Dancing Participation and Cardiovascular Disease Mortality

A Pooled Analysis of 11 Population-Based British Cohorts

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Introduction: Little is known about whether cardiovascular benefits vary by activity type. Dance is a multidimensional physical activity of psychosocial nature. The study aimed to examine the association between dancing and cardiovascular disease mortality.

Methods: A cohort study pooled 11 independent population surveys in the United Kingdom from 1995 to 2007, analyzed in 2014. Participants were 48,390 adults aged ≥40 years who were free of cardiovascular disease at baseline and consented to be linked to the National Death Registry. Respondents reported participation in light- or moderate-intensity dancing and walking in the past 4 weeks. Physical activity amount was calculated based on frequency, duration, and intensity of participation in various types of exercise. The main outcome was cardiovascular disease mortality based on ICD-9 codes 390−459 or ICD-10 codes I01−I99.

Results: During 444,045 person-years, 1,714 deaths caused by cardiovascular disease were documented. Moderate-intensity, but not light-intensity, dancing and walking were both inversely associated with cardiovascular disease mortality. In Cox regression models, the hazard ratios for cardiovascular disease mortality, adjusted for age, sex, SES, smoking, alcohol, BMI, chronic illness, psychosocial distress, and total physical activity amount, were 0.54 (95% CI=0.34, 0.87) for moderate-intensity dancing and 0.67 (95% CI=0.52, 0.87) for moderate-intensity walking.

Conclusions: Moderate-intensity dancing was associated with a reduced risk for cardiovascular disease mortality to a greater extent than walking. The association between dance and cardiovascular disease mortality may be explained by high-intensity bouts during dancing, lifelong adherence, or psychosocial benefits.

(Am J Prev Med 2016;50(6):756–760)

Introduction

Epidemiologic research has supported an inverse relationship of physical activity (PA)[1–3] and fitness levels[4,5] with cardiovascular disease (CVD) and all-cause mortality.[6,7] Previous research tended to focus on quantifying PA risk based on the amount and intensity of activities, with the type of activity often treated as a surrogate for intensity level. As different types of PA challenge musculoskeletal, neurologic, and cardiorespiratory systems differently, and involve different levels of psychosocial or cognitive demands, different types of PA may have differential relationships with health.[8]

Dance is a multidimensional PA, integrating physical, cognitive, emotional, and social elements. To date, only six cohort studies have examined the benefits of specific activity types, other than walking, in relation to health outcomes, including falls,[9,10] incident fatal and non-fatal coronary heart disease,[11] all-cause mortality,[12,13] and dementia.[14] One study found that frequent dancing (three or more times/week) was associated with a 76% reduction in dementia risk, whereas the protective effect of walking was lower (53%) and only marginally significant.[14] Though dementia and CVD share some similar

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0749-3797/$36.00
http://dx.doi.org/10.1016/j.amepre.2016.01.004

risk factors, the impact of dance on CVD has never been studied. The aims of this study are to examine: (1) whether dance participation offers a greater protection against CVD mortality than walking; and (2) whether risk reduction associated with dancing is age or sex dependent.

Methods

Participants were drawn from the Health Survey for England (HSE) and Scottish Health Survey—a series of 11 independent British population-based cohorts with harmonized methodologies and baseline examinations undertaken in 1994/1997 (HSE only), 1995 (Scottish Health Survey only), 1998, 1999 (HSE only), 2003, and 2004/2006/2008 (HSE only). Samples were drawn using multistage stratified probability design to give a representative sample of the two United Kingdom countries. More details of the general methodology, sample design, and selection procedures are provided in the Appendix (available online) and elsewhere.[15,16] Ethical approval was granted for all aspects of these studies by the Local Research Ethics Councils.

Eligible cohort members were aged ≥40 years without doctor-diagnosed CVD (angina, stroke, ischemic heart disease) at baseline and consented to their death being flagged by the National Registry (N=48,390). PA over the last 4 weeks was measured using a validated interviewer-administered questionnaire[17] that inquired about the frequency, duration (for at least 15 continuous minutes), and intensity of participation in walking and other prompted recreational PA. Like previously,[18,19] walking intensity was determined based on respondents' single choice of the usual walking pace: slow, average, brisk, or fast. Moderate-intensity walking included "brisk" or "fast" pace and light-intensity included "slow" or "average" pace. The intensity of other PA, including dancing, was determined by a positive response to the question: *Was the effort of [activity] usually enough to make you out of breath or sweaty?*[20] Moderate-intensity dancing included those who answered *yes* to this question, and light-intensity if otherwise. The PA compendium[21] was used to assign the MET for all PA to calculate total PA MET-hours (Appendix, available online).

Statistical Analysis

The authors examined the association of light- and moderate-intensity dancing with CVD mortality (ICD-9 codes 390–459, ICD-10 codes I01–I99) using Cox models. Surviving participants were censored on December 31, 2009 (Scottish Health Survey) or February 15, 2011 (HSE). Analysis was conducted in 2014. Cox models were adjusted for age and sex (Model 1), additionally

Table 1. Characteristics of the Sample by Participation in Dancing—The Health Surveys for England and Scotland (N=48,390)

Characteristic	Dance participation (any intensity)		p-value
	No (*n*=45,221)	Yes (*n*=3,169)	
Age, y, M±SD	56.9±11.8	55.5±10.6	<**0.001**
Sex, %			
Men	46.2	31.3	<**0.001**
Women	53.8	68.7	
BMI, M±SD	27.4±4.8	26.9±4.5	<**0.001**
Longstanding illness,[a] %	55.5	50.3	<**0.001**
Smoking, % current[b]	23.2	22.1	0.153
Alcohol frequency,[c] % ≥5 times/week	21.7	21.4	0.730
Social class, % manual[d]	43.3	37.8	<**0.001**
Psychological distress, % with GHQ[e] score ≥4	14.2	11.5	<**0.001**
Total physical activity volume, median, IQR (MET-hours per week)	11.7 (24.6)	21.0 (27.8)[f]	<**0.001**
Walking (any intensity), % participated	65.7	75.4	<**0.001**
Meeting physical activity recommendations, %	39.9	57.6	<**0.001**

Note: Boldface indicates statistical significance ($p < 0.05$). The *p*-value was calculated using *t*-test for continuous and likelihood ratio chi-square test for categorical variables.

[a]Dichotomous variable derived from responses to a series of questions (yes/no) on illness within eight listed body systems (e.g., nervous system, digestive system, heart and circulatory system); at least one illness required to have longstanding illness.

[b]Based on one question about smoking status with the options being: never, ex-regular smoker; ex-occasional smoker and current smokers.

[c]Derived from the question: On how many days in the last 7 days did you have an alcoholic drink?

[d]Classification based on type of employment with six categories; manual included skilled manual and unskilled manual occupation.

[e]General Health Questionnaire comprises 12 questions related to psychological health (e.g., concentration, feeling depressed); the categories were 0, 1–3 and ≥4.

[f]Due to the skewed distribution, a non-parametric Mann–Whitney *U* test was used for the *p*-value.GHQ, General Health Questionnaire; IQR, interquartile range.