Educational achievement and trait emotional stability and agreeableness as predictors of the occurrence of backache in adulthood.

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ABSTRACT

This study investigated the associations between psychological as well as social factors in childhood and adulthood and the occurrence of adulthood back pain in a longitudinal birth cohort study. The analytic sample comprises 5,698 participants with complete data on parental social class at birth, childhood cognitive ability tests scores at age 11, educational qualifications measured at age 33, personality traits were assessed at age 50, occupational levels, and back pain measured at age 54. Using logistic regression analyses, results showed that among all socio-demographic and psychological factors examined, only the highest educational qualification (OR=0.62: 0.41-0.93, $p<.05$) and traits emotional stability (OR=0.76: 0.71-0.83, $p<.001$) and agreeableness (OR=1.10: 1.01-1.21, $p<.05$) were significant predictors of the

occurrence of back pain in adulthood. No significant sex differences were found for the prevalence of back pain in adulthood.

Declaration of interests

None.

Keywords: Back Pain; Trait Emotional Stability and Agreeableness; Educational Achievement; Longitudinal

Introduction

Back pain, especially low back pain, is a common public health problem amongst population and a major cause of disability that affects work performances and well-being (Duthey, 2013, Hoy, Brooks, Blyth, & Buchbinder, 2010), affecting about 80–85% of people over their lifetime (World Health Organisation, 2003). Back pain is among the top ten high burden diseases and injuries (Vos, Flaxman, Naghavi, Lozano, Michaud, Ezzati, M., . . . Aboyans, 2013). However the causes of this health condition are unclear and only in approximately 5–15% low back pain can be attributed to a specific cause such as an osteoporotic fracture, neoplasm or infection (Andersson, 1999; Deyo & Weinstein, 2001; Hoy et al., 2010; Vos et al., 2013).

A number of studies have addressed the links between personality and back pain (Burton, Tillotson, Main, & Hollis, 1995; Hansen, Biering-Sôrensen, & Schroll, 1995; Sjøgaard, 1987; Tavallaii, Kargar, Farzanegan, Saeidi, Radfar, 2010; Wickström, Pentti, Hyytiänen, & Uutela, 1989). Personality facets, coping strategies, and emotional problems

have been used to assess the onset and occurrence of back pain (Bru, Mykletun, & Svebak, 1993; Cvijetic, Bobic, Grazio, Uremovic, Nemcic, & Krapac, 2014; Gilchrist, 1983; Guimond & Massireh, 2012; Oron & Reichenberg, 2003; Sjøgaard, 1987; Tavallaii et al., 2010; Wickström, et al., 1989). The results, however, have often been contradictory.

A 20-year follow-up study revealed an association between MMPI-scale elevations (specifically Hypochondriasis, Depression, and Hysteria scores) with the presence of lower back pain for the following and preceding decade (Hansen et al., 1995). Another study by Tavallaii and colleagues (2010) indicated that MMPI subscale scores on Hysteria and Hypochondriasis were significantly correlated with increased pain levels for patients with chronic back pain.

Bru and colleagues (1993) investigated levels of neuroticism (measured via the EPQ-N) in back pain. They found that a great amount of the variance was explained by EPQ-N scores. In a more recent study, Cvijetic and colleagues (2014) also found that chronic back pain patients with higher levels of neuroticism (EPQ) were significantly more likely to report higher levels of disability and lower levels of functioning (indicated by the self-report Rolland-Morris Questionnaire) due to back pain.

Previous findings in the association between extraversion and back pain are not unequivocal. Some studies have shown that extraversion is associated with the higher propensity for back pain as these individuals are more active and liable to engage in behaviours that put their back at risk. Oron and Reichenbach (2003) found that higher levels of extraversion (EPQ-E) was predictive of soldiers self-reporting musculoskeletal complaints to the general practitioner. Yet Guimond and Massireh (2012) revealed that extraversion leads to behavioural patterns that prevent lower back pain. A recent study by that extraversion and perceiving personality preferences (as measured by the Myers-Brigg Type Indicator; MBTI) have also been significantly correlated with body postures styles that reduce lumbar back pain, namely

an ideal posture. Moreover, body postures that are associated with increased pain (a sway-back posture) were significantly correlated with introverted personality types. However, most of the previous study in the area used small clinical samples.

Type-A personality behaviours, known to be associated with heart attacks, have been related to elevated intra-muscular pressure (Sjøgaard, 1987), which can result in musculoskeletal pain. Wickström and colleagues (1989) reported correlations between Type-A personality behaviours, specifically competitiveness, and a higher rate of back pain. Hard-driving, competitive tendency may lead to excess labour, which may elevate intramuscular pressure, inflammation, and overexertion in muscular and soft tissue and/or spinal.

