicial (tras un juicio)

Nunca ☐ Algunas veces ☐ Usualmente ☐

d) Desde otras fuentes:

Nunca ☐ Algunas veces ☐ Usualmente ☐

9. ¿Tienen los trabajadores derecho a una compensación económica por problemas en el hombro relacionadas con el trabajo?

a) Desde la seguridad social

Nunca ☐ Algunas veces ☐ Usualmente ☐

b) Desde el empresario

Nunca ☐ Algunas veces ☐ Usualmente ☐

c) Desde el poder judicial (tras un juicio)

Nunca ☐ Algunas veces ☐ Usualmente ☐

d) Desde otras fuentes

Nunca ☐ Algunas veces ☐ Usualmente ☐

10. ¿Tienen los trabajadores derecho a una compensación económica por problemas en el codo relacionadas con el trabajo?

a) Desde la seguridad social

Nunca ☐ Algunas veces ☐ Usualmente ☐

b) Desde el empresario

Nunca ☐ Algunas veces ☐ Usualmente ☐

c) Desde el poder judicial (tras un juicio)

Nunca ☐ Algunas veces ☐ Usualmente ☐

d) Desde otras fuentes

Nunca ☐ Algunas veces ☐ Usualmente ☐

11. ¿Tienen los trabajadores derecho a una compensación económica por problemas en la muñeca/mano relacionadas con el trabajo?

a) Desde la seguridad social

Nunca ☐ Algunas veces ☐ Usualmente ☐

b) Desde el empresario

Nunca ☐ Algunas veces ☐ Usualmente ☐

c) Desde el poder judicial (tras un juicio)

Nunca ☐ Algunas veces ☐ Usualmente ☐

d) Desde otras fuentes

Nunca ☐ Algunas veces ☐ Usualmente ☐

12. ¿Tienen los trabajadores derecho a una compensación económica por problemas en la rodilla relacionados con el trabajo?

a) Desde la seguridad social

Nunca ☐ Algunas veces ☐ Usualmente ☐

b) Desde el empresario

Nunca ☐ Algunas veces ☐ Usualmente ☐

c) Desde el poder judicial (tras un juicio)

Nunca ☐ Algunas veces ☐ Usualmente ☐

d) Desde otras fuentes

Nunca ☐ Algunas veces ☐ Usualmente ☐

Jubilación por enfermedad

13. ¿Si un trabajador tiene que dejar el trabajo por un problema de salud, el ó ella tiene derecho a una ayuda económica adicional al subsidio por desempleo?

Nunca ☐ Algunas veces ☐ Usualmente ☐

Servicios médicos

14. ¿Si un trabajador consulta a un médico o a otro profesional acerca de un trastorno músculo esquelético, debería pagar los honorarios por la consulta ya que estos no estan cubiertos por su plan de seguro?

	El honorario no está cubierto por el seguro	Una pequeña parte del honorario está cubierto por el seguro	El honorario está cubierto completamente por el seguro
a) Médico de atención primaria	☐	☐	☐
b) Médico del hospital	☐	☐	☐
c) Otro profesional	☐	☐	☐

15. ¿Los trabajadores tienen acceso a un servicio de medicina del trabajo?

a) A través del empresario No ☐ Sí ☐

b) Mediante otras formas No ☐ Sí ☐

Appendix VI. Odds of dropout between subjects with high and low psychological exposures among those reporting pain at baseline

Odds of dropout between subjects with high and low psychological exposures among those reporting pain at baseline

	n[a]	%[b]	OR	(95% CI) [c]
Adverse beliefs about LBP				
Physical activity				
No	464	11.4	1	
Yes	355	15.5	1.4	(0.9-2.2)
Work relatedness				
No	132	8.3	1	
Yes	687	14.1	1.7	(0.9-3.4)
Prognosis				
No	371	12.4	1	
Yes	448	13.8	1.1	(0.7-1.6)
Mental health				
Good	233	14.6	1	
Intermediate	266	12.4	0.9	(0.5-1.5)
Poor	320	12.8	0.9	(0.5-1.4)
Number of distressing somatic symptoms in past week				
0	435	12.6	1	
1	233	11.6	0.9	(0.5-1.5)
≥2	151	17.2	1.5	(0.9-2.5)
Total	819	13.2		

[a] Number of subjects with outcome [b] Percentage of subjects with outcome
[c] Each risk factor analysed in a separate regression model that included sex, age (in four ten-year bands) and occupation.

Appendix VII. Co-author in published articles related to this thesis

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.
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PLoS one

The CUPID (Cultural and Psychosocial Influences on Disability) Study: Methods of Data Collection and Characteristics of Study Sample

David Coggon[1]*, Georgia Ntani[1], Keith T. Palmer[1], Vanda E. Felli[2], Raul Harari[3], Lope H. Barrero[4], Sarah A. Felknor[5,6], David Gimeno[5], Anna Cattrell[7], Consol Serra[8,9,10], Matteo Bonzini[11], Eleni Solidaki[12], Eda Merisalu[13], Rima R. Habib[14], Farideh Sadeghian[15], Masood Kadir[16], Sudath S. P. Warnakulasuriya[17], Ko Matsudaira[18], Busisiwe Nyantumbu[19,20], Malcolm R Sim[21], Helen Harcombe[22], Ken Cox[1], Maria H. Marziale[23], Leila M. Sarquis[24], Florencia Harari[3], Rocio Freire[3], Natalia Harari[3], Magda V. Monroy[4], Leonardo A. Quintana[4], Marianela Rojas[25], Eduardo J. Salazar Vega[5], E. Clare Harris[1], Sergio Vargas-Prada[8], J. Miguel Martinez[8,9], George Delclos[5,8,9], Fernando G. Benavides[8,9], Michele Carugno[26], Marco M. Ferrario[11], Angela C. Pesatori[26,27], Leda Chatzi[12], Panos Bitsios[28], Manolis Kogevinas[29,30,31,32], Kristel Oha[33], Tuuli Sirk[34], Ali Sadeghian[35], Roshini J. Peiris-John[36,37], Nalini Sathiakumar[38], A. Rajitha Wickremasinghe[39], Noriko Yoshimura[40], Danuta Kielkowski[19,20], Helen L. Kelsall[21], Victor C. W. Hoe[21,41], Donna M. Urquhart[21], Sarah Derett[42], David McBride[22], Andrew Gray[22]

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Abstract

Background: The CUPID (Cultural and Psychosocial Influences on Disability) study was established to explore the hypothesis that common musculoskeletal disorders (MSDs) and associated disability are importantly influenced by culturally determined health beliefs and expectations. This paper describes the methods of data collection and various characteristics of the study sample.

Methods/Principal Findings: A standardised questionnaire covering musculoskeletal symptoms, disability and potential risk factors, was used to collect information from 47 samples of nurses, office workers, and other (mostly manual) workers in 18 countries from six continents. In addition, local investigators provided data on economic aspects of employment for each occupational group. Participation exceeded 80% in 33 of the 47 occupational groups, and after pre-specified exclusions, analysis was based on 12,426 subjects (92 to 1018 per occupational group). As expected, there was high usage of computer keyboards by office workers, while nurses had the highest prevalence of heavy manual lifting in all but one country. There was substantial heterogeneity between occupational groups in economic and psychosocial aspects of work; three- to five-fold variation in awareness of someone outside work with musculoskeletal pain; and more than ten-fold variation in the prevalence of adverse health beliefs about back and arm pain, and in awareness of terms such as "repetitive strain injury" (RSI).

Conclusions/Significance: The large differences in psychosocial risk factors (including knowledge and beliefs about MSDs) between occupational groups should allow the study hypothesis to be addressed effectively.

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Introduction

Musculoskeletal disorders of the back, neck and upper limb are a major cause of morbidity and disability with substantial economic impact, especially in western countries. In some cases symptoms arise from identifiable pathology in the spine or arm (e.g. a herniated inter-vertebral disc or peripheral nerve compression in the carpal tunnel). Most often, however, the underlying pathology is unclear, and the symptoms are classed as "non-specific".

Epidemiological research has linked the occurrence of back, neck and upper limb disorders with various physical activities in the workplace [1–4], and also with psycho-social risk factors such as low mood and job dissatisfaction [5–8]. More recently, evidence has accumulated for a causal role also of "somatising tendency" (i.e. a general tendency to report and worry about common somatic symptoms) [6,9]. Together, however, these established risk factors do not adequately explain striking temporal changes that have been observed in disability attributed to common musculoskeletal complaints. For example, in Britain rates of incapacity for work because of back problems increased more than sevenfold between 1953 and 1992 at a time when the physical demands of work were generally reducing [10]; and in Australia there was a major epidemic of disability from arm pain during the early 1980s which was not paralleled in other countries where similar technologies and working methods were employed [11].

This gap in understanding has prompted the hypothesis that the development and persistence of non-specific musculoskeletal complaints and resultant disability are importantly influenced by culturally-determined health beliefs as well as by physical activities and mental health [12]. Several observations provide support for a role of health beliefs. For example, among 178 workers carrying out repetitive tasks on an assembly line in Mumbai, India, only one of whom had ever heard of "RSI" (repetitive strain injury), the 12 month prevalence of disabling arm pain (5%) was less than one fifth of that found using the same questions among manual workers in the UK (including those who were of Indian sub-continental origin) [13]. In longitudinal studies of individuals with back and arm pain, negative beliefs about prognosis have proved predictive of their persistence [7,14]. And in Victoria, Australia, a

Table 1. Specification and recruitment of study sample.

Country/Occupational Group	Detailed description	Method of identification	Method by which baseline questionnaire completed
SOUTH AND CENTRAL AMERICA			
Brazil			
Nurses	Nurses, nursing technicians and auxiliaries at the University Hospital in Sao Paolo	Randomly sampled from a list of eligible subjects provided by managers	Self-administered (in Brazilian Portuguese)
Office workers	Computer users from an informatics centre in Curitiba	Randomly sampled from a list of eligible subjects provided by managers	Self-administered (in Brazilian Portuguese)
Other workers	Sugar cane cutters at a mill in Ribeirao Preto	Randomly sampled from a list of eligible subjects provided by managers	Interview (in Brazilian Portuguese)
Ecuador			
Nurses	Nursing staff at a Social Security hospital	Quasi-random sampling from employment records	Interview (in Spanish)
Office workers	Office workers regular using computers at the Ministry of Public Health in Quito	Quasi-random sampling from employment records	Interview (in Spanish)
Other workers	Flower plantation workers in Tabacundo and Cayambe, Pichincha	Residents of specified blocks of buildings surrounding the flower plantations	Interview (in Spanish)
Colombia			
Office workers	Office workers from the Javeriana University in Bogota	Quasi-random sampling from employment records	Self-administered by web application (In Spanish)
Costa Rica			
Nurses	Nurses, auxiliary nurses and nursing assistants from two national hospitals in San Jose	Randomly sampled from payroll records	Interview (in Spanish)
Office workers	Office workers from the Central Offices of the Costa Rican Social Security System	Randomly sampled from payroll records	Interview (in Spanish)
Other workers	Telephone call centre workers at the Duty Free Zone in San Jose	Randomly selected from payroll records	Interview (in Spanish)
Nicaragua			
Nurses	Nurses in internal medicine, surgery, orthopaedics, gynaecology and paediatrics from two hospitals	Randomly sampled from payroll records	Self-administered (in Spanish)
Office workers	Secretaries and accountants with high computer use at Ministry of Labor and Nicaraguan Institute of Social Security	Randomly sampled from payroll records	Interview (in Spanish)
Other workers	Machine operators from two textile manufacturing companies	Sample identified from worker members of the Maria Elena Cuadra Movement	Interview (in Spanish)
EUROPE			
UK			
Nurses	Nurses from specified wards at Southampton University Hospitals NHS Trust	From employment records	Interview for random subsample; remainder by self-administered questionnaire
Office workers	Full-time clerical workers from three departments at Houses of Parliament, London	From employment records	Interview for random subsample; remainder by self-administered questionnaire
Other workers	Mail sorters from three Royal Mail centres in the London area	From employment records	Interview for random subsample; remainder by self-administered questionnaire
Spain			
Nurses	All nurses and nursing assistants employed for at least one year at specified units of four hospitals in Barcelona.	From employment records	Interview (in Spanish)
Office workers	All office workers from employed for at least one year at specified units in four hospitals and one University (UPF) in Barcelona.	From employment records	Interview (in Spanish)

Table 1. Cont.

