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Social influences on health-related behaviour clustering during adulthood in two British birth cohort studies

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ABSTRACT

Building upon evidence linking socio-economic position (SEP) in childhood and adulthood with health-related behaviours (HRB) in adulthood, we examined how pre-adolescent SEP predicted membership of three HRB clusters: "Risky", "Moderate Smokers" and "Mainstream" (the latter pattern consisting of more beneficial HRBs), that were detected in our previous work.

Data were taken from two British cohorts (born in 1958 and 1970) in pre-adolescence (age 11 and 10, respectively) and adulthood (age 33 and 34). SEP constructs in pre-adolescence and adulthood were derived through Confirmatory Factor Analysis. Conceptualised paths from pre-adolescent SEP to HRB cluster membership via adult SEP in our path models were tested for statistical significance separately by gender and cohort.

Adult SEP mediated the path between pre-adolescent SEP and adult HRB clusters. More disadvantaged SEP in pre-adolescence predicted more disadvantaged SEP in adulthood which was associated with membership of the "Risky" and "Moderate Smokers" clusters compared to the "Mainstream" cluster. For example, large positive indirect effects between pre-adolescent SEP and adult HRB via adult SEP were present (coefficient 1958 Women = 0.39; 1970 Women = 0.36, 1958 Men = 0.51; 1970 Men = 0.39; $p < 0.01$) when comparing "Risky" and "Mainstream" cluster membership. Amongst men we found a small significant direct association ($p < 0.001$) between pre-adolescent SEP and HRB cluster membership.

Our findings suggest that associations between adult SEP and HRBs are not likely to be pre-determined by earlier social circumstances, providing optimism for interventions relevant to reducing social gradients in HRBs. Observing consistent findings across the cohorts implies the social patterning of adult lifestyles may persist across time.

1. Introduction

Research evidence indicates that four health-related behaviours (HRBs), smoking, alcohol, diet and physical activity, cluster together and that HRB clustering is socially patterned (Noble et al., 2015; Meader et al., 2016). More disadvantaged social circumstances in adulthood, captured through socio-economic position (SEP), are associated with membership of clusters characterised by multiple negative HRBs (i.e. smoking, heavy alcohol consumption, physical inactivity, low fruit and vegetable consumption).

Evidence from cohort studies using prospectively collected data suggest that more disadvantaged childhood SEP is associated with negative HRBs in adulthood (Clouston et al., 2015; Lacey et al., 2010; Bann et al., 2016). Studies testing for mediation have found both a direct effect of childhood SEP on adult HRBs and an indirect effect via adult SEP (van de Mheen et al., 1998; Kamphuis et al., 2013; Elhakeem et al., 2015; Watt et al., 2009; Pudrovska and Anishkin, 2013; Schooling and Kuh, 2002; Yang et al., 2008). Other studies have found direct effects of childhood SEP on adult HRBs are fully explained by adult SEP (Kvaavik et al., 2012; Kestila et al., 2015; Paavola et al., 2004). However, some of these mediation studies relied on retrospective accounts of social circumstances in childhood (Elhakeem et al., 2015; Watt et al., 2009; Kestila et al., 2015) or used single measures of SEP (van de Mheen et al., 1998; Kamphuis et al., 2013; Elhakeem et al., 2015; Kvaavik et al., 2012). Notably, none of these studies consider HRB clustering.

To date only one study has considered how SEP early in life shapes HRB clustering in adulthood (Falkstedt et al., 2016). This study found

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disadvantaged SEP in childhood and adulthood was predictive of membership in clusters characterised by multiple negative HRBs. Whilst insightful, this study included parental education as the only measure of SEP which limits it's impact given that SEP is arguably multi-faceted (Bartley, 2016), influencing HRBs through factors such as economic circumstances, social norms and employment relations (Sacker et al., 2001). Moreover, in this study parental education was based on retrospective accounts from participants (Falkstedt et al., 2016), which may be subject to recall bias (Cohen et al., 2010), potentially underestimating the effects of childhood SEP on adult HRB clustering, given the better measurement of adult SEP.

To address these limitations, we built upon our previous work (Mawditt et al., 2016), to investigate the influence of SEP in pre-adolescence and adulthood on membership of three distinct clustered patterns of adult HRBs: "Risky", "Moderate Smokers" and "Mainstream", in two British cohorts born in 1958 (the National Child Development Study, NCDS, (Power and Elliott, 2006)) and 1970 (the British Birth Cohort Study, BCS70, (Elliott and Shepherd, 2006)). The NCDS and the BCS70, purposefully mirror each other in design to include rich and similar measures of HRBs during mid-life and social circumstances across the lifecourse (Ekinsmyth et al., 1992). Information on SEP in childhood was prospectively collected, rather than retrospectively, thus minimising recall bias (Cohen et al., 2010).

We focused on pre-adolescent SEP (adapting the definition of pre-adolescence as age 8 to 11, (Maggs et al., 2008)) as opposed to adolescent and young adult SEP, given that the latter ages are normative periods of HRB experimentation (Schooling and Kuh, 2002; Fothergill et al., 2009), increasingly influenced by external factors such as peer groups and popular media rather than household SEP (Vallejo-Torres et al., 2014; West, 1997; Weyers et al., 2010). Moreover, compared to younger children, pre-adolescent children are more conscious of their identity and differences in social background (West et al., 2010; Leahy, 1981).

