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The economic impact of workplace wellness programmes in Canada

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Background	The economic benefits of workplace wellness programmes (WWPs) are commonly cited as a reason for employers to implement such programmes; however, there is limited evidence outside of the US context exploring their economic impact. US evidence is less relevant in countries such as Canada with universal publicly funded health systems because of the lower potential employer savings from WWPs.
Aims	To conduct a systematic review of the Canadian literature investigating the economic impact of WWPs from an employer perspective. The quality of that evidence was also assessed.
Methods	We reviewed literature which included analyses of four economic outcomes: return on investment calculations; cost-effectiveness or cost-benefit analyses; valuations of productivity, turnover, absenteeism and/or presenteeism costs; and valuations of health care utilization costs. We applied the <i>British Medical Journal (BMJ)</i> Economic Evaluation Working Party Checklist to evaluate the quality of this evidence.
Results	Eight studies met the inclusion criteria. Although the studies showed that WWPs generated economic benefits from an employer perspective (largely from productivity changes), none of the reviewed studies were in the high-quality category (i.e. fulfilled at least 75% of the checklist criteria) and most had severe methodological issues.
Conclusions	Though the Canadian literature pertaining to the economic impact of WWPs spans over three decades, robust evidence on this topic remains sparse. Future research should include a comparable control group, a time horizon of over a year, both direct and indirect costs, and researchers should apply analytical techniques that account for potential selection bias.
Key words	Cost-effectiveness; health care utilization; productivity; return on investment; workplace wellness programmes.

Introduction

In an effort to contain growing health care costs and promote a more favourable work environment, employers are increasingly implementing workplace wellness programmes (WWPs) [1]. WWPs are organization-wide programmes designed to improve employee health outcomes while at work. They can include health education and coaching, weight management programmes, medical screening and on-site fitness programmes [1–3]. Employer interest in these programmes is based on the idea that they can significantly impact employee health, satisfaction

and, from a business perspective, economic outcomes. Companies stand to gain financially from investment in WWPs through lower use of employer-sponsored health insurance benefits, improved disease management, gains in productivity and lower rates of absenteeism and presenteeism [1]. From a societal perspective, there are also potential gains if these programmes decrease use of public health care resources [4].

The USA, in particular, has seen widespread adoption of WWPs, with 74% of employers who provide health benefits offering at least one wellness programme [5]. Because private health insurance, 90% of which is

provided through the workplace [6], accounts for such a significant portion of health care expenditures in the USA [7], there is greater incentive to implement WWP there. As such, the vast majority of evidence evaluating the economic effects of these programmes is from the USA. In a recent review of international evidence on economic impact of WWPs, 70% of the reviewed studies were from the USA [8]. This evidence, however, may not be transferable to contexts where the majority of health care is provided by a public health care system, which is the case for all OECD countries except for the USA [7]. Indeed the lack of context-specific evidence has been identified by key stakeholders as a barrier to WWP adoption in Canada [1]. More evidence with a focus on the economic impact of WWPs in public health care systems is needed to understand whether the effects of WWPs differ based on the health system context.

While reviews that include countries with public health systems do exist [8], these reviews fail to account for the significant differences in the labour and health markets of these countries. Canada presents a unique case of a country with a public health care system combined with an individual employee focus on workplace wellness, compared with the European approach, which places more emphasis on addressing occupational health issues using a social policy framework [9]. In addition, because there are still substantial health care costs covered by employer-sponsored health benefit programmes (e.g. pharmaceutical, physical therapy and mental health costs), there are significant incentives for Canadian health plan sponsors to implement WWPs. This is borne out by a recent survey indicating that 45% of Canadian health benefit plan sponsors offer a WWP [10]. A country with a combination of a public health care system alongside a high WWP adoption rate provides a unique case study that could shed light on the economic impact of WWPs in an intermediate public/private health care context.

