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Determinants of physical activity in a cohort of young adult women. Who is at risk of inactive behaviour?

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ABSTRACT

Objectives: To identify the biological, socio-demographic, work-related and lifestyle determinants of physical activity in young adult women.
Design: Prospective cohort study.
Methods: Self-reported data from 11,695 participants (aged 22–27 years in 2000) in the Australian Longitudinal Study on Women's Health were collected over 9 years in 2000, 2003, 2006 and 2009. Generalised Estimating Equations were used to examine univariable and multivariable associations of body mass index, country of birth, area of residence, education, marital status, number of children, occupational status, working hours, smoking, alcohol intake, and stress with physical activity status (active, ≥600 MET·min/week; or inactive, <600 MET·min/week, consistent with public health guidelines).
Results: All variables were significantly associated with physical activity in univariable models. In the multivariable model, the lowest odds of being active (compared with the relevant reference categories) were for women who: were born in Asia (OR = 0.53), had less than 12 years of education (OR = 0.79), were married (OR = 0.66) or in a de facto relationship (OR = 0.79), had at least one child (OR ranging from 0.67 to 0.69), and were classified as non (OR = 0.66) or rare drinkers (OR = 0.79).
Conclusions: These results are among the first to confirm the biological, socio-demographic, work-related and lifestyle determinants of physical activity in women in their twenties and early thirties. These findings may be used to inform and improve the development of strategies, and to identify target groups most in need of intervention effort.

1. Introduction

Lack of physical activity (PA) is regarded as a life course risk factor for cardiovascular disease, diabetes, cancer, hypertension, obesity, depression and osteoporosis.[1] Conversely, meeting guidelines for PA – defined as 30 min of moderate-intensity PA on at least 5 days every week, 20 min of vigorous-intensity PA on at least 3 days ever week, or an equivalent combination, achieving 600 metabolic equivalent (MET) min per week[2] – is associated with beneficial health outcomes across a variety of physical and mental conditions.[3] As such, identifying factors that influence compliance with PA guidelines is considered a health priority.

This is particularly important in young adult women, because, in Western countries, women in their twenties typically experience many life changes which may be associated with declining PA levels.[4] Furthermore, PA participation is found to be consistently lower in women than in men.[5]

Previous studies have shown that, in women, education level is strongly associated with PA, and that minority women are less active than their 'white' counterparts.[6] Also, being married and motherhood are shown to be negatively associated with PA.[7,8] Results from a large scale Australian Health Survey have also shown that blue collar women are more likely to be insufficiently active than professional women.[9] Other studies have suggested a clustering of PA with potentially harmful health behaviours such as smoking, and drinking alcohol.[10] Almost all these findings have, however, come from cross-sectional studies or from cohort studies with short follow-up, typically in mid-age adults.

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The aim of this study was to identify the biological, socio-demographic, work-related and lifestyle determinants of PA in young adult Australian women over a period of nine years, when they were in their twenties and early thirties.

2. Methods

Data were from the Australian Longitudinal Study on Women's Health (ALSWH), which commenced in 1996. The study aim, rationale, recruitment procedures and protocol have been reported in detail elsewhere.[11] In brief, women were selected randomly from the national Medicare health insurance database (which includes all permanent residents of Australia), with oversampling of those living in rural and remote areas. Data were collected using mailed surveys. For the current study, we used data from the youngest cohort (birth years 1973–1978) collected in 2000, 2003, 2006 and 2009 (surveys 2–5, from now on referred to as S2, S3, S4 and S5). As PA and other variables were assessed differently at baseline (1996; survey 1), these data were not included in the current study. Data were included in the analyses if women provided information on both the explanatory (biological, socio-demographic, work-related or lifestyle factors) and outcome (PA) variables in the same survey, in at least one year (i.e., in 2000, 2003, 2006 or 2009). Data from women who indicated needing regular help with daily tasks because of a long-term illness or disability (103, 94, 135 and 95 women at S2–S5, respectively) were excluded from the analyses, leaving a sample of 11,695 participants (79% of the baseline sample). Forty-four percent of these women completed four surveys, while 16%, 16% and 24% responded to one, two or three surveys, respectively. Compared with the 1996 Australian Bureau of Statistics census, women who participated in the baseline survey in 1996 (41% response rate) were broadly representative of the female population in this age group.[11] ALSWH is approved by the University of Queensland and the University of Newcastle Ethics Committees and all participants gave their written informed consent.

