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Marital status and reproduction: Associations with childhood intelligence and adult social class in the Aberdeen children of the 1950s study

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ABSTRACT

Childhood intelligence (age 11) and occupational social status at midlife (age 46 to 51) was associated with marital status and reproduction in a sample from the Aberdeen Children of the 1950s cohort study ($N = 9614$).

Male and female divorcees had lower childhood intelligence test scores than their married counterparts, but no meaningful difference was found between ever- and never-married individuals. Lower occupational social status increased the odds of being never-married, divorced, separated or widowed compared to being married by 53% to 26% in men ($N = 2716$) but not in women ($N = 2920$). Higher intelligence scores were associated with being married rather than divorced at midlife with odds ratios (OR) of 0.86 (Confidence Interval of 95% of 0.76 to 0.99) in men, and 0.87 (0.77 to 0.98) in women.

In men, lower intelligence predicted having offspring (0.69; 0.59 to 0.81), while in women, higher occupational status was associated with lower odds of having children (0.66; 0.55 to 0.76). An interaction term showed that high intelligence women remained childless in the top occupational classes but, in the lower social groups, mothers were more intelligent than their childless peers. Intelligence or occupational status were not associated with the number of offspring in both sexes.

In Western society, the institution of marriage has traditionally been the basis of sexual reproduction and raising children. Being married has previously been associated with higher intelligence and higher social status compared to staying single, but these associations differ for men and women (e.g. Marmot et al., 1991; Taylor et al., 2005). It has been suggested that married men are of higher social status and ability than their unmarried counterparts, whereas, for women, the opposite is more likely to be the case (Marmot et al., 1991; Taylor et al., 2005). For reproductive success, intelligence has been shown to reveal null or inverse associations with the number of biological children (e.g. Hopcroft, 2006; Lynn & van Court, 2004; Kanazawa, 2004). Similarly, there seems to be an inverse relationship between social status and number of offspring (Kaplan, Lancaster, Tucker, & Anderson, 2002; Vining, 1986). If high ability and status increase the likelihood of being married (at least in men), which in turn facilitates having offspring, it seems somewhat paradoxical that those with the characteristics most conducive for sexual reproduction present with the smallest number of children.

To date, ability and social position have been mostly studied with regard to two categories of marital status: married versus unmarried. Much less is known about the association of IQ and social status with other important marital categories, particularly widowhood and divorce. Reproductive success has typically been conceptualized as number of biological children. However, research rarely addressed the principal question of having offspring versus not, which gained relevance in recent times of increased

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availability of contraceptives. Here, we aim to replicate and extend previous findings on associations of ability and social position with marital status (e.g. Taylor et al., 2005), and to explore their relationship with sexual reproduction in a large, representative birth cohort from Scotland.

1. Intelligence, status and marriage

Taylor et al. (2005) examined the effects of childhood intelligence assessed at age 11 on 'ever' versus 'never' marrying at midlife in a relatively small sample of 547 men and 336 women from the Scottish Mental Survey 1932. They reported that women who never married had higher childhood intelligence than their married counterparts; this association remained significant after adjusting for social status. The reversed pattern was observed for unmarried men, who had lower average intelligence than their married peers, but this difference was non-significant and became negligible after adjustment for social status. Taylor et al. (2005) hypothesized that more intelligent women were likely to spend more time in education and therefore, might delay getting married, with some never marrying. In contrast, less intelligent men may be disadvantaged in competing for marriage partners because their lower cognitive ability would lead to lower occupational status, failing to provide resources for a spouse and offspring (Miller, 2000; Taylor et al., 2005). Marmot et al. (1991) showed in the Whitehall Study II of civil servants that men with higher occupational status were more likely to be married than men of less prestigious profession. Conversely, the proportion of women in the highest occupational grade who married was much smaller than the number of women from lower occupational classes (Marmot et al., 1991). These and related observations have led to suggestions that for men, high occupational status and intelligence are indicators of evolutionary fitness, which define men's chances of marriage and mating (Buss, 1994; Miller, 2000). In women, status and intelligence may also indicate fitness but only seemingly lower probabilities of marriage, which is possibly due to the societal and occupational structures in 20th century Britain.