Country/Occupational Group	Detailed description	Method of identification	Method by which baseline questionnaire completed
Italy			
Nurses	Nurses and nursing assistants at three hospitals in Milan and Varese	From employment records	Self-administered (in Italian)
Other workers	Production workers at a factory making pushchairs	From employment records	Self-administered (in Italian)
Greece			
Nurses	Nurses at Heraklion University Hospital	Randomly sampled from employment records	Interview (in Greek)
Office workers	Office workers at Heraklion University who were registered as computer users	From employment records	Interview (in Greek)
Other workers	Postal clerks from the central post offices of the four prefectures of Crete	From employment records	Interview (in Greek)
Estonia			
Nurses	Nursing staff (nurses, technicians and auxiliaries) at the University Hospital in Tartu and at 31 institutions providing social care	Randomly sampled from lists provided by management	Self-administered (in Estonian or Russian)
Office workers	Secretaries and office workers in specified departments at the University of Tartu	Randomly sampled from lists provided by management	Self-administered (in Estonian or Russian)
ASIA			
Lebanon			
Nurses	Registered nurses at two hospitals	From employment records	Interview (in Lebanese Arabic)
Office workers	Office workers at an academic institution	From employment records	Interview (in Lebanese Arabic)
Other workers	Production workers at a food manufacturer	From employment records	Interview (in Lebanese Arabic)
Iran			
Nurses	Nurses at three university hospitals in Shahroud	Through a nominated manager at each organisation	Self-administered (in Farsi)
Office workers	Office workers at three university hospitals in Shahroud and at four universities in Shahroud (Shahroud University of Medical Sciences, Shahroud University of Technology, Quran Sciences University and Shahroud Azad University)	Through a nominated manager at each organisation	Self-administered (in Farsi)
Pakistan			
Nurses	Nurses in in-patient services at Aga Khan University Hospital, Karachi	From employment records	Interview (in Urdu)
Office workers	Full-time hospital receptionists at Aga Khan University Hospital, Karachi	From employment records	Interview (in Urdu)
Other workers	Postal workers from Pakistan Post at two sorting offices in Karachi	Convenience sample of workers from three shifts	Interview (in Urdu)
Sri Lanka			
Nurses	Nursing officers at two tertiary care hospitals in Colombo	Randomly sampled from employment records	Interview (in Sinhalese)
Office workers	Computer operators from six companies in Colombo	Randomly sampled from employment records	Interview (in Sinhalese)
Other workers (1)	Postal workers at the Central Mail Exchange in Colombo	Randomly sampled from employment records	Interview (in Sinhalese)
Other workers (2)	Sewing machinists at two garment factories in Colombo District	Randomly sampled from employment records	Interview (in Sinhalese)
Japan			
Nurses	Nurses at Tokyo University Hospital	Through a nominated manager	Self-administered (in Japanese)
Office workers	Administrative and clerical workers at Tokyo University Hospital and at four pharmaceutical companies and a private trading company	Through a nominated manager at each organisation	Self-administered (in Japanese)
Other workers (1)	Transportation operatives (mainly lorry drivers and loaders) at two companies transporting baggage and mail	Through a nominated manager at each organisation	Self-administered (in Japanese)
Other workers (2)	Sales/marketing personnel at six pharmaceutical companies	Through a nominated manager at each organisation	Self-administered (in Japanese)

Table 1. Cont.

Country/Occupational Group	Detailed description	Method of identification	Method by which baseline questionnaire completed
AFRICA			
South Africa			
Nurses	Nurses at two academic hospitals in Gauteng	From nurses who were at work when wards were visited	Mostly interview with a few self-administered (all in English)
Office workers	Bank workers at a call centre	From lists of workers provided by the employer	Interview (in English)
AUSTRALASIA			
Australia			
Nurses	Nurses at AlfredHealth (The Alfred, Caulfield Hospital and Sandringham Hospital), Melbourne	From employment records	Self-administered
New Zealand			
Nurses	Nurses (Registered, Enrolled or nurse practitioners) on the Nursing Council of New Zealand register	Randomly selected from all nurses holding a current practising certificate	Self-administered
Office workers	People on the 2005 New Zealand electoral roll in jobs likely to involve use of computers in offices	Randomly selected from those on electoral roll with relevant jobs	Self-administered
Other workers	Mail sorters at New Zealand Post	Randomly selected from an employee database	Self-administered

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community-based intervention aimed at modifying people's beliefs and expectations about back pain was followed by a reduction in morbidity that was not paralleled in a control state [15].

This is not to say that common musculoskeletal symptoms never arise from traumatic injury to tissues. For the most part, however, such injuries would be expected to heal spontaneously over a period of days or weeks, as in other parts of the body. The influence of health beliefs, low mood and somatising tendency is likely to be more on the persistence of symptoms and levels of associated disability than on the occurrence of acute and transient symptoms.

If the hypothesised role of health beliefs were correct, it would have important practical implications. There might be scope for interventions aimed at modifying beliefs and expectations, along the lines of the successful campaign on back pain in Victoria, Australia [15]. More importantly, however, there would be a need for wider review of strategies aimed at preventing work-related musculoskeletal disorders. Currently, preventive efforts focus largely on reduction of physical stresses to the back and arm so as to minimise the risk of injury and maximise opportunities for continued employment in those who have developed symptoms. However, this approach may reinforce beliefs that even quite minor physical stresses (e.g. from use of a computer keyboard) can be seriously hazardous, and might thereby increase workers' vulnerability to long-term symptoms and disability.

The CUPID (Cultural and Psychosocial Influences on Disability) study was designed to explore further the impact of cultural and psychosocial influences on musculoskeletal symptoms and associated disability. It aims to compare the prevalence of symptoms and disability in workers who are carrying out jobs with similar physical demands, but in a range of cultural environments, and to explore risk factors for the incidence and persistence of symptoms and disability in these varying cultural environments. We here describe the methods by which participants have been recruited and data collected, summarise various characteristics of the study sample, and discuss strengths and limitations of the study method.

Methods

Ethical Approval

Ethical approval for the study was provided by the relevant research ethics committee or institutional review board in each participating country (Appendix S1). Written informed consent was obtained from all participants with the following exceptions. For self-administered questionnaires in the UK and Iran, information about the study was provided, and consent to the baseline survey was deemed to be implicit in the return of a completed questionnaire. In Lebanon, according to local practice, oral informed consent was obtained from all participants before interview, and this was recorded on a form signed and dated by the interviewer. In all cases, the method of obtaining consent was approved by the relevant research ethics committee.

Overview

The study focuses on 47 occupational groups from 18 countries (1–4 groups per country), from which information has been collected by means of an initial baseline questionnaire, followed by a further, shorter questionnaire after an interval of 12 months. Data collection in each country was led by a local investigator, who forwarded anonymised computerised data files to a team at the University of Southampton for collation and analysis (several earlier papers have described analyses based, all or in part, on components of the study in individual countries [16–22]). Local investigators also provided background information on the socio-economic circumstances of their study cohorts – for example, on levels of unemployment in the local community and eligibility for sick pay and compensation for occupational injuries.

Identification and Recruitment of Participants

Local investigators were asked to recruit samples of nurses, office workers who regularly used a computer keyboard and/or mouse, and workers who carried out repetitive manual tasks with their arms or hands. Postal workers sorting mail were identified in advance as a group of manual workers who might be suitable for study, but other sources of manual workers were allowed at the

Table 2. Response to baseline questionnaire.

Country/Occupational Group	Number of subjects approached	Number (%) participated	Number of responders excluded	Number of subjects analysed
Brazil				
Nurses	200	192 (96%)	7	185
Office workers	300	292 (97%)	11	281
Other workers	300	182 (61%)	89	93
Ecuador				
Nurses	252	250 (99%)	31	219
Office workers	250	250 (100%)	7	243
Other workers	282	279 (99%)	52	227
Colombia				
Office workers	114	102 (89%)	10	92
Costa Rica				
Nurses	275	249 (91%)	29	220
Office workers	275	249 (91%)	26	223
Other workers	252	237 (94%)	32	205
Nicaragua				
Nurses	300	300 (100%)	18	282
Office workers	300	300 (100%)	15	285
Other workers	300	300 (100%)	103	197
UK				
Nurses	690	290 (42%)	33	257
Office workers	1051	476 (45%)	96	380
Other workers	1569	442 (28%)	56	386
Spain				
Nurses	716	687 (96%)	20	667
Office workers	483	471 (98%)	33	438
Italy				
Nurses	766	585 (76%)	49	536
Other workers	290	151 (52%)	12	139
Greece				
Nurses	240	224 (93%)	0	224
Office workers	202	200 (99%)	1	199
Other workers	154	140 (91%)	0	140
Estonia				
Nurses	876	423 (48%)	52	371
Office workers	415	220 (53%)	18	202
Lebanon				
Nurses	193	186 (96%)	2	184
Office workers	220	190 (86%)	18	172
Other workers	172	168 (98%)	31	137
Iran				
Nurses	263	248 (94%)	2	246
Office workers	213	187 (88%)	5	182
Pakistan				
Nurses	250	235 (94%)	48	187
Office workers	216	216 (100%)	36	180
Other workers	235	225 (96%)	3	222
Sri Lanka				
Nurses	250	237 (95%)	1	236
Office workers	250	157 (63%)	5	152

Table 2. Cont.

Country/Occupational Group	Number of subjects approached	Number (%) participated	Number of responders excluded	Number of subjects analysed
Other workers (1)	250	250 (100%)	0	250
Other workers (2)	250	214 (86%)	63	151
Japan				
Nurses	1074	814 (76%)	222	592
Office workers	425	346 (81%)	36	310
Other workers (1)	1308	1119 (86%)	101	1018
Other workers (2)	380	372 (98%)	17	355
South Africa				
Nurses	280	252 (90%)	5	247
Office workers	285	236 (83%)	7	229
Australia				
Nurses	2878	1119 (39%)	869 (excluded because only a random subset of participants was analysed)	250
New Zealand				
Nurses	260	181 (70%)	4	177
Office workers	280	146 (52%)	1	145
Other workers	230	116 (50%)	3	113

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discretion of the local investigator. In one country (Japan), a group of sales and marketing workers was also recruited, and in the presentation and discussion of results, three main categories of occupation are distinguished – nurses, office workers, and ''other workers'', the last including the sales and marketing group as well as various manual occupations.

The aim was to restrict the international analysis to workers aged 20–59 years, who had been in their current job for at least 12 months. However, local investigators were free to recruit and carry out local analyses without these restrictions. Initial power calculations indicated that a sample size of 200 workers per occupational group would be more than adequate to detect differences between countries in the prevalence of symptoms and disability of the magnitude that was anticipated, and also for analysis of important risk factors for the incidence and persistence of pain at different anatomical sites in the longitudinal follow-up.

Table 1 describes the occupational groups that were selected for study, and the methods by which participants were identified and the baseline questionnaire administered. In most cases, potentially eligible subjects were identified from employers' records, sometimes with random sampling to achieve the desired sample size. Some occupational groups provided information at interview, and others by self-completion of questionnaires. In one country (UK), most questionnaires were self-completed, but random sub-samples of each occupational group were instead interviewed.

At the time of answering the baseline questionnaire, participants were asked whether they were willing to be re-contacted in the future, and those who agreed were asked (or will be asked) to complete a follow-up questionnaire after an interval of 12 months. In most cases, subjects have been followed up through their place of work, but where this was not possible (e.g. because they had left their original employer), they have been contacted at their home address. In each occupational group, follow-up questionnaires have been completed by the same method (interview or self-administration) as the baseline questionnaire.

Questionnaires

The baseline questionnaire (Appendix S2) asked about demographic characteristics; education; height; smoking habits; current occupation; pain in different anatomical regions and associated disability for tasks of daily living; awareness of others with musculoskeletal pain; fear-avoidance beliefs concerning upper limb and low back pain; awareness of repetitive strain injury (RSI) or similar terms; distress from common somatic symptoms; mental health; and sickness absence in the past 12 months because of musculoskeletal problems and other types of illness.

The questions about current occupation covered working hours, whether the job involved each of a specified list of physical tasks, and psychosocial aspects of employment such as time pressures and targets, control over work organisation, support, satisfaction and job security. The questions about pain and disability focused on six anatomical regions (low back, neck, shoulder, elbow, wrist/hand and knee) delineated in diagrams, and were similar in wording to questions that had been used successfully in earlier studies, both by self-administration [9,23,24] and at interview [13]. The questions on fear-avoidance beliefs were adapted from the Fear Avoidance Beliefs Questionnaire [25]. Questions about distress from somatic symptoms were taken from the Brief Symptom Inventory (BSI) [26], and were chosen to provide a measure of the subject's tendency to somatise. Questions on mental health were taken from the Short Form-36 (SF-36) questionnaire [27].

