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Multi-level evidence for the impact of pain on workplace attendance: linking shopping records to labour statistics and survey data

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Introduction & Background

Pain is a global threat to well-being and workplace productivity, yet current estimates of its prevalence vary greatly between studies. This is partly due to a lack of consistency in survey items and reliance on self-reported methods alone. Additionally, although pain can lead to absence from work, individuals are usually not excluded from workplace entirely, instead they might prefer to work despite a reduction in productivity, which further makes economic outcomes difficult to measure.

In this paper, we propose an innovative approach to measure pain by harnessing large-scale shopping data and predict workplace attendance, providing evidence at two levels.

Objectives & Approach

First and foremost, a key objective is to measure pain from self-medication behaviours. Self-medication is a common practice, with pain being a key motivator. While self-medication behaviours have been traditionally difficult to accurately examine, the emergence of digital trace data has opened new avenues.

In Study 1 (regional-level evidence), via data partnership, we utilised shopping records obtained from a major retailer chain (20,500,952 customers, 2014-2015) and computed metrics to represent the prevalence of pain in each local authority district (LAD). Specifically, we calculated the proportion of customers who purchased painkiller products at least 6 times in each LAD. In the statistical models, we used labour statistics as outcomes for workplace attendance (e.g., average working hours and proportions of individuals working part-time in each LAD), controlling for median income and education levels.

In Study 2 (individual-level evidence), with a data donation approach, we asked consenting 828 participants to donate their shopping history (2015-2024) with us via a survey and computed metrics to capture the presence of pain conditions at individual levels (e.g., the proportion of transactions with painkillers). Participants also reported their employment statuses, which we used as outcomes in statistical models, controlling for age, gender, and caring responsibilities.

Relevance to Digital Footprints

With two sets of novel digital footprints data, we inferred health conditions from shopping history and provided insights into the associations between pain and workplace productivity, a link that is traditionally difficult to accurately examine.

Results

In Study 1, we found strong evidence that regions with more individuals suffering from pain were associated with shorter working hours and higher proportion of individuals working part-time.

In Study 2, we found strong evidence that individuals who purchased proportionally more painkillers were less likely to work full-time, and also more likely to be restricted in their workplace attendance.

Conclusions & Implications

This paper investigates the impact of pain on workplace attendance and offers key insights into the future of health data collection and research, as well as providing the foundation for linking shopping patterns to pain conditions.

Keywords

chronic pain, data donation, workplace productivity, labour statistics