2. Intelligence, status and reproduction

Intelligence is frequently hypothesized to be directly related to sexual reproduction (e.g. Kanazawa, 2004; Miller, 2000). In line with this, many researchers have focused on correlating intelligence test scores with the number of offspring (e.g. Lynn & van Court, 2004) but not on the odds of having children versus not. However in times of continuously declining frequencies of births across generations in Western societies, partly due to the wide-spread use of contraceptives and strategic family planning, it seems more appropriate to conceptualize having children as categorical variable rather than as continuous measure. Treating the count of offspring as categorical may also help clarifying the presently inconsistent associations of intelligence and status with the number of children (e.g. Hopcroft, 2006; Meisenberg, 2010). Therefore, it is important to firstly understand the predictors of having offspring, and subsequently to explore factors that affect the number of children.

More intelligent men tend to have a greater number of mating partners and a higher frequency of copulation (Kanazawa, 2003; Pérusse, 1993); that is, they have greater *potential fertility* than men with lower cognitive ability. However, intelligence is unrelated or even negatively associated with *achieved fertility,* referring to the number of biological children, in both men and women (e.g. Hopcroft, 2006; Kanazawa, 2003; 2004; Meisenberg, 2010). In fact, the suggestion that people with lower cognitive ability have more children than individuals of higher intelligence formed the principal rationale for the Scottish Mental Survey 1947 to examine possible dysgenic trends in the Scottish population (Deary, Whalley, & Starr, 2009). Furthermore, high social status individuals have been reported to have fewer children than less privileged people (e.g. Deary et al., 2009; Kaplan et al., 2002; Vining, 1986). This is somewhat paradoxical: on the one hand, high intelligence and status are inter-related factors that are positively associated with marriage and wealth, forming excellent basis for having children (e.g. Marmot et al., 1991; Taylor et al., 2005). On the other hand, individual differences in intelligence have been proposed to correspond to variances in general fitness, which is thought to enhance fertility (Houle, 2000; Miller, 2000). This intelligence-fitness link is supported by studies reporting positive associations between cognitive ability with sperm quality (Arden, Gottfredson, Miller, & Pierce, 2009), with an organism's stability of bilateral symmetry (i.e. fluctuating asymmetry; Bates 2007), and markers of system integrity (e.g. Gale, Batty, Cooper, & Deary, 2009). In summary, high ability and social status individuals have sufficient chances to mate, as well as the biological fitness, to reproduce; nonetheless they fail to achieve their fertility potential. Vining (1986) dubbed this paradox the 'central theoretical problem in human sociobiology' (p. 167).

3. The current study

In the present analyses, we first aim to replicate and extend Taylor et al.'s (2005) findings on intelligence and marital status. Our sample, the Aberdeen children of 1950s study, which recorded data for 12,500 children born between 1946 and 1951 in Scotland, is larger and more representative than the Taylor et al.'s (2005) sub-sample of the Scottish Mental Survey 1932. The data also allow investigating several categories of marital status, including never-married, currently married, divorced, widowed and separated, in contrast to earlier studies including Taylor et al. (2005), which mostly focused on married versus unmarried. Here, we hypothesized that married men were more intelligent and of higher status than their unmarried peers; conversely, never-married women were expected to be on average more intelligent and of higher status than the married ones, in accordance with previous studies (Marmot et al., 1991; Taylor et al., 2005).

Second, we aimed to examine associations of general intelligence and reproductive success, here operationalized by having offspring versus not, as well as the number of children. With hormonal contraception introduced nationwide in the early 1960s in Britain, women in the current cohort matured sexually in an era of unheralded emancipation, gaining more control over family planning than had

previously been the case. Here, we hypothesized that intelligence would increase the odds of having children at all (e.g. Miller, 2000), but be negatively associated with the number of offspring (Hopcroft, 2006; Kanazawa, 2003).