The follow-up questionnaire (Appendix S3) asked about: any change of job since baseline and the reasons; recent pain in different anatomical regions and associated disability for tasks of daily living; distress from common somatic symptoms; mental health; and sickness absence in the past 12 months for musculoskeletal and other reasons. Where possible, the wording of questions was identical to that used in the baseline questionnaire.

Table 3. Economic aspects of employment.

Country/ Occupational Group	Local unemployment rate (%)	Social security provision for unemployed	Sick pay in first three months absence	Compensation for work-related musculoskeletal disorders	Special financial support for ill-health retirement
Brazil					
Nurses	5–9	No	Full for 7 days, but not up to 3 months	Sometimes	No
Office workers	<5	No	Yes	Usually	Usually
Other workers	≥15	Yes	Partial from outset	Usually	No
Ecuador					
Nurses	<5	No	Full for 7 days, but not up to 3 months	No	No
Office workers	5–9	No	Full for 7 days, but not up to 3 months	No	No
Other workers	<5	No	Full for 7 days, but not up to 3 months	No	No
Colombia					
Office workers	5–9	No	Yes	Usually	Sometimes
Costa Rica					
Nurses	<5	Up to 3 months	Yes	Usually	Usually
Office workers	<5	Up to 3 months	Yes	Usually	Usually
Other workers	<5	Up to 3 months	Yes	Usually	Usually
Nicaragua					
Nurses	10–14	No	Yes	Usually	No
Office workers	10–14	No	Yes	Usually	No
Other workers	10–14	No	Yes	Usually	No
UK					
Nurses	<5	Yes	Yes	Sometimes	Usually
Office workers	<5	Yes	Yes	Sometimes	Usually
Other workers	5–9	Yes	Yes	Sometimes	Usually
Spain					
Nurses	5–9	Yes	Yes	Usually	Sometimes
Office workers	5–9	Yes	Yes	Usually	Sometimes
Italy					
Nurses	5–9	Yes	Yes	Sometimes	No
Other workers	5–9	Yes	Yes	Sometimes	No
Greece					
Nurses	5–9	Long-term only	Some workers	No	Sometimes
Office workers	5–9	Long-term only	Yes	No	Sometimes
Other workers	5–9	Long-term only	Yes	No	Sometimes
Estonia					
Nurses	10–14	Yes	Full from 4 days	Usually	Sometimes
Office workers	10–14	Yes	Full from 4 days	Usually	Sometimes
Lebanon					
Nurses	<5	No	Full for 7 days, but not up to 3 months	Sometimes	Usually
Office workers	5–9	No	Full for 7 days, but not up to 3 months	Usually	Sometimes
Other workers	5–9	No	Full for 7 days for some workers, but not up to 3 months	Sometimes	Sometimes
Iran					
Nurses	<5	Most workers	Yes	Sometimes	Sometimes
Office workers	5–9	Most workers	Yes	Sometimes	Sometimes

Table 3. Cont.

Country/ Occupational Group	Local unemployment rate (%)	Social security provision for unemployed	Sick pay in first three months absence	Compensation for work-related musculoskeletal disorders	Special financial support for ill-health retirement
Pakistan					
Nurses	<5	No	Full for 7 days, but not up to 3 months	No	No
Office workers	5–9	No	Full for 7 days, but not up to 3 months	No	No
Other workers	5–9	No	Full for 7 days, but not up to 3 months	No	No

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Both the baseline and follow-up questionnaires were compiled first in English. If necessary, they were then translated into local languages, and the accuracy of the translation was checked by independent back-translation to English. Where this revealed errors, appropriate corrections were made. In addition, in some countries, translated questionnaires were piloted in samples of workers who were not included in the main study, and where this revealed difficulties in understanding, further amendments were made.

Local investigators were at liberty to add to the "core" questions of the international study, and a few (e.g. in Italy, Greece, Iran, Japan, South Africa, Australia and New Zealand) took up this option. However, in doing so, they were asked where possible to place the supplementary questions after the core questions, so as to minimise the chance that they would alter the ways in which participants answered the core questions.

Group-level Socio-economic Information

As well as individual data on study participants, local investigators also provided standardised information about the socio-economic circumstances of the occupational groups which they had recruited. This included the local unemployment rate at the time of the survey, availability of social security support for the unemployed, entitlement to sick pay in the first three months of absence, entitlement to compensation for work-related musculoskeletal disorders, special financial support for ill-health retirement, fees paid for healthcare, and access to an occupational health service.

Results

Response to Baseline Questionnaire

The response to the baseline questionnaire is summarised in Table 2. Participation rates among those invited to take part in the study were greater than 80% in 33 of the 47 occupational groups, ranging from 28% in UK other workers and 39% in Australian nurses to 100% in six occupational groups from Ecuador, Nicaragua, Pakistan and Sri Lanka. However, 2,279 participants were excluded from the international analysis because they fell outside the specified age range (310), had missing data (317), had not worked in their current job for as long as 12 months (783), or (in the case of Australian nurses) were excluded by random sampling (869). After these exclusions, a total of 12,426 workers were available for analysis, with between 92 and 1018 in each occupational group.

Circumstances of Occupational Groups

Table 3 summarises various economic aspects of employment for the occupational groups studied. The local rate of unemployment ranged from <5% in 16 occupational groups to ≥15% in seven. Members of 28 groups would be eligible for social security provision if they became unemployed, although in the three groups from Costa Rica this would be limited to the first three months without a job. Almost all participants could receive some form of sick pay during the first three months of absence from work, but in 22 groups this would not compensate fully for all loss of earnings over that period. Some form of financial compensation for work-related musculoskeletal disorders was available to 40 occupational groups, but 19 groups were ineligible for any special financial support in the event of ill-health retirement.

Table 4 describes the access of participants to different sources of healthcare. Most participants had free access to doctors in primary care and hospitals, but fees were more often required for consultation of other health practitioners. All but nine occupational groups were covered by an occupational health service.

Characteristics of Participants

Table 5 gives information about the demographic characteristics of participants and their hours of work. In all countries, nurses were predominantly female, and in 18 occupational groups more than 90% of subjects were from one sex. Most groups had a broad distribution of ages, but in a few groups, younger (<30 years) or older (≥50 years) workers were less well represented. Levels of education were generally high in nurses and office workers, but lower in many groups of "other workers". Most subjects had been in their current job for longer than five years, and most worked between 30 and 49 hours per week. However, in Pakistan, Sri Lanka and Japan, the prevalence of longer working hours (>50 hours per week) was high relative to other countries.

Table 6 shows the prevalence of different physical tasks by occupational group. As would be expected, a high proportion of office workers (>80% in all but one group) reported using a computer keyboard for longer than four hours per day, while manual lifting of weights ≥25 kg in an average working day was most common in nurses. Patterns of physical activity among the "other workers" were more variable, but several such groups reported a relatively high prevalence of work with the hands above shoulder height.

Table 7 summarises reported psychosocial aspects of work. Time pressure was common in most occupational groups, but the prevalence of financial incentives to productivity was much more variable. Personal autonomy at work was lowest among "other workers". Most subjects were satisfied with their jobs, but job

Table 4. Access to healthcare for musculoskeletal disorders.

Country/Occupational Group	Primary care doctor	Hospital doctor	Other practitioner	Occupational health service
Brazil				
Nurses	Full fee	Full fee	Full fee	Through employer and external
Office workers	Small fee	Small fee	Small fee	Through employer and external
Other workers	Free/insured	Free/insured	Free/insured	Through employer
Ecuador				
Nurses	Full fee	Full fee	Full fee	Through employer or external
Office workers	Full fee	Full fee	Full fee	External
Other workers	Full fee	Full fee	Full fee	Through employer or external
Colombia				
Office workers	Free/insured	Small fee	Small fee	External
Costa Rica				
Nurses	Free/insured	Free/insured	Free/insured	Through employer and external
Office workers	Free/insured	Free/insured	Free/insured	Through employer and external
Other workers	Free/insured	Free/insured	Free/insured	Through employer and external
Nicaragua				
Nurses	Free/insured	Free/insured	Free/insured	External
Office workers	Free/insured	Free/insured	Free/insured	External
Other workers	Free/insured	Free/insured	Free/insured	External
UK				
Nurses	Free/insured	Free/insured	Full fee	Through employer
Office workers	Free/insured	Free/insured	Full fee	Through employer
Other workers	Free/insured	Free/insured	Full fee	Through employer
Spain				
Nurses	Free/insured	Free/insured	Free/insured	Through employer
Office workers	Free/insured	Free/insured	Free/insured	Through employer
Italy				
Nurses	Free/insured	Small fee	Full fee	Through employer
Other workers	Free/insured	Small fee	Full fee	Through employer
Greece				
Nurses	Free/insured	Free/Insured	Varies	No
Office workers	Free/insured	Free/Insured	Varies	No
Other workers	Free/insured	Free/insured	Varies	Through employer
Estonia				
Nurses	Free/insured	Small fee	Free/insured	Through employer and external
Office workers	Free/insured	Small fee	Free/insured	Through employer and external
Lebanon				
Nurses	Full fee	Full fee	Full fee	Through employer
Office workers	Small fee	Small fee	Small fee	Through employer
Other workers	Small fee	Small fee	Small fee	Through employer
Iran				
Nurses	Free/insured or small fee	Free/insured or small fee	Free/insured or small fee	Some participants
Office workers	Free/insured or small fee	Free/insured or small fee	Free/insured or small fee	Some participants
Pakistan				
Nurses	Free/through employer with a cap	Free/through employer with a cap	Full fee	No
Office workers	Free/through employer with a cap	Free/through employer with a cap	Full fee	No
Other workers	Free/through employer	Free/through employer	Full fee	No

Table 4. Cont.

Country/Occupational Group	Primary care doctor	Hospital doctor	Other practitioner	Occupational health service
Sri Lanka				
Nurses	Free/insured	Free/insured	Free/insured	No
Office workers	Free/insured	Free/insured	Free/insured	No
Other workers (1)	Free/insured	Free/insured	Free/insured	No
Other workers (2)	Free/insured	Free/insured	Free/insured	No
Japan				
Nurses	Free/insured	Free/insured	Free/insured	Through employer and external
Office workers	Free/insured	Free/insured	Free/insured	Through employer and external
Other workers (1)	Free/insured	Free/insured	Free/insured	Through employer and external
Other workers (2)	Free/insured	Free/insured	Free/insured	Through employer and external
South Africa				
Nurses	Full fee	Small fee	Full fee	Yes
Office workers	Full fee	Small fee	Full fee	Yes
Australia				
Nurses	Small fee	Small fee	Full fee	Through employer and external
New Zealand				
Nurses	Small fee	Free/insured	Payment varies	External and possibly through employer
Office workers	Small fee	Free/insured	Payment varies	External and possibly through employer
Other workers	Small fee	Free/insured	Payment varies	Through employer and external

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dissatisfaction was notably high in Italy, Japan and South Africa. The prevalence of perceived job insecurity ranged from 1.6% in Sri Lankan postal workers to 90.3% in Brazilian sugar cane cutters.

Table 8 shows the proportions of participants who were aware of a term such as "repetitive strain injury" ("RSI"), "work-related upper limb disorder" ("WRULD") or "cumulative trauma syndrome" ("CTS"), and also the proportions who knew someone else outside work, who had experienced musculoskeletal pain in the past 12 months. Awareness of RSI and similar terms varied widely – from 0.0% in Brazilian sugar cane cutters and 7.0% in South African office workers to 94.6% in Brazilian nurses and 95.9% in New Zealand office workers. There were also marked differences in knowledge of others with musculoskeletal complaints. For example, among food production workers in Lebanon, only 16.1% knew someone outside work with upper limb pain, whereas in telephone call centre workers in Costa Rica, the proportion was 65.9%.

Table 9 presents the prevalence of potentially adverse health beliefs about back and arm pain by occupational group. These again varied substantially (more than tenfold) between occupational groups. For example, 78.6% of Greek postal workers and 77.7% of Lebanese nurses believed that low back pain is commonly caused by people's work, as compared with only 4.0% of Sri Lankan postal workers and no Brazilian sugar cane cutters; and 31.4% of Brazilian nurses and 31.0% of Brazilian office workers had pessimistic views about the prognosis of arm pain, as compared with 1.6% of nurses and office workers in Iran and 0.0% of Brazilian sugar cane cutters.