The link between social class and health is well documented (Marmot, 2007; Wilkinson & Pickett, 2006). In a recent study using a lager sample of 2,231 young people in Finland, Lallukka and colleagues (2014) investigated whether childhood and adult socio-economic position and social mobility are associated with radiating and non-specific lower back pain and sciatica. They found that childhood socio-economic circumstances affect the risk of radiating lower back pain and sciatica in adulthood, and both childhood and own socio-economic position remained associated with radiating lower back pain and sciatica after adjustments (Lallukka et al., 2014). Other studies have showed the significant associations between childhood intelligence and mortality (e.g. Batty, Wennerstad, Smith, Gunnell, Deary, Tynelius, & Rasmussen, 2009).

The present study looks at social and psychological correlates of adult back-ache problems. It concentrates on the role of personality traits that may influence in the prevalence of backache in adulthood taking into account socio-demographic factors in childhood and adulthood. Comparing with previous studies in the area there are three advantages of the data used for the present study: It is a large, nationally representative sample; the personality

measure used in the study is the Big Five personality factors with sound psychometric properties; and it contains both childhood and adulthood social and psychological factors.

Hypotheses

From the available data we set out to investigate the associations between parental social class, gender, childhood intelligence, education, occupation, the Big Five personality traits, and the occurrence of backache in adulthood. From the previous literature we predicted that higher education and social class participants with lower neuroticism scores would report less backache in adulthood.

Method

Sample

The National Child Development Study 1958 is a large-scale longitudinal study of the 17,415 individuals who were born in Great Britain in a week in March 1958 (Ferri, Bynner, & Wadsworth, 2003). The following analysis is based on data collected when the study participants were at birth, at ages 11, 33, 50, and 54 years. Children completed tests of cognitive ability at age 11 years (response = 87%). At age 33 years, cohort members provided information on educational qualifications. At age 50 years, participants completed a questionnaire on personality traits (response = 69%). Participants also provided information on current occupational levels (response = 79%) and on whether they suffered from back pain (response = 78%) since last interview four years earlier. The analytic sample comprises 5,698 cohort members (49.3 per cent 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 gender), despite a slight under-representation of the most disadvantaged groups (Fogelman, 1976). Bias due to

attrition of the sample during childhood has been shown to be minimal (Plewis, Calderwood, Hawkes, & Nathan, 2004).

Measures

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 (Marsh, 1986) 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 (Leete & Fox, 1977). At birth mothers were interviewed and provided information on gestational age and birth weight. Childhood cognitive ability tests (Douglas, 1964) were accessed when cohort members were at age 11 consisting of 40 verbal and 40 non-verbal items and were administered at school.

Adulthood measures: At age 33, 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. At age 50 years, personality traits were assessed by the 50 questions from the International Personality Item Pool (IPIP) (Goldberg, 1999). 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. At age 54 years, data on current or last occupation held by cohort members were coded according to the Registrar General's Classification of Occupations (RGSC), using a 6-point classification described above, and participants were interviewed and answered the question about whether they suffered back problems (recurrent

backache/prolapsed disc/sciatica) since last interview held four years earlier with Yes/No response.

Statistical Analyses

To investigate the prevalence of back pain in adulthood, we first examined the characteristics of the study population and sex difference in the occurrence of back pain using *T*-test. We than conducted the correlational analysis on the measures used in the study. Following this we carried out a series of logistic regression analyses using STATA version 14. Two models were designed. Mode l examines childhood factors in influencing the occurrence of back pain in adulthood; and Model 2 examines the effects of adult social and personality factors on the outcome variable together with childhood factors in Models 1. Gestational age and birth weight were controlled in both models.

Results

Descriptive Analysis

In total, 23.4% cohort members answered "Yes" to the question of whether they suffered from back pain since last interview four years ago. There were no significant sex differences in the occurrence of back pain (t (df = 5696) = .40, ns). Table 1 shows the characteristics of the study population according to the prevalence of backache at 54 years.

Insert table 1 about here

It can be seen from Table 1 that there was a relatively consistent pattern of the rate of pack pain in adulthood and educational qualifications: participants who had no education or had low education tended to have greater rate for pack pain. As for parental and own social

class, the pattern was similar to education: participants who had lower occupational levels unskilled manual) tended to have greater rate for pack pain than non-manual and professionals.

