

Topical Review: PAIN that Does not Interfere with Daily Life – a New Focus for Population
Epidemiology and Public Health?

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Background

The Global Burden of Disease study [20] has highlighted just how much disability is attributable to common syndromes of chronic pain such as back pain and osteoarthritis. Yet prevention of chronic pain remains low in national public health priorities in most countries. One reason may be that epidemiological research into causality and risk factors for disease onset, which has driven and underpinned public health transformation of the occurrence of diseases such as lung cancer and cardiovascular disease, has not provided an evidence base for population-level strategies and action to reduce the risk of chronic disabling pain. In this topical review, we consider the potential for epidemiological research on chronic pain to shift its customary focus in order to support a more practical public health target, namely to reduce population levels of pain interference so that people with chronic pain can better engage in life.

Pain-related interference has been defined as ‘perceived disruption in daily activities, relationships, roles, and employment resulting from pain’ [9]. Chronic or recurrent pain is reported by around one-third of the adult population, but up to half state that their pain does not interfere with daily life [27,48]. Many people, therefore, have chronic pain that does not interfere with their lives, and there is the potential to identify modifiable factors associated with non-interference.

Population-based epidemiological research can contribute to this by quantifying characteristics associated with interference-free pain and investigating how people in community settings maintain an interference-free life despite continuing pain. In this topical review we consider the current contribution of epidemiological studies to this objective. We

start by introducing the measurement of pain interference and the scope of our literature search, before summarizing our findings. We discuss the wider context of research into non-interfering pain, and propose a research agenda for epidemiological studies.

Measuring pain interference

Questions about how pain interferes with daily life, in general or in specific areas such as mobility or sleep, have long been incorporated in self-report instruments. Examples include: one item in the Medical-Outcomes-Survey Short-Form 36 on the extent to which recent pain has interfered with social or domestic work [53]; three items in the Brief Pain Inventory [49] about interference with social and emotional components of daily life; and 41 items in the open-access bank created by the Patient-Reported Outcomes Measurement Information System Pain Interference (PROMIS-PI) initiative [3].

These questions target 'life as it is', as compared with tests of physical function or measures of impairment. Items on interference in the PROMIS-PI databank have high internal consistency and are strongly unidimensional [3]. These interference measures discriminate between clinically different groups, and are responsive to change [6,29].

Pain interference measures have been used mainly to assess pain outcomes in clinical studies. However, pain interference items have been incorporated in national health and general population surveys, establishing normative data and generating prevalence estimates. Such studies have been mostly cross-sectional and hence unable to capture the longitudinal nature of interfering pain and its risk factors. Rarely has their focus been on the subgroup whose pain is non-interfering.

Scope of review

The aim of the topical review was to identify key epidemiological studies on people reporting persistent pain that did not interfere with life. The literature search, encompassing Medline, EMBASE and AgeLine and performed by an information specialist, included the terms 'longitudinal', 'prospective', 'follow*', 'time', 'prognosis', 'cohort', 'pain', '(non)interfere', '(non)interfering', '(non)disabling' (Supplementary file, available at <http://links.lww.com/PAIN/A647>).

We have summarized findings from studies identified by this search below, with more detailed discussion focused on the subgroup of prospective longitudinal studies.

Findings

Occurrence

The prevalence of pain that does not interfere with life can be calculated from studies focused primarily on interfering pain. Population prevalence studies give variable estimates, reflecting between-study differences in definitions of pain and the ages of people studied. An Australian study gives an estimated prevalence of 4% for non-interfering continuous daily pain of at least three months duration in those aged over 65 years [22]. A study of Canadian adults provides a similar prevalence estimate of non-interfering chronic pain of 5% [43]. A study of US adults aged over 50 years provides an estimate of 12% who report they were often troubled by pain without it interfering with daily life [48]. A UK study suggests an estimated prevalence in adults aged over 50 years of 28% for non-interfering pain lasting at least 24 hours [50].