Table 10 compares the characteristics of participants in the UK who answered the questionnaire at interview and by self-administration. Among the nurses and especially the "other workers", participation rates were higher among those invited to interview, whereas in the office workers they were slightly lower. However, there were no consistent differences in the prevalence of reported occupational activities and musculoskeletal pain according to the method of data collection.

Discussion

The CUPID study has generated substantial information which will be the subject of multiple reports. A particular strength is its use of standardised questions to collect information from participants in many different countries and cultural settings. This should provide valuable insights into the determinants of common musculoskeletal illness and associated disability, and particularly the extent of differences between countries.

The occupational groups were chosen for study with the aim that the prevalence of relevant physical tasks should differ between the three broad categories (nurses, office workers and "other workers"), but that within each of these categories, it should be broadly similar across countries. For nurses and office workers this objective was fairly well achieved, although inevitably there was some heterogeneity. For example, in some countries, nurses routinely lift and move patients, whereas in others such tasks may normally be undertaken by care assistants or patients' family members. For "other workers", there was more variation in occupational activities, reflecting the greater diversity of groups selected for study. Nevertheless, the mix of activities tended to differ from that of nurses and office workers, with a relatively high prevalence of work with the arms elevated; and apart from sales personnel in Japan, all groups of "other workers" had a high prevalence of work involving prolonged repetitive movement of the wrists or hands.

The international analysis of data is restricted to subjects aged 20–59 years at baseline, who had held their current job for at least

Table 5. Characteristics of study sample – prevalence (%) by occupational group.

Country/ Occupational Group	Sex	Age (years)				Age finished full time education (years)				Years in current job	Hours worked/week		
	Males	20–29	30–39	40–49	50–59	<14	14–16	17–19	20+	>5	<30	30–49	>50
Brazil													
Nurses	11.4	15.7	24.9	43.8	15.7	32.6	38.6	13.6	15.2	90.3	5.6	87.2	7.3
Office workers	21.7	1.4	23.1	57.3	18.1	36.9	35.0	17.9	10.2	86.6	50.5	44.7	4.8
Other workers	94.6	32.3	34.4	23.7	9.7	59.1	21.6	12.5	6.8	57.1	0.0	100.0	0.0
Ecuador													
Nurses	0.0	6.8	17.8	33.8	41.6	1.8	2.3	29.7	66.2	78.5	73.5	26.5	0.0
Office workers	0.0	11.9	19.8	44.9	23.5	0.4	0.0	35.8	63.8	77.0	3.3	90.5	6.2
Other workers	0.0	43.6	41.4	11.9	3.1	52.0	19.4	11.9	16.7	39.6	2.2	90.3	7.5
Colombia													
Office workers	37.0	27.2	44.6	25.0	3.3	0.0	6.5	17.4	76.1	64.1	26.1	64.1	9.8
Costa Rica													
Nurses	33.6	32.3	28.2	25.9	13.6	2.3	3.2	22.2	72.2	65.1	0.5	72.1	27.4
Office workers	38.1	32.7	27.8	25.6	13.9	0.5	1.4	21.2	77.0	63.3	1.4	94.6	4.1
Other workers	36.6	49.8	23.4	16.1	10.7	0.0	0.5	27.9	71.6	49.0	16.1	82.4	1.5
Nicaragua													
Nurses	3.2	7.4	34.0	37.9	20.6	0.4	2.5	10.7	86.4	88.3	1.1	91.4	7.5
Office workers	27.4	33.3	35.1	22.1	9.5	0.7	4.6	7.4	87.4	57.9	5.3	93.3	1.4
Other workers	54.8	51.8	37.1	7.1	4.1	9.6	24.4	35.0	31.0	21.8	0.0	100.0	0.0
UK													
Nurses	10.1	24.5	37.4	26.1	12.1	0.0	23.7	31.9	44.4	73.4	27.6	72.4	0.0
Office workers	44.7	14.7	31.3	32.1	21.8	0.0	11.1	21.6	67.4	62.5	1.6	94.1	4.3
Other workers	62.4	5.4	19.9	36.8	37.8	0.8	31.5	33.3	34.4	85.5	21.8	70.9	7.3
Spain													
Nurses	9.9	25.0	29.2	29.4	16.4	0.3	7.8	154	76.5	72.4	11.8	87.3	0.9
Office workers	16.4	16.7	37.7	34.7	11.0	0.0	2.5	21.7	75.8	67.4	11.6	88.1	0.2
Italy													
Nurses	16.4	17.5	34.9	32.5	15.1	3.5	11.2	19.4	65.9	79.3	13.1	86.1	0.8
Other workers	28.1	5.0	36.0	37.4	21.6	16.5	33.1	40.3	10.1	83.2	9.6	90.4	0.0
Greece													
Nurses	12.1	5.8	67.0	27.2	0.0	0.0	0.4	18.3	81.3	92.0	0.5	97.3	2.3
Office workers	25.1	7.0	46.2	32.7	14.1	0.0	0.0	20.1	79.9	86.4	16.1	71.9	12.1
Other workers	82.9	1.4	12.1	57.9	28.6	2.9	2.1	66.4	28.6	88.6	2.9	92.9	4.3
Estonia													
Nurses	0.5	15.1	31.3	26.1	27.5	0.3	10.3	46.7	42.7	70.0	5.8	86.4	7.8
Office workers	15.3	17.3	31.2	27.7	23.8	0.0	0.0	20.5	79.5	66.3	5.0	89.0	6.0
Lebanon													
Nurses	33.7	57.6	31.0	9.8	1.6	0.5	0.0	4.9	94.6	48.4	0.0	97.3	2.7
Office workers	42.4	20.3	31.4	30.2	18.0	0.0	1.2	15.1	83.7	70.9	0.0	85.5	14.5
Other workers	52.6	53.3	29.9	12.4	4.4	26.3	29.2	29.9	14.6	47.4	0.0	70.8	29.2
Iran													
Nurses	18.3	32.5	46.7	17.9	2.8	0.0	0.8	12.2	87.0	68.7	0.8	65.9	33.3
Office workers	35.2	49.5	34.6	14.8	1.1	0.5	0.5	30.8	68.1	50.0	1.1	63.7	35.2
Pakistan													
Nurses	25.7	72.2	23.0	3.7	1.1	0.0	4.3	29.0	66.7	36.4	0.5	26.7	72.7
Office workers	82.2	53.9	34.4	10.6	1.1	0.0	1.7	17.4	80.9	48.0	1.1	35.0	63.9
Other workers	100.0	9.9	22.5	53.6	14.0	0.9	7.8	25.1	66.2	86.9	16.7	77.5	5.9

Table 5. Cont.

Country/ Occupational Group	Sex	Age (years)				Age finished full time education (years)				Years in current job	Hours worked/week		
	Males	20–29	30–39	40–49	50–59	<14	14–16	17–19	20+	>5	<30	30–49	>50
Sri Lanka													
Nurses	0.0	46.2	38.6	12.7	2.5	0.0	0.8	38.6	60.6	50.4	0.0	34.3	65.7
Office workers	71.7	75.7	19.1	2.6	2.6	0.0	0.0	12.5	87.5	30.9	0.0	36.8	63.2
Other workers (1)	100.0	0.4	8.4	46.0	45.2	3.6	65.2	28.0	3.2	81.6	0.0	21.6	78.4
Other workers (2)	0.0	67.5	17.9	10.6	4.0	2.6	29.1	47.0	21.2	40.4	0.0	25.8	74.2
Japan													
Nurses	3.4	43.1	32.6	13.5	10.8	0.0	0.0	10.1	89.9	62.5	5.7	59.6	34.7
Office workers	56.5	4.5	36.1	32.9	26.5	0.0	1.3	13.2	85.5	73.9	13.1	50.7	36.3
Other workers (1)	99.6	20.9	40.4	27.4	11.3	0.0	5.7	65.8	28.5	78.3	14.3	15.3	70.5
Other workers (2)	93.2	29.0	50.1	17.7	3.1	0.0	1.4	4.8	93.8	78.3	8.8	12.7	78.5
South Africa													
Nurses	3.6	16.2	31.6	37.2	15.0	0.0	0.8	18.0	81.2	69.6	0.0	100.0	0.0
Office workers	32.3	42.8	28.4	20.5	8.3	0.4	11.2	62.3	26.0	41.9	0.0	100.0	0.0
Australia													
Nurses	6.8	13.2	29.6	29.2	28.0	0.0	6.8	31.3	61.8	57.8	43.1	48.4	8.5
New Zealand													
Nurses	5.6	8.5	21.5	35.6	34.5	0.6	14.7	37.3	47.5	75.7	32.2	62.7	5.1
Office workers	6.2	4.1	12.4	40.0	43.4	0.7	40.7	49.0	9.7	71.7	31.7	64.8	3.5
Other workers	33.6	18.6	17.7	31.0	32.7	0.0	37.2	46.0	16.8	54.9	47.3	51.8	0.9

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12 months. These restrictions were set when the CUPID study was first planned, the latter because some outcomes of interest from the baseline survey, such as sickness absence in the past 12 months, would otherwise be difficult to interpret.

The questions used in the baseline and follow-up surveys were for the most part well-established, having been used successfully in previous studies. In particular, the items on mental health and somatising tendency were taken from validated instruments, and have previously demonstrated predictive validity for the incidence and persistence of musculoskeletal symptoms [7]. Similarly, the questions on fear avoidance beliefs were based on a validated questionnaire [25], and have shown predictive validity in a longitudinal study [7]. The questions on occupational physical activities have been successfully used in earlier studies [7,13,23,24], and the consistency of answers with expectation (e.g. the high prevalence of prolonged keyboard use in office workers) supports their validity. There is no reliable standard against which to assess the accuracy with which subjective symptoms such as pain are reported, but the questions about pain and disability had again been used successfully in earlier studies. Moreover, the style of our questions about symptoms was similar to that of the Nordic questionnaire, which has been shown to have acceptable reliability [28].

Ensuring the accuracy with which the questionnaire was translated into local languages was a challenge. Care was taken to check the accuracy of translation by independent back-translation to English, and this revealed a number of problems. One was the distinction between "stairs" and "flights of stairs", and despite attempts to resolve this problem, it is not certain that the term "30 flights of stairs" was always interpreted correctly. Therefore, this question will be ignored in future analyses based on the full dataset. Another difficulty arose with questions of the form "Do you expect that your back pain will be a problem in 12 months time". In some languages this became "Do you expect your back pain will be a problem over the next 12 months". Attempts were made to correct this misunderstanding, but it is possible that they were not fully successful.

In addition, terms such as "pain" may be understood differently in different languages even though translated as closely as possible. For this reason, when comparing countries, differences in the relative frequency of pain at different anatomical sites may be particularly revealing – there should have been little ambiguity in the understanding of anatomical sites since they were depicted clearly in diagrams. Interpretation should also be assisted by the questions that were asked about associated difficulty with tasks of daily living, since these were probably understood more uniformly.

Another difficulty that had not been expected was in the use of dates. It emerged that some participants in Iran and Japan used different numbering for calendar years, and where this occurred, corrections had to be made.

Some local investigators opted to include extra questions in addition to the core questions prescribed by CUPID. However, these additions were relatively minor and generally followed after the core questions. Thus, it seems unlikely that they will have influenced answers to the core questions importantly.

Ideally, all questionnaires would have been completed in the same way (interview or self-administration) by all participants. However, this proved impractical. Some occupational groups (especially manual workers in developing countries) would have had great difficulty in answering a written questionnaire, while some employers were unwilling to release their staff for interviews. Moreover, in New Zealand, where nurses and office workers were recruited from across the country, interviews would have been prohibitively expensive.

Table 6. Physical activities in an average working day – prevalence (%) by occupational group.