Table 2 shows the correlations between all variables examined in the study. Education, occupation, childhood intelligence and traits Emotional Stability and Agreeableness were all significantly associated with adult back pain ($p<.05$ to $p<.001$).

Insert Table 2 about here

Regression analysis

Table 3 shows the two models using the logistic regression.

Insert Table 3 about here

Model 1 shows that among the childhood factors, intelligence was significantly associated with the outcome variable. Model 2 shows that when adult social and personality factors were entered into the equation, the highest educational qualification was a significant predictor of the prevalence of adult back pain. Among the personality factors, emotional stability and agreeableness were the significant predictors of the prevalence of adult back pain; whereas childhood intelligence ceased to be a significant predictor of the outcome variable.

Discussion

This study looks at social and psychological correlates of adult backache. It is among the first studies that have examined a set of social (parental social class, education and occupation) and psychological (childhood intelligence and adult personality traits) factors in influencing the prevalence of back pain in adulthood. Results from this study confirm the previous findings

(Bru et al., 1993; Cvijetic et al 2014) that trait emotional stability was significantly associated with the occurrence of back pain. The current study extended the previous studies by showing that the association between emotional stability and back pain remained significant after controlling for childhood intelligence and a number of social factors in childhood and adulthood. Further, trait agreeable ness is also a significant predictor of the outcome variable.

There was some evidence that better educated people (especially those who received university degrees) from higher social class backgrounds report less backache (see Tables 2 and 3). This may be explained by the nature of the work that people do: better education leads to more professional jobs which usually require less physical labour and strain on the skeletal-muscular system. These variables are also related to better stress coping and healthier life-style.

The results of the logistic regressions were clear: among the five personality traits, emotional stability and agreeableness were the significant predictors of reported backache. Neuroticism is associated with anxiety, depression, moodiness and hypochondria. Emotionally stable people are more resilient and less prone to worrying and negative affectivity. It is interesting to note that trait agreeableness is also a predictor of the occurrence of backache in adulthood. It seems that assertiveness (low agreeableness) has a protective effect on the prevalence of back pain reported years later.

Whilst these results are interpretable in terms of the previous literature the mechanism that explains the findings are not. First, it could be that more neurotic people report more backache than stable individuals who have similar acute and chronic discomfort. That is, these personality variables reflect either hypochondriac behaviour or an increased sensitivity to pain. In a recent study (Rodriguez-Raecke, Ihle, Ritter, Muhtz, Otte, & May, 2014) there seems to have some evidence that people who had higher scores on depression (one of the main features in neuroticism) tend to rate the pain stimulation as more intense than controls, though the sample size is relatively small (n=21 for each group). Second, it could be that the lifestyle led

by neurotics may in some way increase the probability of back pain. That is, the everyday social behaviours of emotionally unstable people serve to accentuate back problems and aches. Third, living with chronic back ache, which can significantly affect quality of life, may increase poor emotional adjustment. Only longitudinal research where back pain and personality traits are assessed at regular intervals could answer this question of the causal mechanisms which are not exclusive of one another.

The present study shows that to prevent or reduce back pain in adulthood, personality traits emotional stability and agreeableness, educational achievement, as well as early and current socio-economic conditions need to be considered.

Implications and Limitations

One implication for those working in this field is to determine the emotional stability of clients to check the over- or under-reporting of aches and pains. It seems from the above findings and others in the area that neurotic individual were more likely to have psychosomatic illness and perhaps over- exaggerate finding while those more stable and stoical under-report findings.

In the present study personality traits were only measured once, at the same time with the outcome variable. Thus the associations between personality and adult backache might be bi-directional. Future studies with longitudinal data are required to offer a robust explanation for the above findings.

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Table 1. Social and demographic characteristics of the study population and prevalence of adult back pain at age 54.

	n	%	Prevalence of back pain %
Gender			
Male	2890	50.7	23.7
Female	2808	49.3	23.5
Parental social class at birth			
Unskilled (V)	411	7.2	23.6
Partly skilled (IV)	665	11.7	23.2
Skilled manual (III)	2775	48.7	24.8
Skilled non-manual (III)	637	11.2	22.3
Managerial\tech (II)	886	15.5	22.0
Professional (I)	324	5.7	18.5
Educational qualifications at age 33			
No qualifications	402	7.1	26.9
CSE 2-5/equivalent NVQ1	641	11.2	25.7
O Level/equivalent NVQ2	1999	35.1	23.6
A level/equivalent NVQ 3	868	15.2	24.1
Higher qualification/equivalent NVQ4	904	15.9	23.7
University Degree/equivalent NVQ 5, 6	884	15.5	19.1
Own current social class at age 50			
Unskilled (V)	99	1.9	26.3
Partly skilled (IV)	549	10.7	26.8
Skilled manual (III)	900	17.5	26.4
Skilled non-manual (III)	1043	20.3	22.4
Managerial\tech (II)	2195	42.8	21.6
Professional (I)	347	6.8	20.5

Table 2. Pearson product-moment correlations of variables in the study.

