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Review

The relationship between sedentary behaviour and physical activity in adults: A systematic review

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ABSTRACT

To ascertain, through a systematic review, the associations between sedentary behaviour (SB) and physical activity (PA) among adults aged 18–60 years. Studies published in English up to and including June 2013 were located from computerized and manual searches. Studies reporting on at least one measure of SB and an association with one measure of PA were included. 26 studies met the inclusion criteria. Six studies examined associations between SB and PA prospectively, and 20 were cross-sectional. The most commonly assessed subtype of sedentary behaviours were television viewing (11 studies), total sedentary time (10), total sitting time (4), general screen time (3) and occupational sedentary time (2). All studied types of SB were associated with lower levels of PA in adults. Findings of this review suggest inverse associations between SB and PA were weak to moderate. Objective monitoring studies reported larger negative associations between SB and light intensity activity. Current evidence, though limited, supports the notion that sedentary behaviour displaces light intensity activity.

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Contents

Introduction

Over the past few decades, the way in which we live our daily lives has changed dramatically. Technological advances, societal influences and environmental attributes have significantly influenced the way

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Table 1
Characteristics of included studies, along with the results of the study quality assessment for each study.

Study	Sample	Measure SB	Measure PA	Association	Study quality
1 — Kronenberg et al., 2000 (USA)	1778 participants, women mean age 49 ± 13; men mean age 48 ± 14 years	Self-reported television viewing	Questionnaires on physical activity were based on those used in the CARDIA study with minor modifications.	Weak inverse associations between total LTPA and TV viewing in women (Spearman $r = -0.084$, $p = 0.009$) and men ($r = -0.115$, $p = 0.001$).	4/8 50%
2 — Jacoby et al., 2003 (Peru)	1176 families, men mean age 42.1 ± 9.0; women mean age 37.5 ± 7.6 years	Self-reported television viewing	Self-reported physical activity using questions adapted from the Health Insurance Plan of New York (HIP) Activity Questionnaire.	Significant positive associations between hours reported sitting, watching TV and physical inactivity in men and women ($p < 0.001$).	3/8 37.5%
3 — Zhang et al., 2004 (China)	254 females with ovarian cancer and 652 healthy female controls, aged 45–65 years.	Self-reported domain-specific sitting time (work, travel, TV meals, other)	Self-reported leisure-time and occupational physical activity	The association with sedentary behaviours was weak and varied across the three intensity levels of physical activity. Total sitting time was significantly associated with strenuous sport ($r = 0.31$), vigorous work ($r = -0.44$), and moderate PA ($r = -0.41$). No associations between TV viewing and PA, or sitting at work and strenuous sport.	6/8 75%
4 — McCormack and Giles-Corti, 2004 (Australia)	1803 participants, aged 18–59 years	Self-reported television viewing via interview	Self-reported time spent walking, and time in light, moderate and vigorous intensity physical activity	Participation in recommended levels of vigorous-intensity PA was associated with a reduced likelihood of watching television more than 10 h per/week ($OR = 0.71$).	3/8 37.5%
5 — Buckworth and Nigg, 2004 (USA)	493 college students, mean age 21 ± 4.0 years	Self-reported time spent watching television, using a computer, and studying	Self-reported physical activity using the CARDIA Physical Activity History questionnaire	For males, computer use was inversely associated with MVPA. No associations observed for males between TV viewing and PA. In females, TV viewing was inversely associated with PA, no associations were seen with computer use and PA.	3/8 37.5%
6 — Martinez-Gonzalez et al. (2005) Spain	40 obese women, aged 20–50 years	Self-reported television viewing, computer use, driving, socialising. Values combined to provide total sitting time	RT3 accelerometer	Inverse association between total sedentary time and energy expenditure estimated using the RT3 accelerometer (Spearman $r = -0.42$, $p < 0.01$).	6/8 75%
7 — Bennet et al., 2006 (USA)	486 participants, aged >18 years	Self-reported television viewing	Pedometer step counts (Yamax SW-200)	Each hour of TV viewing was associated with 144 fewer steps/day. For each hour of TV viewing, there was a 16% decrease in the likelihood of accumulating 10,000 steps/day.	6/8 75%
8 — Oppert et al., 2006 (France)	213 men, mean age 44 ± 5 years; 192 women, mean age 42 ± 4 years	Self-reported screen time and reading	Self-reported leisure-time and occupational physical activity, using the Modifiable Activity Questionnaire	Reading was inversely associated with occupational PA ($r = -0.26$, $p < 0.001$) in men, no association seen in women. In women, reading was positively associated ($r = 0.36$, $p < 0.001$) with LTPA, no association seen in men.	6/8 75%
9 — Sugiyama et al., 2007 (Australia)	2650 participants, aged 20–65 years	Self-reported television viewing	Leisure-time physical activity, from the IPAQ Long.	A significant negative association was found between TV time and LTPA in women but not in men (statistical values not given).	5/8 62.5%
10 — Healy et al., 2008 (Australia)	169 participants, aged 30–87 years	Accelerometer-determined total sedentary time	ActiGraph 7164	Sedentary and light-intensity time were strongly inversely correlated (Pearson's $r = 0.96$); correlations were weak between sedentary and moderate-to-vigorous-intensity time (Pearson's $r = 0.27$)	8/8 100%
11 — Chang et al., 2008 (Taiwan)	2,353 participants, aged >40 years	Self-reported television viewing	Self-reported leisure time physical activity	Weak inverse associations between TV viewing and occupational PA ($r = -0.08$, $p < 0.05$), and total activity ($r = -0.09$, $p < 0.001$).	4/8 50%
12 — Sugiyama et al., 2008 (Australia)	2210 participants, aged 20 — 65 years	Self-reported leisure-time sedentary behaviour	International Physical Activity Questionnaire (IPAQ Short)	Weak inverse association between leisure time sedentary behaviour and LTPA ($r = -0.07$).	6/8 75%
13 — Ballard et al., 2009 (USA)	116 male undergraduates, mean age 19.5 years	Self-reported time spent watching television, playing video games and reading	International Physical Activity Questionnaire (IPAQ Short)	Small but significant inverse associations seen between measures of video game play and frequency and intensity of PA (correlations range: $r = 0.20$–0.22).	5/8 62.5%
14 — Ekelund et al., 2009 (UK)	192 participants	Accelerometer-determined total sedentary time	ActiGraph 7164	Time spent sedentary was inversely associated with time spent in light-intensity activity ($r = 0.52$, $p < 0.0001$).	8/9 88.9%

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