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Short report

Influence of neighbourhood ethnic density, diet and physical activity on ethnic differences in weight status: A study of 214,807 adults in Australia

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ABSTRACT

We investigated whether ethnic and country of birth differences in adult Body Mass Index (BMI) were associated with differences in diet, physical activity and ethnic density (the percentage of an ethnic group within the neighbourhood environment).

A sample of 214,807 adults living in Australia was extracted from the 45 and Up Study. Analyses comprised multilevel modelling of BMI for 38 ethnic and country of birth groups. Physical activity was ascertained using the Active Australia Survey. Dietary measures included self-reported consumption of fruit, vegetables, meat and cheese. Ethnic density was objectively measured using 2006 Australian Census data. Possible confounders included age, gender, household income, educational qualifications, economic status, couple status, language, duration of residence, neighbourhood affluence and remoteness.

Compared to Australian-born Australians (age-gender adjusted mean BMI = 27.1, 95%CI 27.1, 27.2), overseas-born groups often had lower mean BMI, especially the Chinese born in China (23.2, 23.0, 23.4). Exceptions included the Italians (BMI = 28.1), Greeks (28.5), Maltese (27.6), Lebanese (28.4) and Croatians (27.8) born in their ethnic-country of origin. Regardless of birthplace, BMI was lower for the English, Scottish, and Chinese, but higher for Italians and Greeks. Some ethnic differences reflected the 'healthy migrant' hypothesis, whereas others did not. These differences were only partially attenuated by controls for portions of fruit and vegetables, meat and cheese, frequency of participation in physical activity, and other explanatory variables. Ethnic density was associated with lower BMI for the English and Irish ($p < 0.05$), regardless of whether they were born in the UK, Ireland, or Australia.

Ethnic differences in adult weight status in Australia do not appear to be fully explained by conventional risk factors. For some groups, but not all, living among others of the same ethnic group may proxy unmeasured health-promoting factors and these contexts, along with other factors that harm health (e.g. racial discrimination) warrant further investigation.

Introduction

The sustainability of healthcare systems internationally is threatened by the high prevalence of obesity and associated lifestyle diseases (Wang, McPherson, Marsh, Gortmaker, & Brown, 2011). Australia is no exception: with 60% of adults and one in four children being classified as overweight or obese (Moodie et al., 2009), the potential costs to society and the national economy are high and rising (Colagiuri et al., 2010). Ethnic differences in weight status and associated risk factors across the lifecourse have been investigated in many countries (Agyemang et al., 2011; Baum, 2007; Smith, Kelly, & Nazroo, 2011), though to a lesser extent in Australia. This apparent lack of research attention is surprising because out of 22.6 million people, substantial waves of immigration has made its population one of the world's most ethnically diverse, with over one quarter born overseas, of which 50% originate from non-English-speaking countries (Anikeeva et al., 2010).

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Some research has demonstrated that immigrants often have a lower weight status than populations born in high-income countries, including Australia (Antecol & Bedard, 2006; Bates, Acevedo-Garcia, Alegria, & Krieger, 2008; Gray, Harding, & Reid, 2007; Haenszel & Kurihara, 1968; Hauck, Hollingsworth, & Morgan, 2011; Marmot & Syme, 1976). This so-called 'healthy migrant effect' can be explained, to some extent, by health requirements for immigration and the association between long-distance migration, health and affluence (Anikeeva et al., 2010). It is generally expected that behavioural differences between migrants and the native-born residents will decrease over time due to acculturation, with potential shifts in diet and physical activity modifying energy intake and expenditure (Spiegelman & Flier, 2001). However, while early studies reported converging trajectories in health and behaviours towards those of the host population with longer duration of residence (Haenszel & Kurihara, 1968; Marmot & Syme, 1976), recent studies in Australia suggest a more complex picture of divergence for some ethnic groups (Gray et al., 2007; Hauck et al., 2011). With reflections of how 'spatial assimilation' (Massey & Denton, 1985) was later replaced by 'segmented assimilation' theory (Zhou, 1997), by acknowledging the diversity of experiences in substitution for a singular trajectory of social and geographical mobility that were previously thought to be an inevitable outcome for overseas-born minorities living in impoverished inner cities, it would appear that orthodox notions of convergence in health and lifestyle by ethnicity and nativity as a function of time are due a similar reconceptualisation.