Finally, we explored the possibility that occupational social class modified associations of intelligence with marriage and reproduction. For example, unmarried women may be more intelligent than married women in the top social classes but the reverse might be true for lower social levels. Similarly, unmarried men of the lowest occupational social status may be less intelligent than their married peers but this association might change with increasing social class. Therefore, we examined a series of interaction terms in exploratory analyses.

4. Methods

4.1. Sample

The Aberdeen Children of the 1950s study comprises 12,150 children from the Aberdeen area, Scotland, born between 1950 and 1956. Childhood ability was assessed in primary school at the age of 11 years ($N = 9614$), and the sample was followed up with a postal questionnaire between 2001 and 2003 when participants were aged 46 to 51 years, achieving a response of 64% ($N = 7183$). Batty et al. (2004) and Leon et al. (2006) provided a detailed summary of the original study and its revitalization.

4.2. Measures

4.2.1. Intelligence

Within 6 months of their 11th birthday, children in Aberdeen routinely completed four mental ability tests including the Moray House Verbal Reasoning tests I and II, and an arithmetic and an English test (Thomson, 1940). Local education authorities provided the test materials and corresponding manuals with scoring and standardization instructions. The manuals – based on similar samples – reported reliabilities of above .90 for all tests (Deary et al., 2009). The tests were administered and scored by primary school teachers. Scores were normed according to local standards in accordance with the test manuals. These tests were part of a selection exam, taken at the end of primary school, which determined which type of secondary school the student was destined to attend.

The Moray House Verbal Reasoning tests I and II comprised an array of different items, including finding synonyms and antonyms to a given reference word, spelling exercises, finding words to complete sentences, and deductive reasoning problems.

The arithmetic test comprised one 40-item section assessing children's ability to add, subtract, multiply, and divide, including up to four figures at a time, and a second part with 44 worded arithmetic problems, including fractions and non-metric units. The English test comprised 16 different tasks, assessing text comprehension, grammar and spelling. For example, children were presented with a short text paragraph and subsequently completed questions about its general content and featured characters.

4.2.2. Marital status and occupational social class

Current marital status was reported by participants in the follow-up questionnaire in 2001 to 2003 spanning five categories of 'never-married', 'married', 'widowed', 'divorced' and 'separated'. Occupational social status was coded on a six-point scale (a score of six denoting the highest social group) ranging from unskilled, semi-skilled manual, skilled manual, skilled non-manual, managerial to professional, according to the OPCS Registrar General's Classification of Occupations (OPCS, 1990).

4.2.3. Offspring

Whether the person had any offspring was reported as a dichotomous variable of having biological children versus not. The number of biological children was recorded ranging from 1 to 9 (categorized as 1, 2, 3, and 4 or more).

4.3. Statistical analysis

All analyses were computed using PASW 18. In the first step, a principal axis factor analysis was applied to the four cognitive ability tests and a first unrotated factor was used as an indicator of general intelligence (g). Next, sex differences in the frequency of marital status were examined using χ^2 tests, and subsequently mean differences in intelligence across marital categories were investigated using an ANOVA with post-hoc tests, for men and women separately. Third, χ^2 tests were used to explore the frequency of marital status categories across social classes in men and women. Age-adjusted multinomial regression models were utilized to initially examine the effects of intelligence and occupational social status on marital status in both sexes; the interaction of IQ and social class was then explored. Fourth, average levels of intelligence were compared between parents and childless men and women. Binary logistic regression models, which were adjusted for age and marital status, tested in a first step the associations of intelligence and occupational social status with ever having offspring at midlife in men and women. In a second step, an intelligence × social status interaction term was entered. Finally, the number of offspring was investigated by means of a Poisson regression, which models counts using a log-linear link function.[1] As continuous predictors intelligence and social occupational class were entered, whilst controlling for age and marital status (treated as categorical). In a second step, the interaction of intelligence social status was additionally tested.