Country/Occupational Group	Activity[a]					
	Use keyboard >4 hours	Other repeated wrist/ hand movement >4 hours	Repeated elbow bending >1 hour	Hands above shoulder height >1 hr	Lifting ≥25 kg by hand	Kneeling/ squatting >1 hour
Brazil						
Nurses	9.7	51.9	68.1	11.9	49.7	34.1
Office workers	70.8	70.8	81.5	12.5	10.3	13.2
Other workers	0.0	100.0	100.0	0.0	0.0	100.0
Ecuador						
Nurses	8.2	82.6	89	36.1	68.0	62.6
Office workers	84.0	78.6	84.8	39.1	5.3	16.0
Other workers	11.5	92.1	95.2	82.4	21.1	79.3
Colombia						
Office workers	90.2	62.0	72.8	18.5	6.5	4.3
Costa Rica						
Nurses	10.9	66.4	82.7	30.9	63.6	44.1
Office workers	96.0	76.2	84.8	19.3	5.4	9.4
Other workers	99.0	86.3	88.3	20.5	4.9	4.9
Nicaragua						
Nurses	0.7	78.4	83.0	35.8	42.2	50.0
Office workers	89.8	91.6	84.9	46.0	13.3	17.2
Other workers	4.1	73.6	81.7	26.4	13.2	14.7
UK						
Nurses	12.8	44.0	54.9	8.9	28.4	18.7
Office workers	88.9	31.1	27.1	1.3	4.2	0.5
Other workers	4.1	81.9	91.2	51.8	12.2	9.8
Spain						
Nurses	18.9	59.4	93.7	52.5	82.2	70.5
Office workers	96.8	71.0	91.8	27.4	2.1	14.8
Italy						
Nurses	4.9	55.4	80.2	24.6	60.6	17.0
Other workers	10.1	84.2	85.6	29.5	26.6	4.3
Greece						
Nurses	2.7	71.4	88.8	29.0	70.1	30.4
Office workers	87.4	58.8	74.9	6.0	7.0	6.5
Other workers	1.4	83.6	96.4	65.7	47.1	22.1
Estonia						
Nurses	18.1	64.4	72.5	21.0	56.6	28.6
Office workers	94.6	40.6	51.0	8.4	2.5	2.5
Lebanon						
Nurses	3.3	97.3	96.2	42.9	51.6	34.2
Office workers	85.5	73.8	77.3	13.4	14.5	7.0
Other workers	1.5	98.5	97.1	45.3	44.5	25.5
Iran						
Nurses	10.2	63.0	81.3	43.1	24.8	49.6
Office workers	97.3	89.6	81.3	40.1	7.1	18.7
Pakistan						
Nurses	54.5	93.6	64.2	90.9	73.3	23.0
Office workers	91.7	95.6	35.6	83.9	24.4	10.0
Other workers	7.2	78.4	30.2	77.5	25.7	7.2

Table 6. Cont.

Country/Occupational Group	Activity[a]					
	Use keyboard >4 hours	Other repeated wrist/ hand movement >4 hours	Repeated elbow bending >1 hour	Hands above shoulder height >1 hr	Lifting ≥25 kg by hand	Kneeling/ squatting >1 hour
Sri Lanka						
Nurses	1.3	60.6	43.2	14.4	36.9	9.3
Office workers	100.0	94.7	72.4	11.8	25.7	17.1
Other workers (1)	0.0	95.6	95.6	95.6	0.0	0.0
Other workers (2)	0.7	86.1	60.9	25.2	4.6	29.1
Japan						
Nurses	23.5	23.8	72.8	12.5	66.9	48.5
Office workers	89.0	12.9	22.6	1.6	3.2	2.3
Other workers (1)	2.4	32.8	77.8	33.7	83.3	52.3
Other workers (2)	27.9	10.1	30.1	4.2	9.3	12.1
South Africa						
Nurses	11.3	76.1	85.0	53.4	80.2	26.3
Office workers	100.0	76.9	78.6	26.2	4.8	1.3
Australia						
Nurses	25.6	32.8	47.6	8.4	25.2	15.2
New Zealand						
Nurses	26.6	32.8	42.4	4.0	31.6	14.1
Office workers	91.7	40.0	44.8	0.7	2.1	0.0
Other workers	10.6	87.6	91.2	34.5	51.3	5.3

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To explore whether the two methods of answering the questionnaire might lead to systematic differences in answers, we therefore elected to interview a random subset of UK participants while collecting data from the remainder by self-administration. Comparison of responses using the two approaches (Table 10) suggests that no major bias will have occurred as a consequence using both interviews and self-administration. However, if appropriate, method of data collection can be taken into account in statistical analyses.

Participation rates among subjects eligible for study were mostly high, but were less than 50% in five occupational groups (Table 2). We have no reason to expect that those who elected to take part were importantly unrepresentative in the prevalence of pain and its associations with risk factors. However, in future work it may be appropriate to carry out sensitivity analyses, excluding the occupational groups with the lowest response rates. The incomplete response to the baseline questionnaire will be less of a concern in longitudinal analyses based on the follow-up questionnaire.

The numbers of participants by occupational group that were suitable for analysis ranged from 92 to 1018 with a mean of 264. At the outset, our aim was to recruit at least 200 subjects in each group, and this was for the most part achieved (only 7 groups provided fewer than 150 subjects). Furthermore, the occupational groups studied varied substantially in their employment conditions (Table 3), access to healthcare (Table 4), and prevalence of psychosocial risk factors (Tables 7, 8, and 9). When exploring possible reasons for differences in the prevalence of pain and disability between occupational groups, it will be important to investigate these group-level characteristics as well as individual-level risk factors such as mental health and somatising tendency. The heterogeneity in their distribution should enhance statistical power to address their impact.

As might be expected, the demographic constitution of occupational groups also varied. In particular, many of the samples of nurses were largely or completely female, whereas some groups of "other workers" were all men. This reflects the nature of the occupations of interest. However, it should not be a major problem in interpretation of comparisons since there were an adequate number of occupational groups with a fairly even distribution of sex and age. Moreover, the occurrence of common musculoskeletal complaints appears not to vary greatly between men and women or between older and younger adults of working age [13,23,24].

In summary, the CUPID study is a major resource for the investigation of cultural and psychological determinants of common musculoskeletal disorders and associated disability. Although the data collected have inevitable limitations, the large differences in psychosocial risk factors (including knowledge and beliefs about MSDs) between occupational groups carrying out similar physical tasks in different countries should allow the study hypothesis to be addressed effectively. It will also allow exploration of differences in patterns of musculoskeletal complaint between the three categories of occupation examined, and the consistency of these differences across countries.

Table 7. Psychosocial aspects of work – prevalence (%) by occupational group.

Country/Occupational Group	Incentives[a]	Time pressure[b]	Lack of choice[c]	Lack of support[d]	Job dissatisfaction[e]	Perceived job insecurity[f]
Brazil						
Nurses	25.4	65.4	13.5	4.9	7.6	20.0
Office workers	13.9	49.8	9.6	11.7	19.2	24.9
Other workers	100.0	96.8	96.8	2.2	5.4	90.3
Ecuador						
Nurses	29.2	69.4	39.7	51.6	1.8	30.1
Office workers	37.0	63.4	10.7	63.4	4.5	29.2
Other workers	45.8	65.2	52.0	63.4	11.5	50.7
Colombia						
Office workers	50.0	56.5	2.2	40.2	2.2	25.0
Costa Rica						
Nurses	48.2	92.7	24.5	36.8	12.7	17.7
Office workers	63.2	77.6	8.1	28.7	10.8	18.4
Other workers	67.8	77.6	50.7	29.3	17.1	26.3
Nicaragua						
Nurses	16.0	72.3	10.3	41.5	13.5	22.7
Office workers	26.0	80.0	19.3	43.2	9.5	23.2
Other workers	86.8	60.9	37.1	41.1	6.1	31.0
UK						
Nurses	6.2	75.1	9.7	10.1	14.8	17.9
Office workers	0.5	76.6	6.8	7.9	7.9	5.0
Other workers	19.2	79.5	37.8	17.4	15.5	35.8
Spain						
Nurses	21.0	80.1	19.9	77.7	12.0	16.5
Office workers	26.3	54.3	32.4	78.5	6.6	13.7
Italy						
Nurses	11.6	80.6	13.2	8.2	17.4	21.5
Other workers	19.4	82.7	53.2	34.5	51.8	41.7
Greece						
Nurses	6.3	97.3	8.9	14.7	33.9	29.0
Office workers	6.5	83.4	1.5	9.5	7.0	12.6
Other workers	2.1	97.9	15.0	40.7	18.6	17.9
Estonia						
Nurses	7.8	66.6	23.7	27.0	6.2	14.3
Office workers	4.0	64.4	2.0	8.4	5.9	23.3
Lebanon						
Nurses	81.0	95.1	6.0	6.5	20.1	38.6
Office workers	11.6	75.6	7.6	12.2	16.9	25.0
Other workers	75.9	76.6	29.9	6.6	16.8	41.6
Iran						
Nurses	28.9	90.2	24.8	23.6	29.3	54.9
Office workers	29.7	74.2	18.7	26.9	26.4	66.5
Pakistan						
Nurses	62.0	96.3	40.1	7.5	9.1	56.7
Office workers	68.3	96.1	45.6	7.8	7.8	53.9
Other workers	11.7	95.0	68.0	7.7	9.0	14.9
Sri Lanka						
Nurses	56.8	91.5	5.9	7.2	4.7	11.4
Office workers	18.4	87.5	10.5	5.3	8.6	43.4

Table 7. Cont.

Country/Occupational Group	Incentives[a]	Time pressure[b]	Lack of choice[c]	Lack of support[d]	Job dissatisfaction[e]	Perceived job insecurity[f]
Other workers (1)	100.0	100.0	0.0	0.0	2.8	1.6
Other workers (2)	95.4	94.0	17.2	11.9	4.0	33.8
Japan						
Nurses	4.4	63.0	20.9	5.7	44.4	41.2
Office workers	3.2	35.5	18.1	12.6	70.3	43.5
Other workers (1)	30.7	81.1	28.0	20.1	41.9	64.5
Other workers (2)	9.9	41.4	4.5	5.4	69.6	49.6
South Africa						
Nurses	21.1	80.2	23.1	13.8	34.8	29.6
Office workers	52	95.2	37.6	21.8	43.7	66.4
Australia						
Nurses	4.4	66.8	3.2	7.6	8.8	10.8
New Zealand						
Nurses	1.7	58.2	9.0	8.5	13.6	22.0
Office workers	2.1	58.6	4.8	18.6	8.3	17.9
Other workers	34.5	80.5	23.9	14.2	8.8	20.4

[a]Either a) piecework or b) payment of a bonus if more than an agreed number of articles/tasks are finished in a day.
[b]Either a) a target number of articles or tasks to be finished in the day or b) working under pressure to complete tasks by a fixed time.
[c]Choice seldom or never in all of: a) how work is done, b) what is done at work, and c) work timetable and breaks.
[d]Support from colleagues or supervisor/manager seldom or never.
[e]Dissatisfied or very dissatisfied overall.
[f]Feel job would be rather unsafe or very unsafe if off work for three months with significant illness.
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Table 8. Awareness of repetitive strain injury (RSI) work related upper limb disorder (WRULD) or cumulative trauma syndrome (CTS) – prevalence (%) by occupational group.

Country/Occupational Group	Proportion (%) of participants reporting awareness of				
	RSI, WRULD or CTS	Someone outside work with pain in past 12 months in			
		Low back	Neck	Upper limb	Knee
Brazil					
Nurses	94.6	62.7	49.2	53.0	55.1
Office workers	94.3	60.9	49.1	52.7	50.2
Other workers	0.0	60.2	12.9	36.6	14.0
Ecuador					
Nurses	52.1	42.9	34.7	30.1	42.5
Office workers	28.0	50.6	46.1	37.0	42.4
Other workers	24.2	48.0	27.3	39.2	32.2
Colombia					
Office workers	43.5	40.2	34.8	32.6	39.1
Costa Rica					
Nurses	54.1	55.9	43.6	42.7	46.4
Office workers	26.9	61.0	49.3	48.4	45.7
Other workers	36.1	74.6	65.9	65.9	61.5
Nicaragua					
Nurses	56.0	71.6	57.8	58.2	62.8
Office workers	34.0	60.4	54.0	51.2	48.8
Other workers	29.4	41.6	28.4	31.5	26.9
UK					
Nurses	76.3	59.1	30.0	35.0	41.2
Office workers	93.7	60	31.8	33.4	42.6
Other workers	47.9	42.5	21.0	26.7	35.0
Spain					
Nurses	67.9	82.6	73.1	49.8	55.9
Office workers	59.8	82.9	80.2	45.3	50.6
Italy					
Nurses	84.7	82.3	75.6	56.0	55.4
Other workers	77.0	69.8	66.9	54.0	51.1
Greece					
Nurses	21.4	82.6	62.5	56.3	50.4
Office workers	24.6	81.4	68.3	64.8	51.3
Other workers	15.7	70.7	50	43.6	36.4
Estonia					
Nurses	66.6	69.0	55.3	46.9	57.1
Office workers	49.5	65.8	59.4	47.0	51.5
Lebanon					
Nurses	67.9	70.1	58.2	39.1	57.6
Office workers	67.4	56.4	40.7	36.6	32.6
Other workers	34.3	38.7	27.7	16.1	29.2
Iran					
Nurses	45.5	76.8	53.3	59.3	69.5
Office workers	25.3	67.0	46.7	54.4	63.2
Pakistan					
Nurses	36.9	44.4	23.5	31.0	52.4
Office workers	17.8	39.4	15.0	20	41.1
Other workers	32.4	30.6	19.8	18.9	26.6

Table 8. Cont.

