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Childhood onset of migraine, gender, parental social class, and trait neuroticism as predictors of the prevalence of migraine in adulthood

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ABSTRACT

This study investigated the effects of socio-demographic and psychological factors in childhood and adulthood on the prevalence of migraine in adulthood using data from The National Child Development Studies (NCDS), a birth cohort in the UK. The analytical sample comprises 5799 participants with complete data. Logistic regression analysis showed that higher professional parental social class (OR = 2.0: 1.05, 3.86, $p < 0.05$), female sex (OR = 2.24: 1.68–2.99, $p < 0.001$), migraine in childhood diagnosed by physicians (OR = 1.76: 1.23–2.50, $p < 0.01$), and higher trait neuroticism (OR = 1.17:1.26-1.06, $p < 0.01$): < 0 were all significantly associated with the prevalence of migraine in adulthood. Both socio-demographic and personality factors were significantly associated with the prevalence of migraine in adulthood.

1. Introduction

Migraine is a primary headache disorder of neurovascular origin [1], associated with autonomic symptoms such as cranial throbbing and unilateral pain. Further symptomology can include neurological aura symptoms, which are present in roughly one-third of patients [2]. Migraines have been described as the most burdensome of the headache disorders [3,4] affecting roughly 18% of women and 6% of men [5,6]. Migraine prevalence is highest between ages 25–55 years [7], and more than half of migraine sufferers reported functional impairment or severe impairment in activities or required bed rest; the proportion of respondents reporting severe disability was similar between females and males [6].

In a number of studies, migraine has been found to be associated with lower household income in the USA [6,8,9]. However, the inverse relationship between migraine and socioeconomic status has not been confirmed in studies outside the United States [10,11,12,13], in these studies no difference in migraine prevalence by socioeconomic status was found. Nevertheless, the links between social class and health outcomes have well been demonstrated in the literature.

Ligthart and Boomsma [14] examined monozygotic twins discordant in psychiatric disorder to assess the appropriateness of genetic causality (one trait causing the other) and pleiotropy (one gene causing multiple effects) in explaining migraine prevalence. Their investigation supported genetic causality, finding the risk of migraine was far greater in the twin with higher Neuroticism [14]. Neurological correlates have been implicated in connecting the disorders, specifically the neurotransmitter serotonin, which has been postulated to underlie the migraine-psychiatric disorder comorbidity [6,15,16,17].

The presence of mental stressors is also recurrently cited within the literature as corollaries and aggravators for migraine attacks [18]. Both patients and physicians assign large importance to stressful events as triggers for migraines, with 62% of patients retrospectively reporting psychosocial stress precipitating the attacks [19,20].

Research has demonstrated that personality variables also play an important role in migraine prevalence [21]. Neuroticism, in particular, has been strongly implicated with numerous health outcomes and longevity [22,23,24,25,26]. Earlier Eysenck and Eysenck [27] noted that individuals high in Neuroticism and low in Conscientiousness were more prone to developing chronic psychosomatic illnesses.

Neuroticism has been found to be a correlate of migraines; studies using the MMPI find the 'neurotic triad', comprising of hypochondria, hysteria, and depression [28]. Furthermore, research utilising the Eysenck Personality Questionnaire (EPQ; [27]) has repeatedly demonstrated that

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migraine patients have significantly higher Neuroticism scores than non-migraine controls [12,29,30].

Conscientiousness has been found to be positively associated with various health outcomes [31] and longevity [26]. Bogg and Roberts [22] conducted a meta-analysis of conscientiousness-related traits and the leading behavioural contributors to mortality in the United States. Based on 194 studies that were quantitatively synthesized results showed that conscientiousness-related traits were negatively related to all risky health-related behaviours and positively related to all beneficial health-related behaviours [22].

However, the use of different personality conceptualisations and inventories making it difficult to generalise across studies [32]. The current study has used the primary comprehensive taxonomy of personality, the Big Five personality factors, to find personality correlates of migraines.

Intelligence has been found to link with various health outcomes (e.g. [33,34]) and mortality [35].

In the current study, we are particularly interested in the links between individual differences (intelligence and personality) and migraine as these two components are, to some extent, inter-correlated [36] but few studies have looked at them together. We also included all these other social and childhood biomedical variables as potential confounders (factors driving both adult personality and migraine risk) to determine whether and to what extent each of these factors would affect the outcome variable.