The odds ratio is a measure of effect size, and refers to the ratio of the odds of an event occurring (versus not occurring) if a certain factor or condition is present (Cox, 1958). Here for example, odds ratios were computed to describe the likelihood of obtaining one marital status compared to another (e.g. married versus divorced) depending on occupational social status and intelligence. All continuously treated variables were z-transformed before they were entered in regression models to allow for an interpretation of the odds in terms of one Standard Deviation change. Listwise omission was applied throughout to cases with missing data points.

[1] We thank an anonymous reviewer for recommending this modeling approach.

Table 1
Frequencies of marital status categories (% in parentheses) across sexes with childhood intelligence means and Standard Deviations.

	Males			Females		
	N (%)	Intelligence	*N*	*N* (%)	Intelligence	*N*
Never married	360 (10.5)	105.86 ± 14.63	(263)	250 (6.7)	106.79 ± 13.84	(182)
Married	2489 (72.8)	106.71 ± 12.62	(2067)	2694 (72.0)	106.96 ± 12.22	(2154)
Widowed	28 (0.8)	105.45 ± 12.07	(21)	90 (2.4)	104.67 ± 14.64	(73)
Divorced	392 (11.5)	102.72 ± 12.69	(316)	550 (14.7)	104.92 ± 12.00	(450)
Separated	148 (4.3)	104.90 ± 14.06	(108)	159 (4.2)	107.15 ± 14.79	(121)
Total	3417 (100)	106.09 ± 12.94 F (4) = 6.84**	(2775)	3743 (100)	106.60 ± 12.59 F (4) = 2.96*	(2980)

Note. *N* refers to the sample after listwise omission of cases missing intelligence data points.
* $p<.05$.
** $p<.001$.

5. Results

5.1. Intelligence

A principal axis factor analysis showed a first unrotated factor accounting for 88.8% of the total variance with an Eigenvalue of 3.55 ($N=9614$). Factor loadings of the tests ranged from .88 (Arithmetic) to .96 (Verbal). This single factor corresponds to the general cognitive ability (general intelligence) factor. The scales were added to form a unit-weighted composite score adjusted for the number of scales.

5.2. Marital status

Table 1 shows frequencies and prevalence of marital status for men and women in midlife. A chi-square test (χ^2 (4) = 72.72; $p<.001$; Cramer's V = .10) showed that sexes differed in their marital status, with more men having never married and women being more likely to be widowed or divorced. A series of ANOVA tests found a main effect of intelligence across marital status for both males and females with eta squared values of .010 and .004, respectively (Table 1). Tukey's post-hoc tests showed that married and never-married men were significantly more intelligent than their divorced counterparts ($p<.001$ and $p<.05$, respectively). Similarly, married women had on average significantly higher intelligence test scores than divorced women ($p<.05$). Note that the average intelligence test scores are above the population mean of 100 because of attrition common to longitudinal studies, whereby more intelligent individuals are more likely to continue participating (Batty et al., 2004).

Table 2 shows the number of people in each marital status category according to their occupational status at midlife. There was a significant association between occupational class and marital status for men (χ^2 (20) = 141.71, $p<.001$; Cramer's V = .10) but not for women (χ^2 (20) = 23.82, $p>.05$; Cramer's V = .04). That is, men of the lowest occupational social classes (unskilled and semi-skilled manual) were the least likely to be married at midlife and had the highest percentage of divorced, separated and widowed people. For women, similar trends were observable but non-significant.

In multinomial regression models with the reference group 'married' in both sexes, a Standard Deviation advantage in social status was associated with lower odds of never being married, or being divorced or widowed at midlife compared to being married by 53% to 26% in men but not in women (Table 3). A Standard Deviation advantage in childhood intelligence reduced the odds of being divorced rather than married, with odds ratios (OR) of 0.86 (Confidence Interval of 95% (CI) 0.76 to 0.99) in men, and 0.87 (CI 0.77 to 0.98) in women. No other marital category showed meaningful odds

Table 2
Frequencies of marital status category according to occupational social status at midlife (% in parentheses) across men and women.

