Project Details	
Project Code	MRC23PHSBr Lewis
Title	Estimating the global cancer burden due to low levels of physical activity
Research Theme	Population Health Sciences
Summary	The student will estimate the overall global burden of cancer risk which is due to low levels of physical activity using a combination of: i) observational and Mendelian randomization analyses to estimate of the causal effect of physical activity on cancer risk, and ii) global cancer surveillance data and published data on physical activity rates to estimate population attributable risks.
Description	There is emerging evidence that physical activity has a causal role in cancer risk Around 40% of all cancers are thought to be avoidable by modification of lifestyle factors. Obesity has been found to be a risk factor for several cancers and was estimated to have caused around 3.6% of all new cancers which occurred in 2012. There is now an emerging evidence base which shows that low levels of physical activity can increase the risk of cancer. The World Cancer Research Fund (WCRF), as part of their continuous update project, have concluded that there is strong evidence that high levels of physical activity decreases the risk of cancers of the breast, endometrium and colorectum. In addition, we have recently shown using two-sample Mendelian randomization (MR) that physical activity is inversely causally associated with prostate, colorectal and breast cancer risk. In our MR analyses we found larger protective effects of physical activity on cancers of the breast, prostate, colon and rectum than were estimated by observational studies. It is possible that cancers at other sites are similarly causally influenced by physical activity but they have not yet been investigated using a Mendelian randomization framework. Cancer incidence and physical inactivity are both high and have increased in recent years Cancer surveillance data compiled and analysed by co-supervisor Dr Freddie Bray's group at IARC has shown that 19.3 million new cancer cases and almost 10 million cancer deaths occurred in 2020. They found that the burden of cancer was rapidly increasing worldwide due to an ageing population and in an increase in exposure to the major risk factors. Guthold et al, 2020 combined data from 358 population-based surveys conducted across 168 countries to estimate that approximately 28% of adults worldwide had insufficient levels of physical activity. These findings however were based on self-reported activity levels which are subject to a high degree of response bias and may not reflect actual physical activity. The research problem that the project aims to address is what is the global burden of cancer due to physical inactivity? To achieve this aim, the student will address the following objectives: 1. Identify the patterns of physical activity which are most likely to be causing cancer using wrist-worn accelerometer data and cancer outcomes in UK Biobank. 2. Test whether low levels of physical activity is a causal risk factor for cancer at several sites using Mendelian randomization and genome wide association study data from large cancer consortia 3. Use the best publicly available data to estimate the global prevalence of low levels of physical activity by country/region/ethnicity. 4. Estimate the global burden of cancer attributable to low levels of physical activity using cancer surveillance

	data compiled by IARC broken down by country/region and cancer type. Initially estimates of the burden of cancer due to low levels of physical activity will be don separately in different populations. These separate estimates can then be combined to give a global estimate. Once the student is familiar with the background to the research question, the strengths and limitations of the data and the methods needed to carry-out this project, they will (with support from the supervisors) design the analysis plan for each of the objectives separately, determine which statistical models and which exposure, confounder and outcome variables to use. The student will also set up their own project database for these analyses. There will be an opportunity for the student to focus on some of the more interesting findings in order to validate them or explore them in more depth, for example the student may also want to replication some findings from their analyses using independent replication datasets and carry-out sensitivity analyses to test the robustness of their findings or determine whether they apply to different populations.
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