Reviews evaluating the methodological quality of international evidence have drawn into question the reliability of

many of these findings. For instance, a recent meta-analysis of 51 studies across 12 countries found that the methodological approach and quality of a study had a significant impact on its findings [8]. The authors found a *negative* return on investment (ROI) for randomized controlled trials (RCTs) versus a positive ROI for quasi-experimental and non-experimental studies. More context-specific syntheses evaluating the quality of existing economic analyses are integral for employers who are deciding whether to implement a WWP. Therefore, the aim of this study was to carry out a systematic review of the Canadian literature investigating the economic impact of WWPs from an employer perspective and to evaluate the *quality* of this evidence.

Methods

A systematic review of Canadian evidence related to the economic impact of WWPs was conducted. We performed title, abstract and keyword searches of EBSCO, OVID, Web of Science, PubMed, ProQuest and Google Scholar databases. The economic outcomes included ROI calculations; cost-effectiveness or cost-benefit analyses; valuations of productivity, turnover, absenteeism and/or presenteeism costs; and valuations of health care utilization costs. There were no time limits for our search. One reviewer (J.J.) completed the initial data extraction while the remaining authors reviewed the collected data to validate the study selection process. Table 1 presents an example of our search terms using PubMed.

The 36-item *British Medical Journal (BMJ)* Economic Evaluation Working Party Checklist [11] was applied to evaluate the quality of the evidence (Table 2). In cases where categories were not relevant, the criteria were excluded from the calculation of a study's overall quality score. For instance, if no synthesis or meta-analyses were used in a study, the related criterion (i.e. item 10) was excluded from the overall score. Using Baxter *et al.*'s approach, we categorized studies as *high quality* if they fulfilled at least 75% of the *BMJ* checklist criteria,

Table 1. Search strategy example from PubMed

Filters	Search terms
Economic outcomes	('economic evaluation'[Title/Abstract] OR 'cost'[Title/Abstract] OR 'Effectiveness'[Title/Abstract] OR 'return on investment'[Title/Abstract] OR 'return-on-investment'[Title/Abstract] OR 'cost benefit'[Title/Abstract] OR 'health economic'[Title/Abstract] OR 'economic'[Title/Abstract] OR 'direct cost'[Title/Abstract] OR 'indirect cost'[Title/Abstract] OR 'health care cost'[Title/Abstract] OR 'productivity'[Title/Abstract] OR 'absenteeism'[Title/Abstract] OR 'presenteeism'[Title/Abstract])
Participant	AND ('workplace'[Title/Abstract] OR 'worksites'[Title/Abstract] OR 'workplace wellness'[Title/Abstract] OR 'corporate wellness'[Title/Abstract] OR 'occupational wellness'[Title/Abstract])
Intervention	AND ('health promotion'[Title/Abstract] OR 'lifestyle management'[Title/Abstract] OR 'prevention'[Title/Abstract] OR 'disease management'[Title/Abstract] OR 'weight management'[Title/Abstract] OR 'wellbeing'[Title/Abstract] OR 'health screening'[Title/Abstract] OR 'physical activity'[Title/Abstract] OR 'nutrition'[Title/Abstract])
Context	AND ('canada'[Text Word] OR 'canadian'[Text Word])

