



## Correspondence

## Letter to the editor: The population attributable risk of cancers for inadequate physical activity in Canada in 2015



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Recently, the ComPARE study team provided a detailed estimate of the population attributable risk (PAR) of cancers for various modifiable risk factors in Canada in 2015. These comprehensive, complicated analyses are a highly useful resource for the general public, researchers, public health experts, and policymakers. However, readers should be cautious when interpreting the PAR for inadequate physical activity.

Inadequate physical activity was attributed to 4.9% of all cancers in Canadians in 2015 (Poirier et al., 2019). The authors stated that cancer-risk factor pairs were included when a causal association was considered probable by the International Agency for Research on Cancer (IARC) or World Cancer Research Fund (WCRF). The IARC did not publish a monograph on physical activity, but the WCRF reported a probable/strong association between physical activity and colorectal, endometrium, and breast cancer (World Cancer Research Fund, 2018). When including these associations, 2.1% of cancer cases in Canadians in 2015 were attributable to inadequate physical activity. The authors reported 4.9%, but included associations between inadequate physical activity and lung and esophageal cancer, while the evidence for these associations is limited according to the WCRF; and stomach, kidney and bladder cancers, while the WCRF considers the evidence for these associations insufficient to draw a conclusion.

The WCRF concluded that evidence for an association between inadequate physical activity and lung cancer was limited, due to potential residual confounding by smoking (World Cancer Research Fund, 2018). Smoking is associated with physical inactivity, among others as smoking impairs one's lung capacity. Heavy smokers may have reduced mobility due to diseases related to smoking (e.g., oxygen dependence, amputations). Hence, when evaluating cancers in which smoking is an important risk factor (e.g., lung, bladder), it is crucial to remove confounding by smoking when evaluating a potential association between inadequate physical activity and cancer. In the meta-analysis that Poirier and colleagues used to estimate the relative risk of lung cancer by physical activity levels, not all studies (adequately) adjusted for smoking (Brenner et al., 2016). Incomplete adjustment for confounders may overestimate the PAR (Mansournia and Altman, 2018).

Various data support that observed associations between physical activity and lung cancer could be confounded by smoking. In a pooled analysis including 1.44 million individuals, physical activity was an important risk factor for lung cancer (hazard ratio = 0.74; 95%

confidence interval 0.71–0.77) (Moore et al., 2016). In the multi-variable models, smoking was categorized as never, former, or current, without considering pack-years. Two findings suggested residual confounding by smoking. First, physical activity did not alter lung cancer risk in never-smokers. Second, the association between physical activity and lung cancer was significantly stronger in individuals with a BMI < 25 compared to those with a BMI ≥ 25 ( $P = 0.002$ ); smoking prevalence is higher among the lean.

In the 9247 cancer cases that the ComPARE study team attributed to inadequate physical activity, 31.8% and 13.4% were lung and bladder cancer cases, respectively (Friedenreich et al., 2019). When excluding these cases due to potential residual confounding effects, inadequate physical activity could be attributed to 2.7% of cancers (5067/187,070).

For abovementioned reasons, the estimations provided by the ComPARE study team for the percentage of all cancers attributable to inadequate physical activity (4.9% to 6.4%) need to be interpreted as the maximum number of cancers potentially attributable to inadequate physical activity. In a more conservative estimation, eliminating cancer cases that may have been confounded by smoking, the PAR would be between 2 and 3%. Nevertheless, the ComPARE findings again emphasize that some aspects of our modern western lifestyle, such as inadequate physical activity, may have severe health consequences, and that a healthy lifestyle should be encouraged.

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Michel D. Wissing  
Division of Cancer Epidemiology, Department of Oncology, 5100 Boulevard  
de Maisonneuve Ouest, Office 720F, Montreal, Quebec H4A 3T2, Canada  
E-mail address: [michel.wissing@mcgill.ca](mailto:michel.wissing@mcgill.ca).