

Promoting Physical Activity to Lower the Incidence of Major Non-Communicable Diseases – A Literature Review to Inform a Simulation Model for Policy Purposes

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Purpose: To predict the impact of physical activity (PA) policy in the Netherlands on health outcomes, quality of life, and costs, the Dutch National Institute for Public Health and the Environment developed a model incorporating PA effects across various health outcomes. For model input, we analysed recent literature on the association between PA and major non-communicable diseases.

Methods: For this review, we systematically searched PubMed and Embase from 2016 to 2025 for meta-analyses on the dose–response association between PA and incidence of type 2 diabetes, stroke, ischemic heart disease, congestive heart failure, breast cancer, colon cancer, and dementia. The meta-analyses: 1) preferably included prospective cohort studies, 2) reported a broad range and dispersion of PA levels, 3) expressed PA in MET-min/week, and 4) presented associations as hazard rate ratios (HRR) or relative risks (RR) versus inactivity. Eligible studies were appraised on methodological quality (low, moderate, high), sample size, data quality, generalisability to the Dutch population, and biological plausibility. Data from the highest-quality, most comparable study to the Dutch population was used to estimate the corresponding association in the model.

Results: Kyu et al. (2016) reported that higher total PA (<600 vs $\geq 8,000$ MET-min/week) lowered the risk of type 2 diabetes (RR: 0.80 [0.70, 0.89]), stroke (RR: 0.80 [0.70, 0.90]), and ischemic heart disease (RR: 0.78 [0.72, 0.84]). Aune et al. (2021) found higher leisure-time PA (0 vs 2,100 MET-min/week) lowered the risk of congestive heart failure (RR: 0.71 [0.64, 0.77]). Matthews et al. (2020) found higher leisure-time PA (0 vs 1,800 MET-min/week) lowered the hazard for breast cancer (HRR: 0.86 [0.82, 0.90]) and colon cancer (HRR: 0.82 [0.77, 0.87]). Iso-Markku et al. (2022) found higher total PA (203.64 vs 4,989.09 MET-min/week) lowered the risk of dementia (RR: 0.64 [0.51, 0.81]). All associations were significant and had dose–response relationships, i.e. more PA lowered the risk for these non-communicable diseases.

Conclusion: We identified significant dose-dependent relationships between PA and non-communicable disease incidence from literature, providing risk estimates used to predict and model the impact of PA policies on such diseases.

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