Table 2. Thirty-six item *BMJ* Economic Evaluation Working Party Checklist

Study design	
1	Was the research question stated?
2	Was the economic importance of the research question stated?
3	Was/were the viewpoints of the analysis clearly stated and justified?
4	Was the rationale reported for the choice of the alternative programmes or interventions compared?
5	Were the alternatives being compared clearly described?
6	Was the form of economic evaluation stated?
7	Was the choice of form of economic evaluation justified in relation to the questions addressed?
Data collection	
8	Was/were the source(s) of effectiveness estimates used stated?
9	Were the details of the design and results of the effectiveness study stated (if based on a single study)?
10	Were details of the methods of synthesis or meta-analysis of estimates given (if based on an overview of a number of effectiveness studies)?
11	Were the primary outcome measures for the economic evaluation clearly stated?
12	Were the methods used to value health states and other benefits stated?
13	Were the details of the subjects from whom valuations were obtained given?
14	Were productivity changes (if included) reported separately?
15	Was the relevance of productivity changes to the study question discussed?
16	Were quantities of resources reported separately from their unit cost?
17	Were the methods for the estimation of quantities and unit costs described?
18	Were currency and price data recorded?
19	Were details of price adjustment for inflation or currency conversion given?
20	Were details of any model used given?
21	Was there a justification for the choice of model used and the key parameters on which it was based?
Analysis and interpretation of results	
22	Was time horizon of cost and benefits stated?
23	Was the discount rate stated?
24	Was the choice of rate justified?
25	Was an explanation given if cost or benefits were not discounted?
26	Were the details of statistical tests and confidence intervals given for stochastic data?
27	Was the approach to sensitivity analysis described?
28	Was the choice of variables for sensitivity analysis justified?
29	Were the ranges over which the parameters varied stated?
30	Were relevant alternatives compared? (i.e. were appropriate comparisons made when conducting the incremental analysis?)
31	Was an incremental analysis reported?
32	Were major outcomes presented in a disaggregated as well as aggregated form?
33	Was the answer in the study question given?
34	Did conclusions follow from the data reported?
35	Were conclusions accompanied by the appropriate caveats?
36	Were generalizability issues addressed?

Source: Drummond and Jefferson [11].

moderate quality if they met 50–74% of the criteria and *low quality* if they fulfilled less than 50% of the criteria [8]. Ethics approval for this study was obtained through the University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects.

Results

The search was conducted in July 2015 and yielded 408 studies after removing duplicates. Following a title and

abstract review, this was reduced to a final sample of eight studies from 1981 to 2014. Most studies were excluded due to the lack of a workplace wellness intervention or because they were conducted outside of Canada. Table S1 (available as Supplementary data at *Occupational Medicine* Online) summarizes key characteristics of the reviewed studies.

Most WWPs were comprehensive interventions with on-site health assessments, risk factor and lifestyle education and tools to encourage healthy lifestyle changes

[12–15]. Earlier studies tended to focus on professionally directed, on-site fitness programmes [16–18]. The WHPs did not include financial incentives or penalties. Half of the studies assessed programmes from public employers [12,14,18,19], and half from private employers [13,15–17], ranging from an automotive plant to financial institutions.

Five studies did not explicitly state their perspective (i.e. the point of view from which the costs and benefits were calculated) [12,13,16–18], though it was implicit that the employer perspective was taken. Two studies considered the societal perspective (i.e. the authors attempted to include all costs and effects regardless of who pays the costs or receives the effects) [20]. Herman *et al.* and Shephard took into account public health expenditures by respectively considering annual doctor visits, medical claims and hospital bed usage [17,19].

One study was conducted as a randomized control trial at three locations across Canada [19]. The remaining studies were limited to one location. Though most studies included any employees who participated in the WHP, two studies were limited to employees with health risks and one study [19] only included employees with a primary care physician (14% of Canadians do not have a regular medical doctor) [21]. Half of the studies used a pre-post design without a control group [12–14,18]. The remaining studies used a pre-post-design with a comparison group for some outcomes [15–17]. Two studies followed participants for 1 year [14,19], two for 6 months [16,18] and two for 2.5 years [15] and 3 years [12,13].

One study conducted a cost-effectiveness analysis assessing the cost per Quality-Adjusted Life Year (QALY) gained from the intervention [19], and two studies calculated a cost-benefit ratio [17,18]. Most studies calculated the change in costs attributable to health expenditures and/or productivity measures [12,14–16]. One study calculated the change in absenteeism and turnover rates [13]. Productivity was largely measured indirectly as changes in absenteeism, although one study measured it with a survey instrument [14].

