Concurrent lifestyle risk factors: Clusters and determinants in an Australian sample

Lara J. Morris [a,*], Catherine D'Este [b], Kerry Sargent-Cox [a], Kaarin J. Anstey [a]

[a] Centre for Research on Ageing, Health and Wellbeing, Research School of Population Health, Australian National University, Building 62, Eggleston Road, Canberra, ACT 2601, Australia
[b] National Centre for Epidemiology & Population Health, Research School of Population Health, Australian National University, Building 62, Eggleston Road, Canberra, ACT 2601, Australia

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ABSTRACT

Objective. To examine clustering among three major lifestyle risk factors for chronic disease (smoking, alcohol, and physical inactivity) and define sociodemographic subgroups with elevated risks of multiple lifestyle risk factors.

Method. Data on 6052 adults aged 28–32, 48–52, and 68–72 from wave 3 (2007–2010) of the PATH Through Life Cohort Study, Australia, were used to estimate prevalence of individual and combinations of risk factors, and multinomial regression analysis undertaken to examine demographic factors associated with number of risks.

Results. Clustering of risks varied by age and gender, with more people than expected having none or all of the risk factors. Smoking clustered with harmful alcohol use, as well as physical inactivity. No relationship was observed between physical inactivity and alcohol use. Several sociodemographic characteristics were associated with the number of lifestyle risk factors including partner status, gender, age, education, and physical and mental health related quality of life.

Conclusions. The tendency for lifestyle risk factors to aggregate in different subgroups has meaningful implications for health promotion strategies. Better insight in the more vulnerable subpopulations that are at higher risk of displaying multiple lifestyle risk factors is of importance if we wish to reduce the population propensity for chronic disease.

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Introduction

Major proximal causes of chronic disease and premature mortality are lifestyle behaviors such as tobacco smoking, insufficient physical activity, and harmful alcohol use (Begg et al., 2007; World Health Organisation, 2011). Major reductions in the burden of chronic disease will come from population-wide interventions targeting these lifestyle risk factors (World Health Organisation, 2011). Therefore, widespread calls have been made for regular monitoring of changes in the population prevalence and trends of lifestyle risk factors for non-communicable diseases (Ng et al., 2014; Spring et al., 2012; World Health Organisation, 2011).

Lifestyle risk factors are prevalent in the population and often co-occur within individuals (Spring et al., 2012). Recent evidence suggests that combining multiple unhealthy behaviors may have synergetic health effects, increasing the risk of chronic disease (Danaei et al., 2009). While some lifestyle risk factors may be interrelated, little is known about the co-occurrence or clustering of these health behaviors

nor the relationship of concurrent risk factors with socio-demographic factors (Dumith et al., 2012; Poortinga, 2007). Much of the literature has focused separately on the prevalence of each one of these health behaviors and their associated characteristics. Studies which have examined lifestyle risk factor profiles typically perform analysis using age heterogeneous samples (e.g. wide age ranges 18–65 years), although age is an influential factor contributing to health behaviors (Berrigan et al., 2003).

International studies demonstrate that health inequality and health behaviors are culturally and socio-demographically related (Buck and Frosini, 2012; Cutler and Lleras-Muney, 2010; Fukuda et al., 2005). Recognition of health behaviors as interrelated or unrelated in different cultural contexts is important in designing effective health intervention programs to modify these known health risks. This is particularly relevant in light of recommendations toward multidomain intervention approaches targeting lifestyle-related risk factors (as opposed to single, isolated approaches), to support reduction in chronic diseases such as dementia (Mangialasche et al., 2012; Schneider and Yvon, 2013).

A challenge in the literature is the lack of consistency in the terminology used to describe multiple lifestyle risk factors. Typically, the terms clustering, bundling, co-occurrence, or concurrent are used to describe combinations of multiple risk behaviors. These terms originate from different scholarly traditions and have somewhat different

nuances (Spring et al., 2012). Here, the term clustering is reserved for statistically inter-related combinations of behaviors (McAloney et al., 2013).

This study aims to examine the prevalence and combinations of three major lifestyle risk factors (smoking, alcohol use above recommended levels for long-term health, and physical inactivity), in a large sample of Australian adults. Secondly, we examine the clustering of lifestyle risk factors within narrow range age cohorts and by gender. Finally, this study examines socio-demographic factors associated with the number of concurrent lifestyle risk factors.

Methods

Participants

Participants were drawn from the PATH Through Life project, a longitudinal cohort study designed to investigate health and wellbeing across the adult lifespan. In brief, a representative sample was recruited using the Australian electoral roll from the Canberra/Queanbeyan districts, Australia. The project followed three age cohorts of participants (aged 20–24, 40–44, and 60–64 years at recruitment, also referred to as 20s, 40s, and 60s cohorts). Results presented here concern the most recent complete wave of interviews (wave 3) collected in 2007–2010 (n = 6052), and therefore include participants aged 28–32 years (n = 1962), 48–52 years (n = 2144), and 68–72 years (n = 1946). Participation rates have been high across all waves and cohorts with follow-up rates of 89%–93% across cohorts at wave three. Further details of the survey design, procedure, sampling frame, attrition, ethical approval, and representativeness of the sample are provided elsewhere (Anstey et al., 2012).