It is conceived possible that SEP experienced during pre-adolescence may directly influence HRBs in adulthood by embedding some HRBs through regular participation and establishing attitudes and beliefs towards other HRBs they are yet to experience. It is also conceived possible that pre-adolescent SEP will set children on lifelong SEP trajectories, shaping their SEP in adulthood and subsequently influence HRB cluster membership at the same age.

We hypothesise as follows:

1) More disadvantaged pre-adolescent SEP will predict membership of adult HRB clusters characterised by multiple negative HRBs.
2) Adult SEP will mediate the relationship between pre-adolescent SEP and adult HRB cluster membership.

2. Methods

2.1. Sample

Data were taken from both the National Child Development Study (NCDS) (Power and Elliott, 2006) and the British Birth Cohort Study (BCS70) (Elliott and Shepherd, 2006). The analytical sample was 11,373 in the NCDS (men = 5586, women = 5787) and 9646 in the BCS70 (men = 4613, women = 5033). All of the participants had information on at least one HRB from adulthood and one SEP indicator from either pre-adolescence or adulthood.

Where possible information on adult HRBs and SEP was taken at age 33 in the NCDS (CLS, 2008a) and age 34 in the BCS70 (CLS, 2016a) and indicators of SEP in pre-adolescence were primarily taken at age 11 in the NCDS (CLS, 2014) and age 10 in the BCS70 (CLS, 2016b).

However, some information was taken at age 7 (CLS, 2014) and age 42 (CLS, 2008b) in the NCDS and age 5 (Butler et al., 2016) and age 30 (CLS, 2016c) in the BCS70 (see Appendix A) when questionnaire items were not asked at our main ages of interest. We consider it reasonable to assume that responses to these indicators were very similar during the relatively short periods between the ages of data collection and the ages of interest (e.g. parental education at age 7 instead of age 11).

The data were ethically collected and anonymised. Pre-2000 studies were subject to internal ethical review and post-2000 studies were approved by an external research ethics committee (Shepherd, 2012a; Shepherd, 2012b).

2.2. Measures

2.2.1. Outcome: HRB cluster membership

The outcome in the analysis was based upon a latent categorical variable derived separately by cohort and gender in our previous work (Mawditt et al., 2016). This variable measures the clustered patterns and prevalence of four HRBs: smoking, alcohol, diet and physical activity, and consists of three HRB clusters: "Risky", "Moderate Smokers" and "Mainstream".

The "Mainstream" cluster (68–77%) represents the most prevalent HRB patterns in the two cohorts and is characterised by more health-promoting behavioural patterns, i.e. not smoking, frequent fruit and vegetable consumption, less frequent consumption of chips and fried food, being more physically active, although frequent consumption of sweet foods tends to be more common in this cluster compared to the others. The "Risky" cluster (1–9%) is the smallest cluster and is largely characterised by multiple negative HRBs (i.e. heavy smoking, more frequent consumption of chips and fried food, lower levels of physical activity). The "Moderate Smokers" cluster (20–30%) is a mixture of both positive and negative HRBs, smoking behaviour notably distinguishes this cluster from the others although levels of smoking are lower than the "Risky" cluster.

In this analysis the outcome, originally derived as latent, was treated as observed and operationalised by "modally assigning" participants to their most likely HRB cluster (Heron et al., 2015). This approach aids model convergence and retains the nature of the original latent variable when incorporating covariates (Heron et al., 2015; Vermunt, 2010) and is considered reasonable when classification error is low i.e. entropy > 0.8 (Clark and Muthén, 2009), as was the case in the original measurement models (Mawditt et al., 2016).

2.2.2. Pre-adolescent and adult SEP

We conceptualise SEP as multi-faceted (Bartley, 2016), influencing HRBs through factors such as economic circumstances, social norms and employment relations (Sacker et al., 2001). SEP was captured through Confirmatory Factor Analysis. Detailed information for each pre-adolescent and adult SEP measure are described in Appendix A. More information on the derivation of the SEP variables can be found in Appendix B.

2.2.3. Pre-adolescent SEP

We captured SEP in the context of economic and cultural norms. Indicators selected to capture pre-adolescent household economic circumstance are living in social housing, overcrowding, receiving free school meals, in receipt of benefits associated with disadvantage and income (BCS70 only), whilst indicators of cultural norms are parental education and their interest in the child's education. In our study, pre-adolescent SEP is treated as an exogenous variable.

2.2.4. Adult SEP

Similar to pre-adolescent SEP, economic aspects of adult SEP are captured through receiving benefits associated with disadvantage, living in social housing, owning a car, overcrowding and household equivalised income (Anyaegbu, 2010). Cultural norms are captured by cohort participants' highest qualification achieved by age 33/34, their Cambridge scale (Prandy and Lambert, 2003), occupation class indicated by NS-SEC (ONS, 2010), and employee's benefits such as pension, medical scheme, and company shares.