The findings from these studies suggest that the broader the definition of pain, the higher will be the prevalence estimate, and the higher the proportion of people who will report that pain as non-interfering. There is some evidence to suggest that in people aged over 50 years, the oldest age groups are more likely to state their pain is interfering with their life [14,50], although another study suggests no change with age [48]. There is no consistent association in these studies between gender and non-interfering pain.

Natural history

Pain that does not interfere with life may be an early phase of chronic pain that progresses to interfering pain. Having non-interfering pain is a strong risk factor for onset of future interfering pain [28]. There is also evidence for other trajectories. First, there are people who initially experience pain that interferes with life that becomes non-interfering over time. This occurs, for example, after an acute onset of pain. A study of trauma patients showed lower levels of pain interference for all levels of pain intensity at 12 months post-trauma compared with 6 weeks post-trauma (Figure 1) [10].

Second, older adults may have long-term non-interfering pain, and they form a clearly distinct group. In a general population study of adults aged 50 and over who responded to postal questionnaires at baseline, three years and six years, 12% reported pain that did not interfere with their lives at all three time points [27]. This compares to 19% who reported interfering pain, and 9% who reported no pain, at all three time points. At six-year follow-up, those with long-term non-interfering pain still reported high pain intensity (59%) and a high prevalence of widespread pain (33%), and 90% had used pain medication in the past 4 weeks. However, they differed from the group with long-term interfering pain on socio-demographic characteristics and had lower levels of anxiety, depression, and comorbidity.

Factors explaining non-interfering versus interfering pain

Non-interfering pain may reflect successful treatment, including pain self-management.

However, differences in risk factors between people with pain who report interference and those who report pain without interference suggest that absence of exposure to risks such as depression, anxiety, and economic hardship are important.

Psychosocial factors, for example, are important risk factors for pain interference. Comorbid depression is associated with pain that is interfering [27,40,46], as are anxiety and catastrophizing [30,46]. More cognitively focused studies have identified that established beliefs such as pessimism about the long-term prognosis of pain increase the probability that pain interferes with life (for example, [52]). By contrast, the lower prevalence of non-disabling pain reported by older people is not explained by declining levels of cognitive function [15].

Socio-economic status influences whether pain interferes with life, with evidence that low socio-economic status is associated with a higher prevalence of pain interference, independent of pain severity and number of pain sites [16,27].

Factors that promote non-interfering pain are not as well explored in population studies compared to risk factors for interfering pain. Behavioural psychology has provided insights into how people can live positively despite pain, drawing on concepts such as self-efficacy [8] or coping and acceptance strategies [18]. In persons with pain, self-efficacy concerns the expectation and confidence that they can function in daily life despite pain [38]. Although prospective cohort studies of people with pain report that low self-efficacy predicts reduced

daily activity [42] or interference with psychosocial aspects of life [7], some report high self-efficacy as a positive influence on subsequent improvements in daily function [23] and return to work [1]. The relevance to population studies and public health lies in the potential for improving self-efficacy and coping, as achieved by osteoarthritis self-help groups [12] and public health campaigns about back pain [11]. However, there is limited research on causal pathways to inform the content and effectiveness of interventions to improve public understanding and confidence about living with pain.

The 'disability paradox' states that the degree of disability does not equate to disease severity, such that a good quality of life includes acknowledging impairment, having a degree of control, being able to fulfil roles, having purpose and meaning in life, and engaging in reciprocity [2]. Accordingly, living well with chronic pain can also be attributed to physical and social activity and involvement, within one's capabilities, and with flexibility to adapt [44], alongside the meaning that such activity and involvement hold within the person's life [35].

A linked and influential concept is resilience: 'the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma' [56]. In the context of pain, it has been characterized as 'the ability to restore and sustain living a fulfilling life in the presence of pain' [21]. Resilience may underlie the phenomenon of non-interfering pain, and its maintenance over time rather than its progression to pain that interferes. Importantly, resilience does not lie just at a psychological level. It relates to social, environmental and political contexts [55], highlighting the potential for interventions at these levels, as well as at the level of clinical care.