Country/Occupational Group	Proportion (%) of participants reporting awareness of				
	RSI, WRULD or CTS	Someone outside work with pain in past 12 months in			
		Low back	Neck	Upper limb	Knee
Sri Lanka					
Nurses	48.3	53.0	40.3	45.8	61.0
Office workers	51.3	45.4	36.8	37.5	47.4
Other workers (1)	82.4	57.2	27.6	36.0	57.2
Other workers (2)	36.4	37.1	20.5	25.2	45.0
Japan					
Nurses	72.3	59.5	27.4	35.8	33.6
Office workers	69.4	53.5	28.7	33.5	35.8
Other workers (1)	35.9	51.6	17.5	22.5	20.5
Other workers (2)	70.7	60.8	23.4	27.0	26.8
South Africa					
Nurses	47.0	51.4	36.4	34.8	53.8
Office workers	7.0	55.0	38.4	39.3	40.2
Australia					
Nurses	78.0	71.6	49.2	49.6	53.2
New Zealand					
Nurses	84.7	72.3	53.1	58.2	57.6
Office workers	95.9	64.1	44.8	47.6	54.5
Other workers	86.7	46.9	27.4	37.2	42.5

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Table 9. Adverse health beliefs regarding low back and arm pain – prevalence (%) by occupational group.

	Low back pain			Arm pain		
Country/ Occupational Group	**Commonly caused by people's work[a]**	**Physical activity is harmful[b]**	**Poor prognosis[c]**	**Commonly caused by people's work[a]**	**Physical activity is harmful[b]**	**Poor prognosis[c]**
Brazil						
Nurses	25.9	5.9	29.7	31.9	7.0	31.4
Office workers	32.7	7.5	31.3	42.7	6.0	31.0
Other workers	0.0	1.1	0.0	0.0	1.1	0.0
Ecuador						
Nurses	53.9	25.1	20.5	52.1	18.7	20.5
Office workers	37.9	18.9	10.7	33.7	16.0	9.9
Other workers	77.1	36.1	4.0	76.2	27.3	5.3
Colombia						
Office workers	12.0	1.1	13.0	13.0	1.1	13.0
Costa Rica						
Nurses	30.0	10.9	17.7	35.0	10.5	19.1
Office workers	13.9	4.0	24.2	11.7	2.7	22.0
Other workers	16.1	2.9	25.9	18.0	2.0	21.5
Nicaragua						
Nurses	36.2	23.8	15.2	35.5	21.3	14.5
Office workers	29.1	11.9	9.5	32.3	12.6	9.1
Other workers	38.1	22.3	10.7	36.5	16.8	8.6
UK						
Nurses	23.7	9.3	5.8	15.2	3.5	2.7
Office workers	9.2	2.9	4.7	10.8	1.3	3.2
Other workers	25.6	10.4	8.8	20.7	5.2	5.7
Spain						
Nurses	46.8	23.8	28.2	36.1	13.8	18.3
Office workers	22.4	15.5	22.1	19.6	9.6	15.3
Italy						
Nurses	34.1	3.2	6.9	24.1	0.9	4.5
Other workers	36.0	7.9	15.8	40.3	3.6	16.5
Greece						
Nurses	73.2	49.1	14.7	68.3	33.5	12.9
Office workers	40.2	31.2	10.6	44.2	18.6	12.6
Other workers	78.6	68.6	20.0	76.4	47.1	12.9
Estonia						
Nurses	27.5	9.2	7.5	25.9	5.9	5.9
Office workers	15.8	2.5	11.4	21.3	0.5	10.9
Lebanon						
Nurses	77.7	43.5	27.2	62.5	23.9	9.8
Office workers	36.6	24.4	15.1	36.0	11.0	7.6
Other workers	66.4	77.4	14.6	59.9	57.7	6.6
Iran						
Nurses	31.7	11	2.8	24.8	4.1	1.6
Office workers	24.2	12.1	4.9	22.0	2.7	1.6
Pakistan						
Nurses	51.9	50.3	5.9	47.1	26.2	4.8
Office workers	54.4	43.3	3.9	38.9	29.4	1.7
Other workers	40.5	31.5	5.9	36.9	28.4	6.3

Table 9. Cont.

	Low back pain			Arm pain		
Country/ Occupational Group	**Commonly caused by people's work[a]**	**Physical activity is harmful[b]**	**Poor prognosis[c]**	**Commonly caused by people's work[a]**	**Physical activity is harmful[b]**	**Poor prognosis[c]**
Sri Lanka						
Nurses	5.9	6.4	9.3	9.7	3.0	11.4
Office workers	13.8	10.5	4.6	19.7	4.6	3.9
Other workers (1)	4.0	36.0	10.4	3.6	11.2	8.0
Other workers (2)	20.5	9.9	7.3	20.5	6.0	6.0
Japan						
Nurses	46.6	14.7	18.2	24.3	5.7	9.3
Office workers	16.5	19.7	14.2	11.6	9.0	7.4
Other workers (1)	47.2	25.6	21.8	33.2	11.7	10.1
Other workers (2)	21.4	23.7	17.5	12.4	16.1	6.5
South Africa						
Nurses	37.7	5.3	7.7	36.0	3.6	6.1
Office workers	24.9	6.6	4.8	22.7	3.1	3.5
Australia						
Nurses	19.2	2.8	6.8	12.4	2.4	2.4
New Zealand						
Nurses	20.3	2.8	2.3	11.9	1.1	4.0
Office workers	6.2	2.1	2.8	9.0	2.1	4.1
Other workers	21.2	14.2	6.2	29.2	12.4	5.3

[a]Completely agree that such pain is commonly caused by people's work.
[b]Completely agree that for someone with such pain, a) physical activity should be avoided as it might cause harm, and b) rest is needed to get better.
[c]Completely agree that for someone with such pain, rest is needed to get better, and completely disagree that such problems usually get better within three months.
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Table 10. Comparison of UK participants who provided information by interview and by self-administered questionnaire.

	Nurses		Office workers		Other workers	
	Interview	**Self-administered questionnaire**	**Interview**	**Self-administered questionnaire**	**Interview**	**Self-administered questionnaire**
Number selected	190	500	200	851	240	1329
Number (%) participated	91 (48)	199 (40)	88 (44)	388 (46)	122 (51)	320 (24)
Number of subjects analysed	78	179	66	314	110	276
Prevalence (%) of activities in an average working day						
Use keyboard >4 hr	6.4	15.6	84.9	89.8	1.8	5.1
Other repeated wrist/hand movement >4 hr	46.2	43.0	22.7	32.8	86.4	80.1
Repeated elbow bending >1 hr	60.3	52.5	13.6	29.9	96.4	89.1
Hands above shoulder height >1 hr	7.7	9.5	1.5	1.3	55.5	50.4
Lifting ≥25 kg by hand	28.2	28.5	9.1	3.2	12.7	12.0
Kneeling/squatting >1 hr	21.8	17.3	1.5	0.3	15.5	7.6
Prevalence (%) of pain in past month						
Low back	26.9	36.3	28.8	26.8	34.6	34.4
Neck	14.1	20.1	21.2	22.9	20.9	20.7
Shoulder	9.0	21.8	21.2	20.7	33.6	31.2
Elbow	2.6	2.8	12.1	8.0	14.6	15.2
Wrist/hand	14.1	15.6	19.7	17.5	24.6	21.7
Knee	12.8	18.4	27.3	22.3	21.8	24.6

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Supporting Information

Appendix S1 Committees which provided ethical approval for the cupid study.
(DOCX)

Appendix S2 Baseline questionnaire.
(DOCX)

Appendix S3 Follow-up questionnaire.
(DOCX)

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Author Contributions

Conceived and designed the experiments: DC KTP. Performed the experiments: DC GN KTP KC VEF MHM LMS RH FH RF NH LHB MVM LAQ MR SAF DG EJSV ECH AC SVP CS JMM GD FGB MB MC MMF ACP ES LC PB MK EM KO TS RRH FS AS MMK SSPW RJPJ NS ARW KM NY BN DK MRS HLK VCWH DMU HH SD DM AG. Analyzed the data: GN DC. Wrote the paper: DC. Principal investigator Brazil: VEF. Principal investigator Ecuador: RH. Principal investigator Colombia: LHB. Principal Investigators Costa Rica and Nicaragua: SAF DG. Principal investigator UK: DC. Principal investigator Spain: SV-P. Principal investigator Italy: MB. Principal investigator Greece: ES. Principal investigator Estonia: EM. Principal investigator Lebanon: RRH. Principal investigator Iran: FS. Principal investigator Pakistan: MMK. Principal investigator Sri Lanka: SSPW. Principal investigator Japan: KM. Principal investigator South Africa: BN. Principal investigator Australia: MRS. Principal investigator New Zealand: HH. All authors reviewed the draft manuscript and contributed to its finalization.

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Appendix VIII. Communications presented at scientific conferences


EPICOH 2013
IMPROVING THE IMPACT
18 - 21 JUNE 2013 UTRECHT, THE NETHERLANDS

150 Psychological and culturally influenced risk factors for the incidence and persistence of non-disabling and disabling musculoskeletal pain. Spanish CUPID study. S.V.P. Vargas-Prada , Serra , Martínez , Delclos , Coggon , Benavides
Session: 5. Muscoskeletal disorders.

21 International variation in musculoskeletal sickness absence: findings from the CUPID study D. Coggon , S. Vargas-Prada , G. Ntani , K.T. Palmer
Session: K. Musculoskeletal disease.

Ambdues dins de:

23rd Conference on Epidemiology in Occupational Health
EPICOH 2.0.13: Improving the impact
Utrecht, The Netherlands, 18 - 21 june 2013

Medicina del lavoro. 2012; 103 (4)

Vargas-Prada S, Coggon D, Ntani G, Palmer KT on behalf of the CUPID collaboration. International variation in musculoskeletal sickness absence: findings from the CUPID study. Póster presentat en el congrés EPICOH 2013 : 23rd Conference on Epidemiology in Occupational Health. Improving the impact. Utrecht (The Netherlands), 18-21 June 2013.

The CUPID Collaboration

INTERNATIONAL VARIATIONS IN MUSCULOSKELETAL SICKNESS ABSENCE: FINDINGS FROM THE CUPID STUDY

Sergio Vargas-Prada (1), David Coggon (2), Georgia Ntani (2), Keith T. Palmer (2) on behalf of the CUPID Collaboration.

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Introduction

- Absence from work due to musculoskeletal pain (MSP) is expensive for employers and damaging to workers' confidence and self-esteem.
- Substantial international variations in rates of sickness absence have been suggested.
- Identification of risk factors that explain these variations might provide valuable pointers to practical preventive policies.

Objectives

- To quantify the variation rates of absence for MSP across 47 occupational groups from 18 countries.
- To explore personal and group-level risk factors that might explain observed differences.

Methods

- Cross-sectional design. Study population: 12,416 workers (aged 20-59 who had been in their current job for at least 12 months) from 47 occupational groups - three categories: nurses (including nursing assistants), office workers and other workers (mainly manual workers performing repetitive tasks).
- Data collection in each country (2006-11) using a standardised questionnaire (self-administrated or interview) originally drafted in English, translated into local languages, and then independently back-translated into English. Approved by Local Ethics Committees.
- CUPID questionnaire: demographics; age finished full-time education; occupation; work-related psychosocial risk factors and physical activities; pain during the past 12 months in each of six anatomical sites (low back, neck, shoulder, elbow, wrist/hand and knee); adverse health beliefs about pain (FABQ - 3 domains relating to the effects of physical activity, work-relatedness and prognosis); somatising tendency (BSI), mental health (SF-36); and total duration of sickness absence in the past year because of MSP in the six anatomical regions and because of other illness.
- Information for each occupational group on: unemployment rate; entitlement to sick pay (first 3 months of absence); availability of social security support; financial support for ill-health retirement; payment for primary medical care; and availability of compensation for work-related MS disorders.
- Associations of sickness absence due to MSP (>5 days in total) with risk factors were examined by Poisson regression (Stata v12.1).

