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Is an index of co-occurring unhealthy lifestyles suitable for understanding migrant health?

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ABSTRACT

Objective. This study investigated variation in unhealthy lifestyles within Australia according to where people were born.

Method. Multilevel linear regression models were used to explore variation in co-occurring unhealthy lifestyles (from 0 to 8) constructed from responses to tobacco smoking, alcohol consumption, moderate-to-vigorous physical activity and a range of dietary indicators for 217,498 adults born in 22 different countries now living in Australia. Models were adjusted for socio-economic variables. Data was from the 45 and Up Study (2006–2009). Further analyses involved multilevel logistic regression to examine country-of-birth patterning of each individual unhealthy lifestyle.

Results. Small differences in the co-occurrence of unhealthy lifestyles were observed by country of birth, ranging from 3.1 (Philippines) to 3.8 (Russia). More substantial variation was observed for each individual unhealthy lifestyle. Smoking and alcohol ranged from 7.3% and 4.2% (both China) to 28.5% (Lebanon) and 30.8% (Ireland) respectively. Non-adherence to physical activity guidelines was joint-highest among participants born in Japan and China (both 74.5%), but lowest among those born in Scandinavian countries (52.5%). Substantial variation in meeting national dietary guidelines was also evident between participants born in different countries.

Conclusion. The growing trend for constructing unhealthy lifestyle indices can hide important variation in individual unhealthy lifestyles by country of birth.

Introduction

Achieving published guidelines for healthier lifestyles (Department for Health and Ageing, 2005, 2009; World Health Organization, 2010; Zwar et al., 2011) is important for preventing obesity and type 2 diabetes mellitus (Colagiuri et al., 2010; Lee et al., 2013). Studies around the world, however, have reported that most people find it very difficult to meet all of these guidelines (Buck and Frosini, 2012; Chou, 2008; Drieskens et al., 2010; Feng and Astell-Burt, 2013; Halonen et al., 2012; Lakshman et al., 2011; Lawder et al., 2010; Li et al., 2007; Lv et al., 2011; Poortinga, 2007; Schuit et al., 2002; Shankar et al., 2010; Tobias et al., 2007; Tsai et al., 2010). Many studies have demonstrated that unhealthy lifestyles cluster among people with no educational qualifications, low incomes, and those living in deprived neighborhoods (Feng and Astell-Burt, 2013; Halonen et al., 2012; Lakshman et al., 2011; Lawder et al., 2010). By comparison, few studies have investigated the clustering of unhealthy lifestyles between persons according to their country of birth, but living in the same country. Knowing whether certain unhealthy lifestyles are more likely to occur, or co-occur among particular migrant groups, could help to direct scarce resources towards communities with the greatest potential to benefit from investments in multiple lifestyle interventions. In this paper, the largest ongoing study of healthy aging in the Southern Hemisphere was used to investigate country-of-birth differences in the clustering of unhealthy lifestyles, and also of each individual's unhealthy lifestyle separately.

Method

Sample

Data were extracted from the baseline dataset of the 45 and Up Study, details of which are published (45 and Up Study Collaborators, 2008). In brief, a random sample of people aged 45 and over (up to 106) from the Australian Medicare Benefit Schedule database self-completed a questionnaire between 2006 and 2009, with a response rate of 18% and approximately 267,000 participants. Responses to the question 'in which country were you born?' were used to define participants born in Australia and those born in 21 other countries, including: China, Croatia, France, Germany, Greece, India, Ireland, Italy, Japan, Lebanon, Malta, Netherlands, New Zealand, Philippines, Poland,

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Russia, Scandinavia (an aggregation of Denmark, Finland, Norway and Sweden due to small numbers), Spain, Switzerland, United Kingdom and Vietnam. The University of New South Wales Human Research Ethics Committee approved the study.

Outcome variables: unhealthy lifestyles

In line with previous work (Feng and Astell-Burt, 2013), we constructed binary indicators (see Supplementary Table 1) of whether a participant failed to adhere to 5 published guidelines for diet (vegetables, fruit, milk, fish and red meat) (Department for Health and Ageing, 2005), moderate-to-vigorous physical activity (MVPA) (World Health Organization, 2010), tobacco smoking cessation (Zwar et al., 2011) and alcohol consumption (Department for Health and Ageing, 2009). These indicators were summed to create the unhealthy lifestyle index, ranging from 0 to 8. Missing information left a sample of 217,498 participants with valid unhealthy lifestyle index scores.

Confounders

Possible confounders are considered at both individual and neighborhood levels. The individual level included age, gender, annual household income, educational qualifications, employment and couple status. The neighborhood level considered affluence (measured by Socio-economic Index for Areas (SEIFA) 'Index of Relative Socio-economic Advantage/Disadvantage', defined by the Australian Bureau of Statistics (ABS) using census variables including household income and educational qualifications (Trewin, 2001)) and geographical remoteness (measured using the 'Accessibility/Remoteness Index of Australia' (ARIA), a score ranging from 0 to 15: urban and inner regions (<2.4); and rural or remote (≥2.4) (Australian Population and Migration Research Centre, 2012)).

