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Working long hours and health

No unequivocal scientific evidence to support or refute a 48 hour week

Whether working long hours adversely affects health has been debated for many years. A recent European Council directive on working time (93/104/EC) has heightened the controversy. Its proposals include a minimum daily rest period of 11 consecutive hours in each 24 hour period, at least one rest day a week, four weeks' annual leave, and a restriction on night work to a maximum of eight hours on average. With some exceptions (including doctors in training), employees would, under the directive, have the legal right to refuse to work more than 48 hours a week. The directive would be implemented under article 118A of the Treaty of Rome, which requires the directive to be based on health and safety considerations and not general employment conditions. The British government disputes that this is a health and safety measure and is challenging its legal basis before the European Court of Justice.

The topic has attracted further attention recently with the death of a junior hospital doctor after an extended period on duty, and again in the aftermath of the untimely death of the leader of the Labour party. So what is the evidence linking working hours and health? The explanatory memorandum that accompanies the directive should help, and there is certainly no shortage of scientific papers.

Unfortunately, neither of these sources provides an unequivocal answer. The explanatory memorandum is particularly unhelpful. Most of the references are German: this is not a reflection of the world literature; many are obscure, and some are untraceable. It is not possible to examine, let alone support, assertions on health and working hours from this standpoint. A general literature search uncovers hundreds of papers since my review of the subject in 1978.[1] Three recent reviews are particularly good.[2-4] In addition, over 20 reviews have concentrated on specific concerns such as sleep, fatigue, performance, and the scheduling of hours of work.

At least half of the individual papers are concerned with attitudinal surveys, devoted to employees' (occasionally employers') opinions. Most of the rest are still rooted in studies of shift work, with few attempting to investigate the growing fashion for 10 hour or 12 hour working days. Virtually no work has been done on the influence of rest periods on health, and the early pioneering research on fatigue in munitions workers during the first world war remains unparalleled.[5] Indeed, no substantive research has looked at holiday periods or work on Sundays.

Working hours outside "normal" office hours, either because of extended work schedules or because of shifts entailing night work, disrupts circadian rhythms. This may cause fatigue and can certainly disrupt social life. Few employees like such work, but the need of industry and commerce carries great economic weight. Little work has been undertaken to study the influence of gender on work schedules.

There is general agreement that working abnormal hours leads to loss of quantity and quality of sleep.[6] Sleep disturbance is greatest after a night shift and may lead to napping at work. Not surprisingly, fatigue is a frequent—if immeasurable—complaint of shift workers. Stress is equally difficult to quantify, but some good studies have provided limited evidence for such work schedules being linked to anxiety or depression.[7] But shift workers are a highly selected group, and distinguishing cause from effect is difficult.

Although the case for linking gastrointestinal disease—particularly peptic ulceration—with shift work is reasonably good, no recent studies have tested this longstanding association. By contrast, the case for linking cardiovascular mortality and morbidity and unsocial hours has strengthened considerably recently, although most of the studies are Scandinavian.[3] The phenomenon of sudden death linked to overwork ("karoshi") is mainly derived from Japan[8] and mainly published as case reports. Sound epidemiological studies are lacking to support or refute this assertion.

New working patterns

Many good quality studies now exist to support the notion that work performance and output are poorer at night.[9] Some evidence exists to suggest that safety records are poorer at night as well. Overall, it seems that, although working abnormal hours is difficult to avoid in some industries, work scheduling, such as rapid, forward rotating shifts (spells of three or four days on each shift with a morning/afternoon/evening sequence), is less disruptive than most other options.[4] The compressed working week of three or four 10 to 12 hour shifts is gaining vogue. The trade off of a longer block of rest days seems to offset the increased fatigue of the longer shifts, but few data exist on long term risks to health and safety.

With regard to the directive, there is no unequivocal scientific evidence to support a 48 hour week; nor is there any overwhelming evidence against it. One study suggests that working more than 56 hours a week carries serious health and safety risks.[10] After a 12 hour shift a 12 hour break seems reasonable.

Yet the directive rolls on and carries in its wake the requirement for "health checks" on night workers. The widespread introduction of unfocused health surveillance measures is unjustifiable on grounds of preventive health. Astonishingly, 100 years after the first experiments on shorter working hours and performance[11] we are still unable to decide whether working long hours is bad for health. Seeing how the European Court of Justice handles it will be interesting.

