Multiple health behaviours among mothers and partners in England: Clustering, social patterning and intra-couple concordance

Hilary Graham[a,*], Jayne Hutchinson[a,b], Catherine Law[c], Lucinda Platt[d], Heather Wardle[e]

[a] Nutritional Epidemiology Group, Department of Health Sciences, Seebohm Rowntree Building, University of York, YO10 5DD, UK
[b] School of Food Science and Nutrition, University of Leeds, Leeds LS2 9JT, UK
[c] Population, Policy & Practice Programme, UCL Great Ormond Street, Institute of Child Health, 30 Guilford Street, London WC1N 1EH, UK
[d] Department of Social Policy, London School of Economics and Political Science, Houghton Street, London WC2A 2AE, UK
[e] Heather Wardle Research Limited, 1 Rymer Street, Herne Hill, London SE24 0NQ, UK

ARTICLE INFO

ABSTRACT

Research on multiple health behaviours is increasing but little is known about parental behaviours and how they covary. Our study investigates cigarette smoking, alcohol intake, fruit and vegetable (F & V) consumption and physical activity among mothers and co-resident partners in England. Using the UK Household Longitudinal Study, we examined (i) clustering of health behaviours using observed-expected ratios and latent class analysis (ii) socio-demographic correlates of the derived latent classes and (iii) intra-couple concordance of individual health behaviours and their latent classes. We identified five latent classes for mothers and partners: Never smoked drinkers (28% of mothers; 29% of partners), Abstainers (25%; 17%), Drinkers and ex-smokers (19%; 26%), Unhealthy low frequency drinkers (18%; 16%) and Unhealthiest behaviour group (11%; 12%). These had distinctive social profiles. Never smoked drinkers were more likely than those in other groups to be white and socially advantaged: married, older, and with higher educational qualifications and incomes. Abstainers were non-smokers who never or occasionally drank, and were disproportionately drawn from ethnic minority groups and middle/lower income families. Drinkers and ex-smokers were the most physically active group and were more likely to be socially advantaged. Unhealthy low frequency drinkers were more likely to be disadvantaged and have a limiting long-standing illness. The Unhealthiest behaviour group had the highest proportion of smokers, heavy smokers and binge drinkers and the lowest F & V intake and physical activity levels. They were largely white and socially disadvantaged: younger, non-married and with lower educational levels. Mothers and their partners typically shared the same risk behaviours, and 44 per cent of partners and mothers belonged to the same latent class. Our findings point to the potential for a broadening of research and policy perspectives, from separate behaviours to combinations of behaviours, and from individuals to the domestic units and communities of which they are part.

1. Introduction

Four behaviours – cigarette smoking, high alcohol intake, poor diet and physical inactivity – underlie the chronic diseases (cardiovascular disease, cancer, lung disease and type-2 diabetes) responsible for 70% of premature deaths in Europe (WHO, 2011, 2014). These behaviours have both separate and synergistic effects on health (Khaw et al., 2008; Kvaavik, Batty, Ursin, Huxley & Gale, 2010; Martin-Diener et al., 2014; WHO, 2008). Social disadvantage increases the risk of smoking,

poor diet and physical inactivity; evidence for high alcohol intake is less consistent (Bloomfield, Grittner, Kramer & Gmel, 2006; Stringhini et al., 2010). the four behaviours are a major focus of public health policies, with governments advising the public not to smoke and providing recommendations on minimum levels of physical activity and fruit and vegetables (F & V) intake and maximum thresholds for alcohol consumption.[1]

While much of the evidence focuses on single health behaviours, there is increasing appreciation that these behaviours are not inde-

---

pendent (McAloney et al., 2014; Noble, Paul, Turon & Oldmeadow, 2015; Prochaska, Spring & Nigg, 2008). Earlier studies have investigated the co-occurrence of behaviours by establishing the prevalence of different risk behaviour combinations and/or by summing the number of risk behaviours reported by each study participant into a risk score. However, these approaches have limitations (McAloney et al., 2014; Noble et al., 2015a). Establishing that behaviours co-occur does not establish whether their co-occurrence differs from what would be expected given the prevalence of each behaviour, and risk scores do not indicate which behaviours contribute to an individual's score.

Studies are therefore increasingly going beyond co-occurrence and risk scores to examine inter-relationships between health behaviours. Recent reviews have identified two main analytical approaches: examining differences between observed and expected combinations of behaviour and interrogating underlying patterns across the behaviours (McAloney et al., 2014; Noble et al., 2015a). The first approach led the way in the analysis of multiple risk behaviours (McAloney et al., 2014). It uses dichotomous measures of behaviours and observed and expected (O/E) ratios to provide a simple summary measure of whether combinations of behaviours occurs more (or less) often than would be expected if the behaviours were independent.