Finally, conceptions of ‘successful’ or ‘healthy’ ageing are prominent in the gerontological literature [24,45] and serve to expand the subjective meaning of ‘non-interference’. Illness and disability do not preclude individuals’ perceptions of successful ageing [41,57], and more specifically older people can consider themselves to have aged successfully despite chronic pain [13].

How does pain interference relate to pain intensity?

People may adjust their assessment of interference in line with changes in their reported pain intensity [26], the implication being that reduction in pain intensity can reduce pain interference. Other evidence, for example from studies of pain management based on cognitive-behavioural therapy [36], indicates that treatment approaches directed at reducing pain interference can alleviate pain intensity.

Clinical studies suggest that pain intensity and interference may have a bidirectional relationship. Patients with post-operative pain may achieve pain control by restricting activity after analgesics have run out [47]. Although treatment to reduce pain intensity can reduce interference, it may cause side effects that increase interference [32]. People may adjust their expectations of how and to what extent pain can be managed, so they no longer perceive their pain as interfering [33,34].

However, the important observation that non-interference is reported by people with pain at all levels of intensity [10,27] is strong evidence that pain interference is not simply another measure of pain intensity. The study highlighted in figure 1 is a rare example of an epidemiological study assessing levels of pain interference over time, stratified by pain

severity, in a cohort with new onset pain [10]. Studies in clinical settings have confirmed that the domain of pain interference is distinct from, although related to, pain intensity [3].

What are the consequences of non-interfering pain?

In the Women's Health Initiative study, women with non-interfering pain at baseline had a slightly slower rate of decline in overall physical function over 18 years compared with women reporting interfering pain at baseline [40]. However, most evidence on the more benign course of non-interfering pain is provided indirectly from findings about interfering pain that it is associated with a higher likelihood of developing long-term depression and anxiety [5], increased incidence of other medical conditions [9], worsening cognitive impairment in older people [51], and a higher incidence of falls [31].

Limitations of the review

In order to illustrate specific issues, we chose to limit our epidemiological review to "pain interference". The use of broader search terms (for example, functional limitation, quality of life) may yield more studies relevant to these issues.

Agenda for epidemiological research and public health

1. Broaden the conceptual field of view of long-term pain

Goubert and Trompetter [21] argued for a shift in pain research to focus on positive approaches and outcomes, and we propose that this should extend to epidemiology to include the characterization and study of non-interfering pain in positive biopsychosocial terms (e.g. improved physical and mental wellbeing; active social engagement) to inform public health, and policy.

Importantly, we can learn from people with non-interfering pain about potential benefits of promoting social participation and enhancing physical and mental wellbeing, which could form part of an integrated public health and clinical agenda for research, practice and policy. Qualitative studies (for example [25]) highlight that subgroups of the population are less able to increase social participation without support. Population-level interventions, as used in successful public health campaigns [11], are needed [4,25]. Aims of this agenda would be to increase the relative prevalence of non-interfering compared with interfering pain in the general population, and to improve early identification of those on a trajectory of non-interfering pain, avoiding unnecessary treatment and investigation. Approaches that focus on modifiable determinants of non-interference could help deliver better long-term individual and social outcomes. As one example, future epidemiological research could identify mechanisms that promote resilient functioning to inform development of targeted population-based interventions or interventions at an early stage of pain to prevent long-term interference with daily life. The value of such a research agenda would lie in its potential to shift the impact of chronic pain at the population level.

2. Use more appropriate study designs to capture the complexity of non-interfering pain

More needs to be known about common long-term trajectories of non-interfering pain. Trajectory research is needed that explores onset, patterns and variation over time, long-term consequences, and factors that determine differing non-interfering pain trajectories.