Results

Table 1 Associations of personal characteristics with prolonged sickness absence (> 5 days in total) in past 12 months because of musculoskeletal pain

Risk factor	Number in sample	Cases[a] N (%)	PRR (95%CI)[b]
Sex			
Male	4348	235 (5.4)	1
Female	8068	705 (8.7)	1.02 (0.88-1.19)
Age (years)			
20-29	3058	139 (4.5)	1
30-39	3971	283 (7.1)	1.35 (1.06-1.73)
40-49	3451	308 (8.9)	1.38 (1.08-1.77)
50-59	1936	210 (10.8)	1.60 (1.29-1.98)
Age finished full-time education (years)			
≥20	7244	486 (6.7)	1
17-19	3374	263 (7.8)	1.15 (0.96-1.38)
14-16	1269	130 (10.2)	1.28 (1.00-1.65)
<14	470	57 (12.1)	1.21 (0.82-1.78)
Unknown	59	4 (6.8)	0.97 (0.36-2.56)
Number of distressing somatic symptoms in past week			
0	7399	392 (5.3)	1
1	2609	212 (8.1)	1.09 (0.93-1.27)
2+	2286	318 (13.9)	1.24 (1.08-1.44)
Missing	122	18 (14.8)	1.17 (0.76-1.81)
Mental health			
Good	4700	295 (6.3)	1
Intermediate	3756	269 (7.2)	1.06 (0.92-1.22)
Poor	3885	366 (9.4)	1.19 (1.04-1.35)
Missing	75	10 (13.3)	1.63 (0.76-3.52)
Number of physically loading activities			
0	874	35 (4.0)	1
1	2198	94 (4.3)	0.99 (0.70-1.40)
2	3711	253 (6.8)	1.16 (0.78-1.71)
3	3068	286 (9.3)	1.38 (0.96-1.99)
4	1750	165 (9.4)	1.30 (0.90-1.88)
5	815	107 (13.1)	1.49 (1.02-2.18)
Psychosocial aspects of work			
Work >50 hours per week	2664	106 (4.0)	0.90 (0.69-1.17)
Time pressure at work	9341	785 (8.4)	1.23 (1.03-1.46)
Lack of support at work	3013	296 (9.8)	1.03 (0.89-1.18)
Job dissatisfaction	2535	223 (8.8)	1.10 (0.95-1.27)
Lack of job control	2663	250 (9.4)	1.04 (0.94-1.16)
Job insecurity	3912	277 (7.1)	0.89 (0.78-1.02)
Adverse beliefs about musculoskeletal pain			
Work-relatedness	4870	470 (9.7)	1.10 (0.98-1.24)
Physical activity	2576	219 (8.5)	1.18 (1.02-1.37)
Prognosis	2079	240 (11.5)	1.23 (1.06-1.44)
>5 days absence in past 12 months for other illness	1226	194 (15.8)	1.43 (1.16-1.77)
Number of anatomical sites painful for ≥7 days in past 12 months			
0-1	7765	274 (3.5)	1
2	1530	138 (9.0)	2.16 (1.78-2.62)
3	1468	170 (11.6)	2.67 (2.21-3.22)
4	975	159 (16.3)	3.40 (2.86-4.03)
5	462	129 (27.9)	4.55 (3.78-5.48)
6	216	70 (32.4)	4.98 (3.85-6.44)

a Number (%) of cases among those exposed to risk factor
b Risk estimates derived from a single Poisson regression model incorporating all of variables for which results are presented

Figure 1 Twelve-month prevalence of prolonged sickness absence (>5 days in total) for musculoskeletal pain and for other illness by occupational group

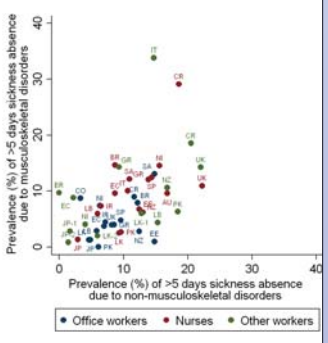

Figure 2 Ratios of observed to expected prevalence of prolonged sickness absence in past year (>5 days in total) because of musculoskeletal pain in 47 occupational groups, according to level of adjustment for risk factors

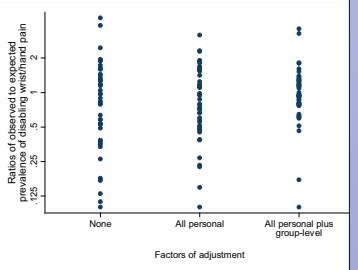

Table 2 Associations of group-level risk factors with prolonged sickness absence (> 5 days in total) in the past 12 months because of musculoskeletal disorders. Analysis was based on 47 occupational groups.

	Number of occupational groups exposed	Level of exposure Mean	(SD[a])	PRR (95% CI)[b]
Unemployment rate ≥10%	12			1.04 (0.70-1.54)
Full sick pay in first three months absence	25			1.06 (0.74-1.52)
Social security for long-term unemployment	28			0.87 (0.48-1.58)
Financial support for ill-health retirement (sometimes or usually)	28			0.98 (0.65-1.46)
Payment for primary care (part or full)	19			1.09 (0.69-1.71)
Compensation for work-related musculoskeletal disorders (any)	38			1.08 (0.77-1.51)
Group prevalence (%) of adverse beliefs about work-relatedness of musculoskeletal pain[c]	47	39	21	1.22 (1.01-1.47)
Group prevalence (%) of adverse beliefs about musculoskeletal pain and physical activity[c]	47	22	19	0.68 (0.53-0.85)
Group prevalence (%) of adverse beliefs about prognosis of musculoskeletal pain[c]	47	16	9	1.03 (0.86-1.23)
Group prevalence (%) of time pressure at work[c]	47	77	16	1.43 (1.24-1.65)
Group prevalence (%) of lack of support at work[c]	47	22	20	1.06 (0.93-1.22)
Group prevalence (%) of job dissatisfaction[c]	47	17	16	1.05 (0.84-1.32)
Group prevalence (%) of lack of job control[c]	47	22	20	1.08 (0.90-1.28)
Group prevalence (%) of job insecurity[c]	47	31	18	0.94 (0.78-1.13)
Group prevalence (%) of >5days absence in past 12 months for other illness[c]	47	10	6	1.34 (1.16-1.56)

a Mean and standard deviation of prevalence (%) across the 47 occupational groups
b Risk estimates derived from a single Poisson regression model incorporating all of variables for which results are presented
c Analysed as a continuous variable. Risk estimates are for an increase of one standard deviation

Conclusions

- Individual-level risk factors explained little of the >30-fold variation in prevalence between occupational groups.
- MS sickness absence might be reduced by eliminating excessive time pressures in work, maximising employees' responsibility and control, and providing flexibility of duties for those with disabling symptoms.

OC 4.2.4
Predictors for the incidence of upper limb pain and associated disability in a cohort of Spanish worker : findings from the CUPID study. Pàg S36

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Heath beliefs, mental health, somatizing tendency and recent history of pain as predictors of the incidence and persistence of low back pain in Spanish workers.

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Introduction

- In Spain it has been estimated that the costs of sickness absence due to low back pain (LBP) is more than €67 million per year, representing 22 lost working days per episode of LBP[1]
- LBP has been linked with physical demands at the workplace[2]
- It has been suggested that also cultural environment and psychosocial influences may have an important role in pain perception among workers who perform similar tasks at jobs located in different cultural settings[3]
- There is still a lack of longitudinal studies that jointly analyze the role of occupational lifting and psychological risk factors in relation to the incidence and persistence of LBP

1. González Viejo et al. Incapacidad por dolor lumbar en España. Med Clin (Barc). 2000;114:491-2.
2. Wadell et al. Occupational health guidelines for the management of low back pain at work: evidence review. Occup Med (Lond) 2001;51:124-135.
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Objective

To assess whether health beliefs, mental health, somatizing tendency and history of LBP are important predictors of incidence and persistence of low back pain (LBP).

Methods

- Computer assisted personal interviews (November 2007 - February 2010).
- 1.105 Spanish nurses and office workers (aged 20-59 years).
- Questions at baseline: Health beliefs, mental health and somatising tendency
  LBP in the past month and past year
  Lift weights over 25 kg by hand during the working day.
- Questions after 1 year: LBP in the past month.
- Associations with incidence and persistence of LBP were explored using log binomial regression modelling.

Results

Table 1 Characteristics of participants at baseline and response rates at follow-up

Characteristic	Number who completed baseline questionnaire	Number who completed follow-up	Response rate (%)
Sex			
Male	136	124	91.2
Female	969	847	87.4
Age (years)			
20-29	240	196	81.7
30-39	360	318	88.3
40-49	348	315	90.5
50-59	157	142	90.4
Occupation			
Nurse	667	578	86.7
Office worker	438	393	89.7
Occupational lifting	557	483	86.7
Mental Health			
Good	370	323	87.3
Intermediate	356	314	88.2
Poor	379	334	88.1
Number of distressing somatic symptoms in the past week			
0	632	556	88.0
1	294	264	89.8
≥2	179	151	84.4
Adverse beliefs about LBP			
Physical activity	450	385	85.6
Work-relatedness	864	750	86.8
Prognosis	487	419	86.0
LBP in the past 12 months			
No	402	359	89.3
≤1 month in total	446	395	88.6
>1 month in total	257	217	84.4
LBP in the past month	460	392	85.2
All subjects	1,105	971	87.9

Table 2 Baseline predictors of new low back pain
Analysis was restricted to the 579 subjects with no LBP in the past month at baseline

Risk Factor	New low back pain n[a]	%[b]	RR (95% CI)[c]	RR (95% CI)[d]
Occupational lifting	64	25.8	0.9 (0.6-1.4)	0.9 (0.6-1.4)
Adverse beliefs about LBP				
Physical activity	51	22.6	1.0 (0.7-1.3)	0.9 (0.7-1.2)
Work relatedness	106	24.5	1.3 (0.8-1.9)	1.1 (0.8-1.6)
Prognosis	52	23.5	1.0 (0.7-1.3)	0.8 (0.6-1.1)
Mental health				
Good	38	16.8	1	1
Intermediate	53	27.7	1.7 (1.2-2.4)	1.4 (1.0-2.0)
Poor	41	25.3	1.5 (1.0-2.2)	1.2 (0.8-1.7)
Number of distressing somatic symptoms in the past week				
0	61	17.5	1	1
1	46	29.7	1.6 (1.2-2.3)	1.3 (1.0-1.8)
≥2	25	32.9	1.8 (1.2-2.7)	1.3 (0.9-1.9)
LBP in the past 12 months, at baseline				
No	47	13.1	1	1
≤1 month in total	68	34.9	2.6 (1.9-3.7)	2.4 (1.7-3.4)
>1 month in total	17	68.0	4.7 (3.1-6.9)	4.1 (2.8-6.0)

[a] Number of subjects with new LBP
[b] Percentage of subjects with new LBP
[c] Adjusted for sex, age and occupation
[d] Adjusted for sex, age, occupation and for the other risk factors in the table

Table 3 Baseline predictors of persistence of low back pain
Analysis was restricted to the 392 subjects with LBP in the past month at baseline

Risk Factor	Persistence of low back pain n[a]	%[b]	RR (95% CI) [c]	RR (95% CI) [d]
Occupational lifting	144	61.3	1.2 (0.9-1.5)	1.1 (1.0-1.4)
Adverse beliefs about LBP				
Physical activity	93	58.5	1.0 (0.8-1.1)	0.9 (0.8-1.0)
Work relatedness	196	61.6	1.2 (1.0-1.5)	1.2 (1.0-1.5)
Prognosis	128	64.6	1.2 (1.1-1.4)	1.1 (1.0-1.3)
Mental health				
Good	56	57.7	1	1
Intermediate	68	55.3	1.0 (0.8-1.2)	0.9 (0.8-1.1)
Poor	109	63.4	1.1 (0.9-1.3)	1.0 (0.9-1.2)
Number of distressing somatic symptoms in the past week				
0	115	55.3	1	1
1	66	60.6	1.1 (0.9-1.3)	1.1 (1.0-1.3)
≥2	52	69.3	1.3 (1.0-1.5)	1.1 (1.0-1.3)
LBP in past 12 months, at baseline				
≤1 month in total	97	48.5	1	1
>1 month in total	136	70.8	1.4 (1.2-1.7)	1.4 (1.2-1.6)

[a] Number of subjects with persistence of LBP
[b] Percentage of subjects with persistence of LBP
[c] Adjusted for sex, age and occupation
[d] Adjusted for sex, age occupation and for the other risk factors in the table

Conclusions

- Health beliefs, mental health, somatising tendency and history of LBP should be considered as possible predictors when assessing the prognosis of patients with LBP.
- In this longitudinal survey of Spanish workers, occupational lifting was not a predictor both of incident LBP and of persistence of LBP.