Measures

All measures were self-report survey items. Alcohol consumption was measured using the Alcohol Use Disorders Identification Test (Bohn et al., 1995). A drinking pattern based on the Australian National Health and Medical Research Council Guidelines (2009) of more than 14 standard drinks (standard drink = 10 g of ethanol) for both males and females per week, was considered alcohol use above recommended levels and that which may pose a long-term risk of harm (classified as "harmful alcohol use"). Smoking status was measured through the single question "Do you currently smoke (yes/no)". Items and cut-off criteria from the UK Whitehall II Study (Stafford et al., 1998) assessed physical activity. Time spent per week engaging in mild, moderate, and vigorous physical activities were coded as either meeting moderate to vigorous activity criteria or as sedentary/mild physical activity levels. A score of 1 was given for the presence of each risk factor (harmful alcohol use, smoking, and or physical inactivity) and the total number of lifestyle risk factors summed to provide a score ranging from 0 to 3. Mental and Physical Health Related Quality of Life was measured using the Short Form Health Survey (SF12), with RAND scoring (Ware et al., 1996). At a population level, the scale is standardized with a mean of 50 and a standard deviation of 10, with higher scores indicating better health. Socio-demographic measures included gender, age cohort, region of birth, household income, and highest level of education. Partner status was married or living with a partner; or not living with a partner, single, or widowed.

Statistical analyses

Characteristics of the sample are presented as frequencies and percentages. The observed prevalence of each risk factor was the percentage of the sample reporting that risk factor. Expected prevalence for each combination of risk factors, assuming no association (i.e. independence), was calculated by multiplying the observed prevalence of each behavior (Schuit et al., 2002). A measure of clustering was calculated as observed divided by expected prevalence for each risk factor combination (O/E). Confidence intervals (CIs) were obtained through bootstrapping procedures in STATA. Clustering was determined to have occurred when the 95% CIs for the O/E did not include one (Schuit et al., 2002). The associations between pairs of risk factors were then examined by calculating prevalence odds ratios (POR) and tested using the Chi-squared test. The POR and cluster analysis were conducted separately for each age cohort and gender. A multinomial regression analysis was undertaken on the full sample to investigate socio-demographic factors associated with the number of lifestyle risk factors (classified as none, one or two/three risks). The categories of two and

three lifestyle risk factors were collapsed due to small numbers reporting all three lifestyle risk behaviors.

Results

Sample characteristics and prevalence of lifestyle risk behaviors are presented in Table 1. The majority of individuals had one or more lifestyle risk factor. The most frequently reported lifestyle risk factor was physical inactivity (36%), followed by smoking (13%) and harmful alcohol use (13%). Smoking was more commonly reported in the younger age cohorts, with 21% of those aged 28–32 years reporting being a current smoker. Smoking and harmful alcohol use was more common among males than females. Females were more frequently physically inactive than males.

The observed and observed/expected prevalence ratios of all eight possible combinations of the three lifestyle risk factors by cohort and gender are shown in Table 2. The observed prevalence of having *all* or *none* of the three lifestyle risk factors was higher than expected for all age cohorts; however, this was not statistically significant for the oldest age cohort. Observed prevalence of persons engaging in only one risk factor was typically lower than the expected prevalence, particularly for smoking and alcohol use. Although the older cohort were more likely than expected to exhibit alcohol use at levels of lifetime harm as their only risk factor, this was not statistically significant.

Where smoking was one of the risk factors present, there were higher than expected prevalence of additional risk factors for most age cohort by gender strata, although this was generally only significant for smoking and alcohol use (see Table 2). This association between

Table 1
Selected lifestyle risk factors and sample characteristics.

Characteristic	N	%#	Lifestyle risk factor %*		
			Smoking	Alcohol	Inactive
			n = 810	n = 786	n = 2203
Total sample	6052	100.0	13.4	13.0	36.4
Age					
28–32 years.	1962	32.4	21.1	11.8	25.5
48–52 years.	2144	35.4	13.5	14.5	39.1
68–72 yrs.	1946	32.2	5.4	12.5	44.4
Sex					
Males	2937	48.5	14.0	19.9	28.6
Females	3115	51.5	12.8	6.5	43.7
Partner status					
Living together	4449	73.6	10.4	13.6	35.8
Unpartnered	1596	26.4	21.8	11.2	38.2
Region of birth					
Australia	4714	79.8	14.3	13.5	36.0
Overseas	1196	20.2	9.2	11.0	38.5
Education					
< High school (<12 years)	719	11.9	17.8	10.8	54.8
Senior certificate (12 years)	316	5.2	17.1	14.6	48.1
Tertiary (>12 yrs. <15 years)	2094	34.8	18.1	13.9	36.8
Post tertiary (>15 years)	2891	48.0	8.6	12.8	30.2
Household income					
< $30 kpa.	894	15.4	16.1	9.1	49.1
≥ $30 k < $56 kpa.	1311	22.6	15.3	14.0	38.6
≥$56 k < $125 kpa	1360	23.4	14.0	12.4	34.1
≥$125 kpa	2243	38.6	10.8	14.8	30.4
No. of risk factors					
Zero risks	2961	48.9	0.0	0.0	0.0
One risks	2454	40.5	43.6	51.1	77.1
Two risks	566	9.4	47.7	39.8	19.7
Three risks	71	1.2	8.8	9.0	3.2

Note. Numbers may not add to the total sample size due to missing values. # Column reflects percent of total sample; *column reflects percent of each group with risk factor of interest.