1.1. Hypotheses

This study has drawn data from a large, representative longitudinal sample, investigating childhood and adulthood factors that potentially would influence the instance of adult migraine prevalence. Parental social class at birth, sex, childhood instance of migraine, intelligence, education, occupation, and the Big Five personality traits were investigated in relation to adulthood migraine instance. Due to evidence that demonstrates the biological and aetiological determinants of illness, our first hypothesis was that childhood migraine would be significantly associated with migraine instance in adulthood (H1). Based on the link between socio-economic conditions and health outcomes it was hypothesised that parental social class would be significantly and negatively associated with the prevalence of migraine in adulthood (H2). Based on the previous findings, it was hypothesised that childhood intelligence would be significantly and negatively associated with migraine in adulthood (H3). Furthermore, based on the literature that implicates the influence of personality traits on a number of health outcomes trait neuroticism was predicted to be significantly and positively associated with migraine (H4) and trait conscientiousness was predicted to be significantly and negatively associated with the outcome variable (H5).

2. Method

2.1. Sample

The National Child Development Study (the 1958 British birth cohort) is a large-scale longitudinal study of the 17,415 individuals who were born in Great Britain in a week in March 1958 [37]. The following analysis is based on data collected at birth, at ages 7, 11, 33 and at 50 years. Information of migraine onset in childhood was provided at age 7 years (response = 94%). Children at age 11 years completed tests of cognitive ability (response = 87%). At the age 33 years respondents provided information on educational qualifications. At age 50 years, participants completed a questionnaire on personality traits (response = 69%), and provided information on the prevalence of migraine (response = 79%). Participants also provided information on their current occupational levels. The analytic sample comprises 5799 cohort members (51% females) with complete data. Analysis of response bias in the cohort data showed that the achieved adult samples did not differ from their target sample across a number of critical variables (social class, parental education and sex), despite a slight under-representation of the most disadvantaged groups [38]. Bias due to attrition of the sample during childhood has been shown to be minimal [39].

2.2. Measures

2.2.1. Childhood measures

Parental social class at birth was measured by the Registrar General's measure of social class (RGSC). RGSC is defined according to occupational status and the associated education, prestige or lifestyle [40] and is assessed by the current or last held job. Where the father was absent, the social class (RGSC) of the mother was used. RGSC was coded on a six-point scale: I professional; II managerial/tech; IIIN skilled non-manual; IIIM skilled manual; IV semi-skilled; and V unskilled occupations [41]. At birth mothers were interviewed and provided information on gestational age and birth weight, and mothers were interviewed again when participants were at age 7 on whether cohort members ever had migraine diagnosed by physicians by the time of interview. Childhood cognitive ability tests [42] were accessed when cohort members were at age 11, consisting of 40 verbal and 40 non-verbal items, and were administered at school. Scores from these two set of tests correlate strongly with scores on an IQ-type test used for secondary school selection ($r = 0.93$, [42]) suggesting a high degree of validity.

2.2.2. Adulthood measures

At age 33 years, participants were asked about their highest academic or vocational qualifications. Responses are coded to the six-point scale of National Vocational Qualifications levels (NVQ) which ranges from 'none' to 'university degree/higher/equivalent NVQ 5 or 6'. Data on current or last occupation held by cohort members at age 50 years were coded according to the Registrar General's Classification of Occupations (RGSC), described above (parental social class), using a 6-point classification mentioned above. Personality traits were assessed by the 50 questions from the International Personality Item Pool (IPIP) [43]. Responses (5-point, from "Strongly Agree" to "Strongly Disagree") are summed to provide scores on the 'Big-Five' personality traits: Extraversion, Emotionality/Neuroticism, Conscientiousness, Agreeableness, and Intellect/Openness. Z-scores were used for the regression analysis. Alphas for the Big-Five factors ranged from 0.73 to 0.88. Migraine at age 50 years was assessed by a question "Are you currently suffering from Migraine?" with Yes/No response.

2.3. Statistical analysis

First, the characteristics of the study population were examined. Second, correlational analysis on the measures in the study were conducted to examine bivariate associations. Third, logistic regression analysis was conducted using STATA version 12 with migraine at age 50 as the dependent variable, adjusting for all predictors simultaneously to determine their unique risk. Further, gestational age and birth weight were controlled in the model as findings show the link between these conditions and health outcomes [44,45].

3. Results

3.1. Descriptive analysis

Table 1 shows the characteristics of the study population according to the rate of migraine at 50 years. Results showed the percentage of the prevalence of migraine in adulthood was 8.1 for the total sample. There were sex differences in the prevalence of migraine in adulthood, women had greater rate of migraine than men (11.4% vs 4.6%). ANOVA showed that the sex differences in the prevalence of migraine in adulthood were statistically significant ($F(1,5797) = 90.93$,