Three studies calculated the net cost associated with the WHPs. Below, we report all dollar amounts in 2014 Canadian dollars. Herman *et al.* calculated average employer cost savings of \$1187/employee (and \$1138 in societal costs) and found no changes in QALYs [19]. Shore *et al.* calculated net per employee savings of \$468 (\$256 in 1989 dollars) for the MetroFit fitness programme [18]. Shephard calculated that at actual participation rates (13%), the programme would result in a net benefit of \$403/employee/year (\$270 in 1992 dollars) [17].

The most consistent findings related to productivity-related cost savings. All six studies that included productivity measures found improvements in productivity after the WHPs were implemented, though the statistical

significance and magnitude of these effects varied. Cox *et al.*, Shore *et al.* and Makrides *et al.*, respectively, concluded that the reduction in absenteeism resulted in savings of \$164/employee/year (\$65 in 1981 dollars) [16], \$208/employee/year (\$125 in 1989 dollars) [18] and \$260/employee/year (or \$248 2011 dollars) [12]. Herman *et al.* found that the intervention group lost 55 fewer hours due to presenteeism than the control group (though this difference was not statistically significant). They calculated savings of \$1440/employee/year [19].

The remaining studies did not monetize changes due to productivity improvements. Renaud *et al.* found that absenteeism initially dropped by 28% and then remained constant following programme implementation [13]. Tarride *et al.* found that the number of hours missed from work decreased by 6 h, but these differences were not statistically significant [14].

Five studies included analyses of health care utilization and costs. Tarride *et al.* analysed drug claims over 1 year and found that the average number of prescriptions increased from 5.4 to 6.7 after the programme intervention, though this change [14] was not statistically significant. Makrides *et al.* found that an individual moving from the low health risk to high-risk category was associated with the highest relative increase in drug costs (81%) [12], but they did not find a statistically significant increase in drug costs as health risk increased. Herman *et al.* found that a naturopathic WHP emphasizing patient education, self-care, nutrition, healthy lifestyle and disease prevention resulted in a significant cost reduction of \$174 due to a decrease in doctors' visits, though this would not be realized from the employer perspective [19]. All other changes in utilization-related costs (i.e. other health professional visits and medication costs) were not statistically significant.

Two studies found a significant effect of WHPs on health care utilization costs. Chung *et al.* found that as a result of individuals shifting into lower cardiovascular disease risk categories, the intervention was associated with prescription drug savings of \$608 (\$582 in 2011 dollars) [15]. Shephard found that relative to the control group whose medical claims increased from \$271 to \$368 per year, the intervention group's medical claims remained unchanged at \$271 [17]. The net 1-year benefit from the programme was equivalent to three medical consultations. Further, hospital bed usage per worker averaged half a day more for control subjects in the year following the programme, a difference of \$176/worker.

According to the *BMJ* criteria, none of the reviewed studies were in the high-quality category (i.e. fulfilled at least 75% of the checklist criteria). Most studies were moderate quality, with two studies in the low-quality category [13,18]. The highest scoring studies fulfilled 71% [17] and 69% [19] of the *BMJ* checklist criteria.

Discussion

Overall, this systematic review suggests that the savings generated from WWPs tended to come from productivity changes (e.g. absenteeism and presenteeism), which highlights the importance of including these indirect costs in economic evaluations of WWPs. The findings with respect to cost savings from health care utilization were less consistent. More robust analyses with larger samples sizes are required to determine whether and how health care utilization is impacted by WWPs. All three studies that calculated net benefits from the programmes found a positive net benefit. While it is possible to more broadly apply these conclusions to the Canadian context, it is important to acknowledge the shortcomings of these studies before drawing any conclusions about the economic impact of WWPs in Canada.

There was a limited pool of Canadian studies to evaluate, and these studies were of moderate and low overall quality with respect to the economic components of their evaluations. We note that in many cases, the overall studies were not necessarily of low quality, but the economic analyses did not meet a number of the quality criteria we outlined, possibly because the primary intent of the paper was not an economic evaluation (e.g. Renaud *et al.* [13]) [8].