	Variables	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11
1.	Back pain at age 54	.23 (.42)	_										
2.	Sex	.49 (.50)	**.027***	_									
3.	Parental social class	3.33 (1.24)	**-.044****	-.020	_								
4.	Childhood intelligence	103.9 (12.87)	**-.071****	.078**	.261**	_							
5.	Educational qualifications	2.68 (1.45)	**-.073****	-.081**	.325**	.482**	_						
6.	Own occupational levels	4.12 (1.21)	**-.043****	-.015	.212**	.326**	.456**	_					
7.	Extraversion (α=.72)	29.43 (6.62)	**-.021**	.078**	.033*	.021	.076**	.122**	_				
8.	Emotional stability (α=.88)	29.11 (7.04)	**-.122****	-.138**	.026	.090**	.087**	.075**	.216**	_			
9.	Agreeableness (α=.81)	36.80 (5.24)	**.035***	.401**	.044*	.116**	.080**	.104**	.361**	.054**	_		
10.	Conscientiousness (α=.77)	34.04 (5.19)	**-.003**	.107**	.013	.040*	.064**	.088**	.144**	.183**	.277**	_	
11.	Openness (α=.78)	32.57 (5.17)	**.006**	-.013	.139**	.272**	.321**	.244**	.399**	.096**	.338**	.223**	_

Note: *p<.05; **p<.01. Variables were scored such that a higher score indicated being female, the presence of back pain in adulthood, a more professional occupation for parents or cohort members, higher scores on childhood intelligence, highest educational qualification, higher scores on traits extraversion, emotional stability, agreeableness, conscientiousness, and openness. Associations between migraine in adulthood and other variables are in bold.

Table 3. Odds ratios (95% CI) for back pain at age 54, according to childhood and adulthood factors.

Measure	**Model 1** Odds ratio (95% CI)	**Model 2** Odds ratio (95% CI)	***p*-value**[#]
Sex	1.08 (0.97, 1.20)	0.96 (0.84, 1.12)	0.661
Childhood factors			
Parental social class at birth *(unskilled as reference group)*			
Partly skilled	0.93 (0.73, 1.18)	0.95 (0.66, 1.36)	0.767
Skilled manual	0.95 (0.78, 1.16)	1.02 (0.75, 1.38)	0.918
Skilled non-manual	0.79 (0.62, 1.01)	0.87 (0.61, 1.28)	0.524
Managerial\tech	0.82 (0.65, 1.04)	0.94 (0.66, 1.34)	0.736
Professional	0.75 (0.54, 1.03)	0.79 (0.50, 1.25)	0.323
Childhood intelligence at age 11	0.86 (0.81, 0.91)***	1.05 (0.96, 1.17)	0.268
Adulthood social factors			
Educational qualifications *(no qualification as reference group)*			
CSE 2-5/equivalent NVQ1		0.09 (0.76, 1.58)	0.632
O Level/equivalent NVQ2		0.86 (0.61, 1.20)	0.369
A level/equivalent NVQ 3		0.87 (0.60, 1.26)	0.460
Higher qualification/equivalent NVQ4		0.87 (0.60, 1.27)	0.452
University Degree/equivalent NVQ 5, 6		0.62 (0.41, 0.93)*	0.022
Own social class (*unskilled as reference group*)			
Partly skilled		0.89 (0.51, 1.54)	0.679
Skilled manual		0.89 (0.52, 1.53)	0.685
Skilled non-manual		0.71 (0.41, 1.22)	0.213
Managerial\tech		0.74 (0.43, 1.25)	0.261
Professional		0.65 (0.35, 1.21)	0.174

Adulthood personality factors			
Extraversion		0.99 (0.91, 1.08)	0.773
Emotional stability		0.76 (0.71, 0.83)***	<0.000
Agreeableness		1.10 (1.01, 1.21)*	0.039
Conscientiousness		1.06 (0.98, 1.15)	0.167
Openness		1.07 (0.97, 1.17)	0.164

Note: *p<.05; ***p<.001. Controlling for gestational age and birth weight. [#]*P*-values of the final model.