In the current study, PA (dependent variable) was assessed using a modified version of the Active Australia questionnaire,[12] which assesses the frequency and total duration of walking, moderate, and vigorous intensity leisure time PA during the last week. This measure has been shown to have acceptable levels of test-retest reliability and validity (using both pedometer and accelerometer data as criterion measures).[12] A PA score in metabolic equivalent (MET) min per week was derived using the following formula: MET·min/week = (walking minutes × 3.0 METs) + (moderate minutes × 4.0 METs) + (vigorous minutes × 7.5 METs). PA scores were categorised as 'inactive' (<600 MET·min per week) or 'active' (≥600 MET·min per week) according to public health guidelines.[2]

We considered biological, socio-demographic, work-related and lifestyle factors as potential determinants (independent variables) of PA. Biological and socio-demographic factors included body mass index (BMI, calculated based on self-reported weight and height (weight(kg)/[height(m)]^2), country of birth, area of residence, education, marital status and number of children. Work-related factors included occupational status and hours worked per week. Finally, lifestyle factors included smoking, alcohol status and stress. With the exception of country of birth, which was reported only in 1996, all variables included in current analyses were assessed at every survey. All potential determinants were included as categorical variables, except for BMI. Copies of all the surveys, with individual questions, are available at www.alswh.org.au, and details of variable categorisation are shown in Supplementary Table 1.

The core of a longitudinal study is that the same participants are measured repeatedly over time. As such, repeated observations from each participant are not independent of each other and estimation of the parameters of the statistical model should take into account within-participants correlations. Generalised Estimating Equations (GEE) adjust statistically for this within-participants correlations, making the technique well suited for longitudinal data analyses.[13] GEE carries out pooled analysis of between-participants associations and within-participants associations. This means that the regression coefficient combines the within-participants and between-participants associations into one single coefficient.[13] To assess the longitudinal associations between potential determinants and PA status in the current study sample, two different types of GEE analyses were carried out, each including data from each participant at each follow-up measurement: (1) age-adjusted univariable logistic GEE analyses assessing the association between each independent variable and PA status separately; and (2) age-adjusted multivariable GEE analyses to identifying the most important determinants of PA status (see Fig. 1A). The multivariable GEE model included all independent variables that were significantly associated with PA in univariable analysis ($p < 0.05$). All GEE analyses were run with an exchangeable correlation structure, and were conducted in 2012 using SPSS version 20.0. All parameter estimates were expressed with a 95% confidence interval (95% CI) and statistical significance was set at $p < 0.05$. Before running the main analyses as described above, descriptive statistics (mean, SD and proportions) were run for all independent variables and PA.

Note: the main analyses were based on data from women who responded to at least one survey. To test the robustness of our results, both univariable and multivariable GEE analyses were repeated using only data from women who responded to all four surveys ($n = 5192$).

3. Results

Descriptive information about the study sample at different time points is presented in Table 1. The majority of women were born in Australia and lived in urban areas. By survey 5, more than half had completed a University or higher degree, almost two thirds were married, and more than 60% had at least one child. The proportion of active women was stable over the first two surveys (55%), and declined to 50% and 47% in 2006 and 2009, respectively.

Univariable models showed that all variables were significantly associated with PA status with most of the associations attenuated in the multivariable model (Table 2). Only multivariable results are presented below.

The odds for being active declined with increasing BMI, meaning that women with higher BMI were significantly less likely to be active. Women born in Asia (compared with Australian born women), those with lower educational qualifications than a University/higher degree, those who were married or in a de facto relationship (compared with single women), and/or women who had at least one child (compared with childless women), were significantly less likely to be active. The only factor associated with increased odds of being active was area of residence: women who lived in rural areas were more likely to be active than their urban counterparts.

Women in white collar occupations were significantly less likely to be active than professional women, and those not in the workforce or working 25–34 h per week, were significantly less likely to be active than full-time workers. Women who smoked, non- or rare drinkers, and women who were somewhat stressed were significantly less likely to be active than non-smokers, low risk drinkers, and not stressed women, respectively.

Of the categories significantly associated with PA status, odds were lowest (ORs ≤ 0.80; $p < 0.001$) for women born in Asia, those who had less than 12 years of education, were married or in a de