Statistical analysis

Cross-tabulations were used to examine the patterning of the unhealthy lifestyle index and separate binary indicators across all country-of-birth groups. Multilevel linear regression was used to fit association between the unhealthy lifestyle index and country of birth, adjusted for age and gender. The robustness of association was subjected to adjustment for individual- and neighborhood-level confounders. Further analyses were conducted to investigate country-of-birth patterning of each binary unhealthy lifestyle indicator separately using multilevel logistic regression. Multilevel models were used to adjust all model parameters for the clustering of participants within Census Collection Districts, which are small geographic areas with 225 dwellings on average (Australian Bureau of Statistics, 2012). Statistically significant associations were identified by using the log-likelihood ratio test ($p < 0.05$). All the data analyses were conducted in MLwIN v.2.29 (Rasbash et al., 2009).

Results

Table 1 reports the patterning of unhealthy lifestyles by country of birth. Participants born in Australia scored an average of 3.4 unhealthy lifestyles from a possible 8. By comparison, many overseas-born groups had slightly higher average scores on the unhealthy lifestyle index, such as those born in Japan, Lebanon or Scandinavian countries (all 3.7) or in Russia (3.8). Only those born in the Philippines (3.1) had an average score on the unhealthy lifestyle index that was lower (i.e. more favorable) than participants born in Australia. Although statistically different, this country of birth differences in the unhealthy lifestyle index was not substantial. When considering each unhealthy lifestyle individually, however, noticeably more heterogeneity by country of birth was evident.

Table 2 reports the results of the multivariate analysis of the unhealthy lifestyle index. After accounting for country of birth, age and gender, only 1.3% of the total variation in the unhealthy lifestyle index was observed between Census Collection Districts according to the Intra-class Correlation Coefficient (ICC). Model 1, adjusted for age and gender, shows participants born in China, Malta, Philippines, Spain and UK which had significantly lower scores on the unhealthy lifestyle index than their counterparts born in Australia. By contrast, those born in Germany, Ireland, Japan, Netherlands, Russia and Scandinavian countries scored slightly higher on the unhealthy lifestyle index. Controlling for individual-level characteristics in Model 2 attenuated the difference for participants born in China and the Philippines, but amplified the difference for those born in Italy, Malta and Switzerland. Adjusting for neighborhood affluence and geographic remoteness in

Table 1
Country of birth differences in unhealthy lifestyles.

Country of birth	N (mean unhealthy lifestyles)	Percentage not meeting published guidelines							
		Smoking	Alcohol	MVPA	Fruit	Vegetables	Milk	Fish	Red meat
Australia	163,654 (3.4)	14.6	26	57.9	42.1	66	40.7	80.5	16
China	2242 (3.4)	7.3***	4.2***	74.5***	39.2**	84.5***	60.4***	53.7***	15
Croatia	332 (3.5)	16.6	15.1***	59.3	32.5***	77.4***	54.2***	80.1	15.4
France	293 (3.4)	20.5**	18.8**	53.6	30.7***	70.7	59.4***	74.4**	12
Germany	2228 (3.5)**	17.6***	21.1***	53.0***	36.3***	73.8***	53.6***	79.8	16.6
Greece	639 (3.5)	18.2**	11.9***	68.7***	33.5***	75.0***	58.2***	78.4	8.8***
India	900 (3.5)	10.3***	13.3***	62.4**	46.1*	80.8***	47.2***	80	6.0***
Ireland	904 (3.6)**	17.0*	30.8***	57.4	43.9	74.5***	41.8	82.5	10.5***
Italy	1629 (3.4)	14.6	14.5***	66.1***	29.0***	74.1***	49.5***	81.1	11.5***
Japan	192 (3.7)*	19.3	15.1***	74.5***	47.4	77.6***	64.6***	64.1***	6.3***
Lebanon	506 (3.7)***	28.5***	6.3***	75.3***	33.8***	73.1***	55.9***	87.9***	8.9***
Malta	676 (3.4)	18.1*	14.6***	64.9***	33.7***	72.6***	43.1	80.3	11.2***
Netherlands	2019 (3.6)***	16.7**	20.3***	58.3	37.5***	75.6***	48.8***	83.0**	15.2
New Zealand	4243 (3.4)	18.6***	27.1	54.7***	38.0***	69.9***	43.8***	79.3	11.6***
Philippines	952 (3.1)***	10.0***	4.9***	59.9***	40.1	81.2***	49.9***	48.5***	13.1*
Poland	505 (3.5)	15.8	13.5***	64.4**	34.1***	73.5***	53.9***	77.8	17.4
Russia	111 (3.8)**	18.9**	10.8***	73.0**	34.2	79.3**	68.5***	74.8	20.7
Scandinavia	335 (3.7)**	20.9***	29.9	52.5*	38.8	81.2***	51.9***	76.4	19.4
Spain	174 (3.3)	18.4	15.5**	62.6	33.3*	71.3	50.0*	65.5***	9.8*
Switzerland	241 (3.6)*	17	18.3**	56.9	35.3*	78.4***	56.0***	84.7	17.8
United Kingdom	21,026 (3.4)***	15	27.4***	54.6***	42.6	70.9***	39.5**	76.5***	10.4***
Vietnam	637 (3.5)	12.6	5.0***	72.4***	40.4	82.4***	70.8***	56.8***	8.2***

Authors created this table by using the 45 and Up Study baseline data (45 and Up Study Collaborators, 2008).
MVPA: moderate to vigorous physical activity.
* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$