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Editorial comment

# Chronic pain is strongly associated with work disability

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In this issue of the *Scandinavian Journal of Pain*, Landmark et al. analyse associations between chronic pain and both objective and subjective measures of functioning [1]. Most profoundly the study reports that nearly half the work disability cases can be attributed to chronic pain.

## 1. Defining chronic pain

As the authors point out, there is currently no consensus definition of chronic pain in epidemiology. Though there appears to be some convergence on three or six months as a cutoff between acute and chronic pain, shorter durations have also been applied [2]. The use of additional criteria such as pain intensity or pain impact varies, as do the scales used to measure these dimensions. In many studies pain is confounded with discomfort, as is the case with the Rome III criteria for irritable bowel syndrome [3]. Taken together one is hard put to find two epidemiological studies that use the exact same definition of chronic pain, making comparisons between studies problematic to say the least.

Inconsistent definitions are most likely the major cause of the huge variation in prevalence estimates, ranging from 11 to 64 percent among adults [4,5]. Lack of comparability means that there is currently little or no grounds for concluding whether there are real differences between countries or whether chronic pain is a growing, constant or declining problem. This issue is not purely academic, but has important practical implications. With rising public healthcare costs, governments are increasingly basing priority decisions on epidemiological data sources such as the Global Burden of Disease Study [6]. Widely varying prevalence estimates and lack of a consensus definition are hardly helpful in placing chronic pain on this agenda. The 2010 wave of Global Burden of Disease Study did include some painful conditions: Notably, low-back pain was ranked 1st and neck pain was ranked 4th among causes of years lived with disability (YLD). However, chronic pain as a general category was notably absent from the study.

## 2. Prevalence versus impact

The societal impact of a given condition depends on both the number of people affected and on how debilitating the condition is for the average patient, most significantly: the extent to which the condition is associated with sick-leave, unemployment and disability (i.e. lost productivity and benefit expenses) and with health care utilisation (i.e. treatment expenses). As a general rule, a broad diagnostic classification will tend to show a weaker association with measures of impact than a more narrow definition, because a large proportion of the cases will have health problems of minor consequence. A highly important question is therefore whether chronic pain, when defined broadly so as to include a large proportion of the population, is associated with a considerable risk of work disability and other negative consequences, or whether the definition is too broad, with the majority of cases experiencing little or no impact on functioning. Here Landmark et al. study is of major importance because it documents these associations in a representative sample using registry data on work participation. The most notable finding was that the disability rate was 32% among those reporting chronic pain, compared to 8% of the remaining population. This translates to a population attributable fraction of 49% (i.e. the proportion disability cases in the population that would be prevented if chronic pain was abolished, assuming a causal relationship). This finding strongly suggests that chronic pain as defined in this study has considerable impact on functioning, despite 31% of the population meeting the case definition. Importantly, it has major implications for health policy: *If nearly half the disability cases can be attributed to chronic pain, even minimally effective treatment and preventative programmes for chronic pain may have major impact on the number of disabled individuals and resultant social security costs.*

## 3. Replication of findings in an independent data set

As part of the *The Status of Public Health in Norway 2010 – Report* our institute has previously estimated the population attributable proportion of chronic pain on disability with remarkably similar results to those reported by Landmark et al. As the report was cursory, did not include a methods section and is not available in English, this finding will briefly be reported here:

***Methods***: Data from the 2005 health study conducted by Statistics Norway was analysed. The target population was a random sample of 5000 randomly selected Norwegian individuals aged 16 years or older, stratified by sex and age. Selected individuals were interviewed by phone and completed a follow-up mail-in questionnaire. Interview data included information obtained for 3371 individuals (response rate = 67.4%) and the questionnaire was completed by 2239 individuals (response rate = 44.8%). This sample was

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**Table 1**
Risk ratio (RR) for work disability and population attributable fraction (PAF) as a function of chronic pain status. 95% confidence intervals are given in parenthesis. Note that PAF for all risk factors add to more than 100%. This does not reflect an error in the estimation, but rather that disability can be prevented by several means in the same individuals, i.e. most profoundly either *by removing chronic pain* or by arresting ageing (!).

| | RR | P | PAF |
|---|---|---|---|
| **Step 1** | | | |
| Sex (female) | 1.17 (0.89–1.53) | n.s. | 0.09 (−0.07 to 0.23) |
| Age (per 10 years) | 2.21 (1.90–2.65) | <0.01 | 0.81 (0.73 to 0.88) |
| Education (<11 years) | 1.44 (1.10–1.92) | <0.01 | 0.07 (0.02 to 0.14) |
| Chronic pain | 4.66 (3.41–6.47) | <0.01 | 0.56 (0.45 to 0.66) |
| **Step 2** | | | |
| Sex (female) | 1.11 (0.96–1.52) | n.s. | 0.06 (−0.03 to 0.22) |
| Age (per 10 years) | 2.20 (1.84–2.64) | <0.01 | 0.81 (0.71 to 0.88) |
| Education (<11 years) | 1.42 (1.11–1.82) | <0.01 | 0.07 (0.02 to 0.13) |
| HSCL (≥1.75) | 1.81 (1.43–2.31) | <0.01 | 0.10 (0.05 to 0.16) |
| Chronic pain | 4.30 (3.16–6.21) | <0.01 | 0.54 (0.44 to 0.65) |

restricted post hoc to include only persons aged 26–64 years, so as to omit children, student and pensioners, leaving a final sample of 804 men and 890 women. Chronic pain was defined as present if the subject responded "yes" to the question "Do you have persistent pain that has lasted for 3 months of longer?" and stated that the pain had lasted at least 6 months in the phone interview. The interview also included information on education, which for analytic purposes was dichotomised as low (≤10 years) or high (>10 years). Data on mental health was obtained from the follow-up questionnaire which included the Hopkins Symptom Check List, 25-item version (HSCL) [7]. From this questionnaire one item was dropped (headache) as it was considered overlapping with chronic pain. The remaining items were averaged and a standard cutoff of ≥1.75 was applied to identify individuals with probable case-level anxiety and/or depression. Analysis was performed in *R* version 3.0, using stepwise log-binomial regression, with disability as the dependent variable. Bootstrapping ($B = 1000$) was used to estimate 95% confidence intervals). In Step 1, chronic pain status, sex, age and education were entered as predictors, followed by Step 2, where HSCL status was also included.

***Results:*** The prevalence of chronic pain, was 29.5% (compared to 31% for Landmark, et al. [1]) and 9.5% were disabled. As can be seen from Table 1, Step 1, individuals reporting chronic pain are more than four and a half times as likely to be disabled as individuals without chronic pain. This translates to a population attributable fraction of 56%. Surprisingly, these figures were only slightly and non-significantly attenuated when controlling for mental health.

## 4. Conclusions

Landmark et al. demonstrate that chronic pain, though very common, is strongly associated with negative health outcomes and functioning – most profoundly with work disability, where chronic pain accounts for a population attributable fraction of 49% [1]. The validity of their findings gain strong support from their use of a large representative sample, longitudinal pain measurement, and the inclusion of registry data for work-participation. Furthermore, analysis of independent data presented here yields virtually identical results. Though neither analysis is informative about the causal direction between pain and disability, a recent longitudinal twin study of muscular skeletal conditions with 25 year follow-up strongly suggests that pain is a cause and not a consequence of disability [8]. *Taken together these findings provide a compelling incentive for initiating prevention and treatment programmes for chronic pain, in order to reduce disability rates in the population.*

## Conflict of interest

No conflict of interests declared.

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