Relying on more advanced statistical techniques, the second approach offers a number of analytic advantages. It moves beyond observed combinations of behaviour, to identify latent (or unobservable) types either of participants based on their behaviours (e.g. latent class analysis) or of behaviours (e.g. factor analysis) (Hofstetter, Dusseldorp, van Empelen & Paulussen, 2014). Latent class analysis (LCA) is increasingly used to investigate inter-relationships between behaviours (Mawditt, Sacker, Britton, Kelly & Cable, 2016; McAloney et al., 2014; Noble et al., 2015a). It identifies mutually exclusive behavioural clusters to which study participants are assigned on the basis of their probability of membership. While some studies use single dichotomous measures of behaviour based on adherence to national public health guidelines (e.g. de Vries et al., 2008), the methods allow a broader set of measures of the relevant behaviours to be included, for example, smoker/ex-smoker/never smoker. In addition, by identifying underlying relationships between behaviours, a potentially large number of behavioural combinations can be reduced to a smaller number of behavioural classes (McAloney et al., 2014; Muthén, 2001). The socio-demographic profile of the resultant classes can also be described, for example by regression analyses to predict class membership (Cleveland, Collins, Lanza, Greenberg & Feinberg, 2010; Evans-Polce, Lanza, and Maggs, 2016; Robinson, 2012).

However, while evidence on multiple risk behaviours is accumulating, there are important gaps. Despite the policy emphasis on settings-based approaches to health promotion (Poland, Krupa & McCall, 2009; WHO, 2013), we found no studies investigating intra-household associations in multiple risk behaviours. In addition, most studies focus on the general population, together with a few studies of younger adults, older people and patient populations (e.g. people with hypertension, cancer survivors) (King et al., 2015; McAloney et al., 2014; Noble et al., 2015a). Neither of the reviews of multiple health behaviours studies included studies of parents or reported measures that enabled identification of parents, e.g. presence of dependent children in the household (King et al., 2015; McAloney et al., 2014; Noble et al., 2015a). A citation search of the reviews identified a further five studies of clustering of the four behaviours covered here (Bryant, Bonevski, Paul & Lecathelinais, 2013; Filippidis, Agaku, & Vardavas, 2015; Kritsotakis, Psarrou, Vassilaki, Androulaki, & Philalithis, 2016; Mawditt et al., 2016; Morris, D'Este, Sargent-Cox, & Anstey, 2016). Again, none provided information on parental health behaviours.

As this suggests, little is known about parental health behaviours and how they covary. Yet parents caring for dependent children represent a large sub-group of the population. In the UK, they represent 31% of all adults (Office of National Statistics (ONS, 2014). Over a third of UK married couples (38%) and cohabiting couples

(41%) are caring for dependent children in the family, and 75% of children are living in two-parent households (ONS, 2015). Childhood and adolescence are formative periods for the development of health behaviours which persist into adulthood (Ebrahim, Montaner, & Lawlor, 2004; Jefferis, Power, Graham, & Manor, 2004; Schooling & Kuh, 2002) and parents are an important influence on the behaviours of their children (Brown & Ogden, 2004; Edwardson & Gorely, 2010; Gilman et al., 2009; Pearson, Biddle, & Gorely, 2009; Van Der Vorst, Engels, Meeus, Deković, & Van Leeuwe, 2005).

Our study investigates patterns of smoking, alcohol intake, F & V consumption and physical inactivity among co-resident parents caring for dependent children in England. Within the UK's devolved structure, England's health policy has a particularly strong emphasis on health behaviours (Graham, 2009; Smith & Collin, 2013) and the study funder's remit is to provide evidence to inform this policy. We include measures based on government recommendations ('health risk behaviours') along with a fuller range of measures of the four behaviours. Looking separately at mothers and partners, we examine (i) inter-relationships between heath behaviours using observed-expected ratios and LCA and (ii) the socio-demographic correlates of the latent classes. Focusing on mother-partner pairs, we examine (iii) intra-couple concordance of health risk behaviours and class membership. Because 'class' is commonly used to refer to an individual's socio-economic background, we use 'group' and 'latent class' when referring to the classes derived from the LCA.

2. Design and methods

2.1. The study population

The UK Household Longitudinal Study (UKHLS) is a panel study of individuals from c28,000 UK households and an ethnic minority boost sample of around 4000 households. Study participants were first surveyed in 2009/10 and are followed up each year (Buck & McFall, 2011; ISER & NatCen Social Research, 2012). In 2010/11 (wave 2), the UKHLS included questions on the four health behaviours.

We defined mothers as adult non-pregnant women (aged 16 years and over) who lived in England and had a child < 16 years living with them at the time of the interview whom they reported to be their natural, step, foster, or adoptive child. A small proportion (3.3%) of mothers was excluded because they were pregnant. Partners were the co-resident partners of mothers. Almost all (99.6%) of the partners were male and most (78%) were married to the mother. Further sample details are given in Supplementary Appendix A1.

2.2. Questions on health behaviour

The main interview included questions on smoking, F & V consumption and physical activity; alcohol consumption was part of a separate self-completion questionnaire (details in Supplementary Appendix A2). A high proportion of responses were missing for alcohol consumption among minority ethnic groups; imputed values were therefore derived from median values matched for ethnic and religious group, marital status and country of birth (see Appendix A2).

Behavioural measures included ones aligned to government recommendations for smoking, single-occasion alcohol intake (consuming more than twice the recommended daily limit, with separate limits set for men and women) and F & V consumption; for physical activity, we derived a measure that approximated to the recommendation (see Box 1). These binary measures (meeting/not meeting the relevant recommendation) were used for investigating clustering using observed-expected ratios; for the LCA, additional categories and a wider range of behaviour measures were used (see Box 2). In addition to current smoking behaviour, age of smoking initiation was used in the LCAs because early smoking initiation is associated with difficulty quitting and longer term use, as well as with heavier smoking (Breslau, Fenn &