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Vargas-Prada S, Serra C, Martínez JM, Ntani G, Palmer KT, Coggon D, Benavides FG.
Dolor musculoesquelético, salud mental y somatización por ocupación y país: hallazgos del estudio CUPID.
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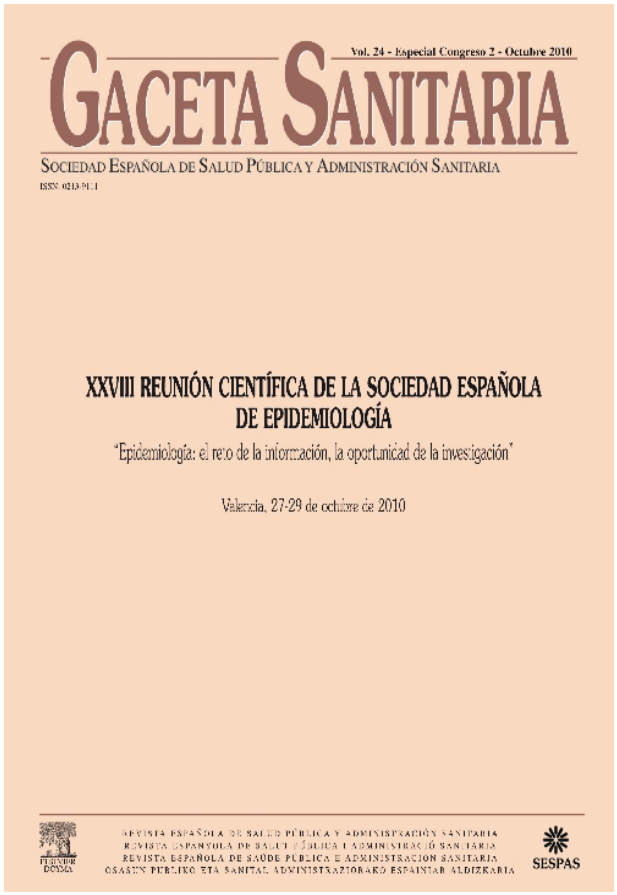
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Vargas-Prada S, Serra C, Martínez JM, Orpella, X, Bas J, Peña P, Benavides F.G.
Estudio longitudinal acerca del papel de los factores culturales y creencias sobre la salud en el dolor musculoesquelético de espalda.

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Factores culturales y creencias sobre la salud asociados a la incidencia del dolor de espalda. Estudio CUPID-España.

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Introducción

- Los trastornos musculoesqueléticos (ME) representan entre 40-50% de la patología relacionada con el trabajo[1].
- La lumbalgia se ha relacionado con la actividad física en el trabajo, sin embargo, evidencia reciente sugiere que el entorno cultural y las creencias sobre la salud tendrían un papel importante[2].
- Las creencias sobre la salud se definen como aquellas ideas o actitudes sobre el dolor ampliamente aceptadas por parte de la población y que son muy difíciles de modificar[3].

Objetivo

Analizar el papel de los factores culturales y creencias sobre la salud en la incidencia de dolor de espalda, valorando si el aumento del número de creencias produce un incremento de la incidencia de dolor de espalda.

Material y métodos

- Cohorte de 415 enfermeras y administrativos (Estudio CUPID- España), de 3 hospitales de Barcelona, 19 y 60 años de edad, sin dolor de espalda en la entrevista basal.
- Entrevistas al inicio y después de un año, cuestionario electrónico en el lugar de trabajo sobre características demográficas, laborales, síntomas de dolor de espalda y cinco premisas sobre creencias del dolor de espalda. Tasa de respuesta del 89,9%.
- Se analizó si a mayor número de creencias, mayor incidencia de dolor de espalda. Se consideró el diferente peso de cada premisa ponderando cada una en función de su relación con el dolor de espalda (tabla 1)[4].
- Según la puntuación, se clasificaron las creencias en débiles, moderadas y fuertes. Para valorar la asociación entre el número y peso de creencias y la incidencia de dolor de espalda se obtuvieron odds ratios crudas (ORc) y ajustadas (ORa) e intervalos de confianza del 95% (IC95%) mediante regresión logística.

Tabla 1. Odds ratio de desarrollar dolor de espalda en 1 año para una respuesta afirmativa a cada creencia individual respecto a respuesta negativa y peso asignado a cada creencia individual.

	OR*	Peso asignado**
La actividad física debe ser evitada	**0,94**	**0**
Estos problemas no mejoran en <3m	**1,17**	**1**
El descanso es necesario para mejorar	**1,69**	**2**
No atenderlos problemas permanentes	**3,42**	**3**
Trabajo como causa de dolor	**1,71**	**2**

*OR de dolor de espalda en un año ajustada por cada creencia en forma individual.

** Si OR < 1,1 = 0; OR 1,1-1,5 =1; OR >1,5-2,5 =2; OR >2,5 = 3.

Conclusiones

- Las creencias sobre la salud podrían tener una influencia en la incidencia del dolor de espalda.
- Las intervenciones estarían dirigidas a modificar las creencias y expectativas complementando los esfuerzos preventivos actuales enfocados principalmente a la reducción de la carga física.

Resultados

Tabla 2. Descripción de la muestra (frecuencia y porcentaje), incidencia acumulada de dolor de espalda e Intervalo de confianza al 95%.

	n (%)	IA* (IC 95%)
Sexo		
Hombres	42 (11,3)	9,5 (2,7 – 22,6)
Mujeres	331 (88,7)	25,7 (21,1 – 30,7)
Edad (años)		
≤ 29	87 (23,3)	28,7 (19,5 – 39,4)
30 - 39	109 (29,2)	26,6 (18,6 – 35,9)
40 - 49	123 (33,0)	19,5 (12,9 – 27,6)
≥ 50	54 (14,5)	20,4 (10,6 – 33,5)
Ocupación		
Administrativa/o	112 (30,0)	17,0 (10,5 – 25,2)
Enfermera/o	155 (41,6)	22,6 (16,3 – 30,0)
Auxiliar de Enfermería	106 (28,4)	33,0 (24,2 – 42,8)
Tipo Contrato		
Indefinido	323 (86,6)	23,8 (19,3 – 28,9)
Temporal	50 (13,4)	24,0 (13,1 – 38,2)
Tiempo en su trabajo (años)		
≤ 5	114 (30,6)	23,7 (16,2 – 32,6)
> 5	259 (69,4)	23,9 (18,9 – 29,6)
Horas/semana trabajadas		
≤ 37	199 (53,4)	26,6 (20,6 – 33,3)
> 37	174 (46,6)	20,7 (14,9 – 27,5)
Antecedente de dolor		
No	221 (59,2)	12,2 (8,2 – 17,3)
Si	152 (40,8)	40,8 (32,9 – 49,0)
Demanda física laboral		
Baja	122 (32,7)	18,9 (12,3 – 26,9)
Media	174 (46,6)	24,1 (18,0 – 31,2)
Alta	77 (20,6)	31,2 (21,1 – 42,7)
Riesgo psicosocial laboral		
Baja	113 (30,3)	25,7 (17,9 – 34,7)
Media	236 (63,3)	23,3 (18,1 – 29,2)
Alta	24 (6,4)	20,8 (7,1 – 42,2)
Creencias sobre dolor:		
La actividad física debe ser evitada		
Si	158 (42,4)	24,1 (17,6 – 31,5)
No	215 (57,6)	23,7 (18,2 – 30,0)
Estos problemas no mejoran en <3m		
Si	234 (62,7)	23,1 (17,8 – 29,0)
No	139 (37,3)	25,2 (18,2 – 33,2)
El descanso es necesario para mejorar		
Si	359 (96,2)	24,2 (19,9 – 29,0)
No	14 (3,8)	14,3 (17,8 – 42,8)
No atenderlos problemas permanentes		
Si	365 (97,9)	24,4 (20,1 – 29,1)
No	8 (2,1)	0 (0 – 36, 9)
Trabajo como causa de dolor		
Si	283 (75,9)	26,1 (21,1 – 31,7)
No	90 (24,1)	16,7 (9,6 – 26,0)
Total	373 (100,0)	23,9 (19,6 ; 28,5)

*Incidencia de dolor de espalda al año por 100 personas.

Figura 1: Incidencia acumulada de dolor de espalda e Intervalo de confianza al 95% para la escala de creencias sobre dolor de espalda.

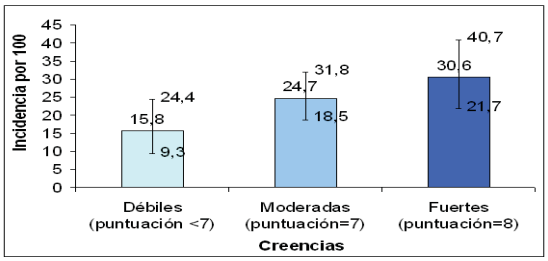

Tabla 2. Asociación entre desarrollar dolor de espalda después de un año y grado de creencias sobre dolor de espalda. Odds Ratio (OR) e intervalo de confianza (IC95%) crudos y ajustados.

	Creencias débiles OR	Creencias moderadas OR (IC 95%)	Creencias fuertes OR (IC 95%)	OR** (IC 95%)
Crudo	1	1,74 (0,92-3,29)	**2,34* (1,18-4,65)**	**1,51* (1,08-2,11)**
Ajustado***	1	1,26 (0,61-2,63)	1,45 (0,65-3,24)	1,20 (0,81-1,78)

IC 95%: Intervalo de confianza al 95% de la odds ratio.
*Estadísticamente significativo
** Valoración de la tendencia lineal: OR de dolor de espalda al incrementar en una categoría los valores de la escala de creencia (débil, moderada, fuerte).
***Ajustado por edad, sexo, ocupación, tipo contrato, tiempo en su trabajo, centro, # horas/semana, demanda física, riesgo psicosocial laboral, antecedente dolor.

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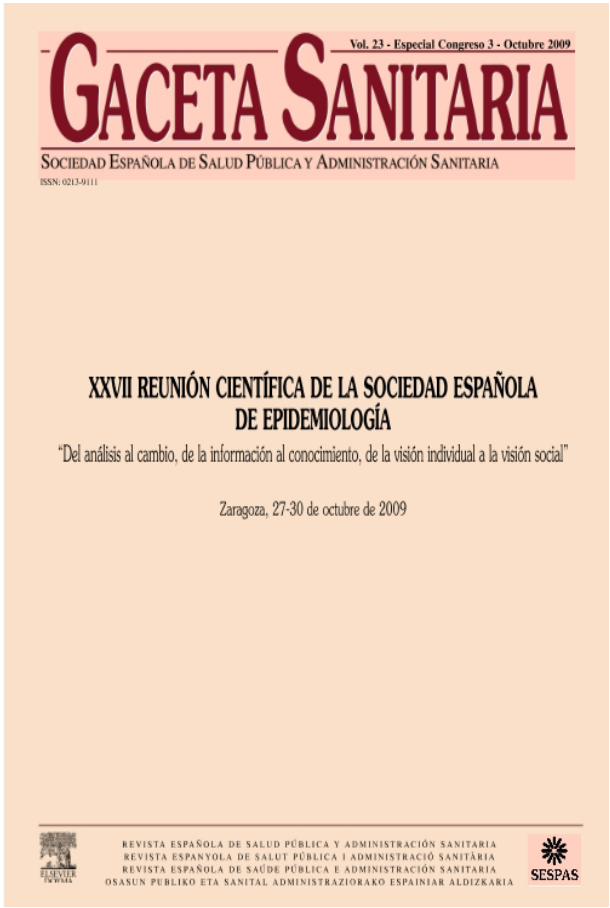
Los autores declaran no tener ningún conflicto de intereses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