It is just over two decades since the renowned geographer, Peter Gould, questioned the potential usefulness of research on health and related phenomena that took scant interest in the role of place and society (Gould, 1993). Around that time, understandings on the significance of place for health (Kearns & Moon, 2002) and wider life-chances (Wilson, 1987) were gathering momentum, leading to major quasi-experimental studies (Kling, Liebman, & Katz, 2007) and renewed theorising (Galster, 2012) of what has come to be known as 'neighbourhood effects' (Sampson, 2012). Belief is now increasingly widespread that the neighbourhoods in which people live and interact could be, to a potentially large extent, shaping health and lifestyles (Kawachi & Berkman, 2003). It is plausible that the non-random social and spatial patterning of people by ethnicity and country of birth (Osypuk & Acevedo-Garcia, 2008) may, therefore, promote systematic differences in exposure to opportunity structures and convergence among some groups, but also divergence in the same outcomes for others who are exposed to a different configuration of neighbourhood characteristics.

In Australia's case, pro-family-centred immigration policy has led to a clustered residential patterning of ethnic groups in Australian cities (Dunn, 1998; Johnston, Forrest, & Poulsen, 2001a, b). According to previous work in geography, sociology and economics, high levels of this 'ethnic density' within the local area can foster demand for ethnic-specific institutions, retail environments and a social fabric capable of retaining behavioural norms that influence health (Aldrich, Cater, Jones, McEvoy, & Velleman, 1985; Borjas, 1995; Cutler, Glaeser, & Vigdor, 2005; Peach, 1996; Zhou, 2005). The health benefits associated with a Mediterranean diet (Knoops et al., 2004; Trichopoulou, Costacou, Bamia, & Trichopoulos, 2003), for example, are likely to be more persistent in areas where Greeks and Italians comprise a large proportion of the local community (Kouris-Blazos, Wahlqvist, Trichopoulou, Polychronopoulos, & Trichopoulos, 1996; Kouris-Blazos et al., 1999), whereas local customs and food outlets associated with the Vietnamese, Korean and Chinese are also more common within other geographic areas, such as the suburb of Cabramatta in Sydney (Dunn, 1993, 1998). The entwining of self-identified ethnicity with the predominant ethnicity of the area in which that person lives could, therefore, play an important role in patterns of convergence or divergence in health and lifestyles.

We theorise that the ethnic density of a neighbourhood could play a potentially important role in shaping ethnic and country of birth differences in weight status. Few have investigated this hypothesis and those studies have been focussed on the US (Chang, 2006; Kirby, Liang, Chen, & Wang, 2012). None have been located in Australia. The aim of this paper was to investigate these issues in New South Wales (NSW); the most populous and diverse state in the country. Our study considered differences in weight status between people born in Australia versus their ethnic-country of origin (e.g. Chinese adults born in Australia, in comparison to their contemporaries born in China, now living in Australia), and therefore how individual- and neighbourhood-level characteristics, including ethnic density, were associated with variation in weight status between and within ethnic and country of birth groups.

Methods

Study population

Detailed information on the 45 and Up Study is available elsewhere (45 and Up Study Collaborators, 2008). In brief, the Study is a survey of over 267,000 people aged 45 years and over living in the Australian state of New South Wales and was approved by the University of New South Wales Human Research Ethics Committee. Participants at baseline were randomly selected from records in the Medicare Australia database (the national provider of universal health insurance) between 2006 and 2008. A baseline questionnaire covering a range of health and social issues was self-administered and, while the response rate of approximately 18% was low, previous research has suggested that results remain broadly comparable to those derived from representative samples (Mealing et al., 2010).

In this paper, we focused on the main ethnic groups resident in NSW: Australian, English, Scottish, Welsh, Irish, Danish, French, Swiss, German, Dutch, Spanish, Italian, Greek, Polish, Maltese, Lebanese, Croatian, Indian, and Chinese. Aboriginal and Torres Strait Islander status was not identified in the data. In line with previous work (Feng, Astell-Burt, & Kolt, 2013), ethnicity was defined according to the first response from each participant to the question 'What is your ancestry?' We stratified each group according to responses to the question 'In which country were you born?' We retained all participants born in Australia ($n = 179{,}727$), all participants of Australian ethnicity born outside Australia ($n = 1336$), and participants of non-Australian ethnic groups born in their ethnic-country of origin ($n = 33{,}744$). Participants of non-Australian ethnic groups not born in Australia or their ethnic-country of origin were omitted from the sample ($n = 34{,}741$) as they were heterogeneous by definition and numerically small, which made it difficult to meaningfully interpret results. We omitted participants missing a postcode ($n = 263$) and missing a valid outcome measure ($n = 20{,}154$). Missing data for independent variables was resolved via single imputation of the gender-specific mean, retaining an overall sample size of 214,807.

Outcome measure

BMI was based on self-reported height and weight from the 45 and Up Study baseline questionnaire (Ng et al., 2011). BMI can be used as a continuous measure and also categorised according to World Health Organization definitions as 'underweight' (BMI < 18.5), 'normal weight' (18.5–24.9), 'overweight' (25.0–29.9) and 'obese' ($\geq$30.0). Results using an obese/non-obese dichotomy did not vary substantially from those obtained using the continuous measure of BMI that are reported in this paper.