Previous studies have generally focussed on baseline measurements of pain and pain interference, and measurements at one or two short-term follow-up time points. However, pain experience tends to be complex and non-linear, involving progression, resolution, recurrence, or fluctuations. Current approaches to measurement cannot capture this

complexity. New methods of trajectory analysis are useful in describing the nature of pain experience over time [37]. These methods require extended periods of follow-up and multiple points of data capture. Trajectory-based studies exist for pain frequency and intensity and could usefully inform similar studies for non-interfering pain [17,19,39,54].

Conclusion

Our topical review sets out the basis for epidemiological research to support a public health target for prevention of chronic pain that interferes with everyday life. We have identified from the literature that non-interfering pain is common, and is a distinctive state rather than an inevitable precursor of interfering pain. People with high levels of pain intensity can have non-interference that is maintained over time, or levels of interference that improve over time regardless of pain intensity. We have proposed an agenda for epidemiology research on non-interfering pain to understand its common trajectories at a population level. This agenda should incorporate public health research that build on behavioural approaches to pain management and existing research into resilience and healthy ageing. This has the potential to reduce or prevent the population impact of chronic pain on daily living.

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Conflicts of Interest: None

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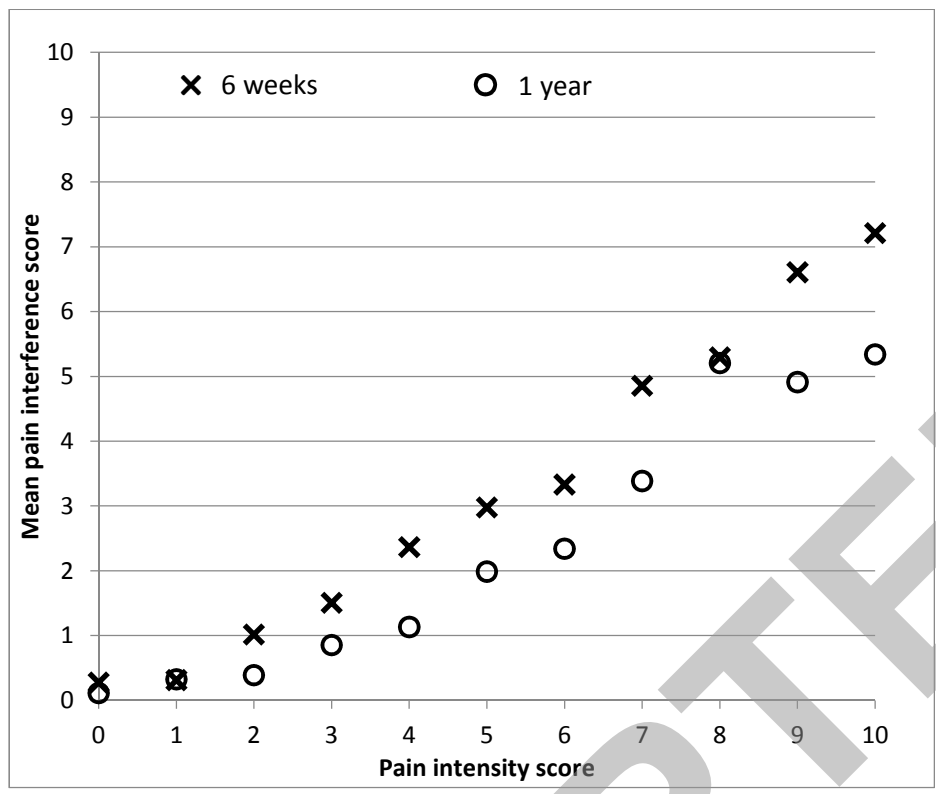
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Figure 1 – Mean pain interference score for each level of pain intensity, at 6 weeks and at 1 year after a motor vehicle collision^a

^a Adapted from Bortsov et al. [10] with permission, using original data supplied by the corresponding author; higher scores indicate greater pain interference and intensity, range 0–

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ACCEPTED