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The role of letters in reviewing research

Always look for letters that follow original papers

The publication of medical research is prone to error. Misuse of statistics, selective citation of published work, misquotation of references, and overenthusiasm in the search for positive findings are crimes, often committed unwittingly, that can escape peer review before a paper is published.[1] Only after publication can a piece of research be exposed to the sort of critical review, by journal readers, that can either establish its place or consign it to the dustbin. The potential of correspondence as a form of peer review is supported by editors[2]—the *BMJ* reserves its letters pages almost exclusively for comment on published material—but it remains underdeveloped and undervalued by clinicians, academics, teachers, and many journals.

In four specialist journals examined by Spodick and Goldberg only 2% of the space was devoted to letters from readers.[3] Four general journals gave 15% of the space to letters, but fewer than half referred to original papers. Dr Steven Spiro, editor of *Thorax*, says he receives only about four letters an issue (the journal received only 37 in 1993). He encourages letters referring to original research and publishes most that come in, usually with a response from the authors. Last year the *Annals of Rheumatic Diseases*, a monthly journal, received only 84 letters and the *British Journal of Ophthalmology*, also a monthly, received only 37.

The *BMJ* received 4075 letters last year—an average of only 78 each week from a circulation of 110 000—and published 1800, but only one of the 10 articles attracting the most comment was original research.[4] An earlier audit of *BMJ* correspondence showed that in 20 weeks in 1989 the journal received fewer than two letters for each original paper published.[5] Naturally some research attracts more comment than others. The *BMJ* received 18 letters responding to a series of three papers on cholesterol, but most attract little or none.[6-8]

Two things contribute to the underdevelopment of letters pages as a platform for correcting scientific error and contributing to peer review. Firstly, in the assessment of academic performance scientific papers carry great weight while critical analysis in the form of correspondence carries little or none. The intellectual challenge and educational benefits of preparing a concise critical evaluation of published research need to be more widely recognised and rewarded. Letters, like papers, should have data, analysis, insights, and ideas. Secondly, patchy indexing and inadequate linkage of letters to papers make it difficult for authors reviewing a subject to search for, cite, and summarise letters and other comment. This is particularly important when consideration of ensuing comment is central to the interpretation of a paper. For example, a study of the Bristol Cancer Help Centre[9] was heavily criticised in several of the 15 letters in response published in the *Lancet*. One letter, on behalf of the funding agency, withdrew support for the main conclusions of the research.[10]

Inadequate linkage of papers to comment and corrections ensures that the impact of a paper endures while the effect of relevant comment does not. A search of the *Science Citation Index* shows nine citations for the Bristol study,[9] one for the 15 letters, and none for the letter from the funding agency.[10] In 1992 the *BMJ* published a paper suggesting that elective delivery by caesarean section of the breech fetus at term was far safer than spontaneous vaginal delivery.[11] Nineteen letters were subsequently published in response which robustly challenged the paper's conclusions. Three subsequent articles cited the paper, none cited the critical comment. Finally, Bhopal criticised the design, data, interpretation, and conclusions of a paper on snoring and disease.[12,13] The *Science Citation Index* lists 70 citations for the paper and one for the letter.

Thomasson and Stanley recognised this phenomenon in 1955,[14] commenting in *Science* that, "Buried in scholarly journals, critical notes are increasingly likely to be overlooked with the passage of time, while the studies to which they pertain, having been reported more widely, are apt to be rediscovered." Their communication has itself been ignored while the same issues still plague science. This work was cited only twice in 1981-92.

If all searches of published reports are to include relevant letters, corrections, and other comment, a system will need to be developed systematically and reliably to link papers with other relevant material. The first step must be comprehensively to index all letters responding to original research. Currently, *BMJ* letters are indexed and linked to the related paper under both author and subject heading. The US National Library of Medicine has since 1989 linked comment, corrections, and retractions to papers on its Medline database, but only "substantive comment" is indexed and the library limits linkages to comments that were published in the same journal as the related paper. Further, letters are indexed independently, possibly even under different subject headings so a reviewer must undertake a separate search to