A recurrent theme with respect to study quality related to study design. Half of the studies were a pre-post design with no comparison group, and these tended to be the more recent studies, with the exception of Herman *et al.* and Chung *et al.* [15,19]. As noted by Baxter *et al.*, experimental designs such as RCTs and quasi-experimental designs tend to demonstrate much smaller net benefits than non-experimental studies in international contexts [8]. Without a comparison group, it is impossible to draw conclusions about causality with respect to the effects of WWPs. Though we did not find that this was the case in our review, we note that the studies that had a comparison group and also found a positive net benefit (e.g., Herman *et al.* [19]; Shephard [17]) had other methodological shortcomings. For instance, the time horizons of most studies were very limited, making it difficult to assess the longer term effects of the WWPs. In cases where participants were followed over the longer term, it was evident that issues such as employee participation significantly lowered the potential benefits of the WWPs [17].

Another methodological weakness of all of the reviewed studies relates to selection into programme participation. Even in the best designed studies that included an RCT, individuals who opted to and continued to participate in a WWP could systematically differ from those who did not. These differences in motivation and attitude towards health could be the reason behind any observed economic benefits from WWPs that studies often attribute to the programmes themselves. Some

studies did acknowledge this potential source of bias [16,17], though it was unaddressed in all studies and completely overlooked in the discussion of more recent studies.

Our results are in line with reviews of international evidence that find a net benefit of WWPs among lower quality studies [8]. Given the lack of high-quality evidence in the Canadian context, however, we have no way of assessing whether high-quality Canadian studies would see a reversal of these positive effects, as is the case with international reviews [8]. More robust studies are needed to determine whether this reversal occurs in the Canadian context and to make a convincing case that WWPs have economic benefits from an employer perspective. Future research should include a comparable control group, a time horizon of over a year and both direct and indirect costs. Statistical techniques that account for potential selection of healthier and more health-conscious individuals into these programmes should also be implemented, or at least explored in sensitivity checks. Without meeting these criteria, it is difficult to make a convincing business case for WWPs.

We note that country context is important in interpreting the results of economic evaluations of WWPs. Economic evaluations can take a private (employer), public (governmental) or societal perspective. In Canada, all perspectives are important because the burden of poor employee health is balanced between employers and the public payers. Compared to the US experience, there is less pressure on employers in Canada to provide such programmes because this burden is shared between the government and employers. In all cases, of course, positive economic results from a private perspective will motivate employers to extend such interventions. However, Canadian-specific studies are important for Canadian employers because of the unique distribution of the burden of poor employee health. The results in the above-mentioned studies, all of which are Canadian, do not provide robust economic evidence in favour of WWPs in Canada. Indeed, given the widespread sharing of the economic burden of poor health in Canada, this is not surprising. In addition, an absence of convincing evidence can help explain why Canadian employers have been more reticent than US employers to provide WWPs.

Though the Canadian literature about the economic impact of WWPs spans over three decades, robust evidence on this topic remains sparse. There are a number of important reasons for employers to implement WWPs, not the least of which is potentially, positively impacting the health of their employees. However, the economic benefit of these programmes will play a key role in whether employers opt to invest in these programmes in Canada and whether governments may opt to subsidize their implementation.

Key points

- A systematic review of the Canadian literature on the economic impact of workplace wellness programmes from an employer perspective found that overall the quality of the existing evidence in this area was moderate to low.
- Our findings suggest that in Canada, a public health system context, savings generated from workplace wellness programmes tended to come from productivity changes, with less robust findings surrounding savings from health care utilization.
- In order to make a convincing business case for workplace wellness programmes, future studies need to include a comparable control group, explore a time horizon of over a year, include both direct and indirect costs and use statistical techniques that account for potential selection of healthier and more health-conscious individuals into these programmes.

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Conflicts of interest

None declared.

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