	Never-married	Married	Widowed	Divorced	Separated	Total
Males						
Professional	23 (7.4)	254 (81.7)	3 (1.0)	20 (6.4)	11 (3.5)	311
Intermediate	115 (8.7)	1024 (77.8)	6 (0.5)	123 (9.3)	49 (3.7)	1317
Skilled non-manual	45 (13.8)	236 (72.6)	1 (0.3)	31 (9.5)	12 (3.7)	325
Skilled manual	86 (8.5)	723 (71.9)	11 (1.1)	141 (14.0)	45 (4.5)	1006
Semi-skilled manual	58 (20.4)	159 (56.0)	5 (1.8)	43 (15.1)	19 (6.7)	284
Unskilled	22 (22.4)	42 (42.9)	2 (2.0)	26 (26.5)	6 (6.1)	98
Total	349 (10.4)	2438 (73.0)	28 (0.8)	384 (11.5)	142 (4.3)	3341
Females						
Professional	8 (8.2)	74 (75.5)	0 (0)	11 (11.2)	5 (5.1)	98
Intermediate	87 (7.2)	3871 (72.0)	33 (2.7)	167 (13.8)	52 (4.3)	1210
Skilled non-manual	82 (5.7)	1064 (74.4)	31 (2.2)	197 (13.8)	56 (3.9)	1430
Skilled manual	14 (5.4)	176 (68.0)	10 (3.9)	48 (18.5)	11 (4.2)	259
Semi-skilled manual	27 (5.9)	329 (71.7)	10 (2.2)	69 (15.0)	24 (5.2)	459
Unskilled	20 (9.8)	138 (67.6)	5 (2.5)	36 (17.6)	5 (2.5)	204
Total	238 (6.5)	2652 (72.5)	89 (2.4)	528 (14.4)	153 (4.2)	3660

Table 3
Odds ratios (95% Confidence Intervals) for the relation of childhood intelligence and adult social status with marital categories in men and women.

	N	Social status		Intelligence	
Men					
Never-married	255	**0.74**	**(0.64 to 0.86)**	1.10	(0.94 to 1.29)
Widowed	21	**0.47**	**(0.29 to 0.76)**	1.35	(0.80 to 2.27)
Divorced	310	**0.74**	**(0.65 to 0.85)**	**0.86**	**(0.74 to 0.99)**
Separated	104	1.02	(0.85 to 1.22)	1.06	(0.84 to 1.21)
Women					
Never-married	176	1.02	(0.85 to 1.22)	1.01	(0.84 to 1.21)
Widowed	72	0.97	(0.75 to 1.27)	0.86	(0.65 to 1.13)
Divorced	436	0.96	(0.85 to 1.08)	**0.87**	**(0.77 to 0.98)**
Separated	117	0.93	(0.75 to 1.16)	1.11	(0.89 to 1.40)

Note: Reference group is married with $N = 2026$ in men, and $N = 2119$ in women after listwise omission. Significant odds are shown in bold.

for intelligence or occupational social status in either sex. Additional multinomial regressions tested for interactions of intelligence social status; they were all non-significant ($p > .01$) in men and women.

5.3. Offspring

Male and female parents were found to have significantly lower averages of intelligence than their childless peers ($p < .01$ and $p < .001$; Cohen's d of .14 and .20, respectively). Overall, men with children had an average intelligence score of 105.70 ($SD = 12.81$, $N = 2310$) and childless men a score of 107.54 ($SD = .13.58$; $N = 466$). Similarly, mothers had an average intelligence score of 106.27 ($SD = 12.56$; $N = 2597$) and childless women presented a mean score of 108.81 ($SD = 12.54$; $N = 386$).

In binary logistic regression models, a Standard Deviation increase of intelligence was associated with the odds of 0.69 (CI 0.59 to 0.81) for having children at midlife in men; the odds for occupational social status of 1.25 (CI 1.11–1.40) for having children became non-significant after controlling for marital status. In women, intelligence had no meaningful effects on the odds of being a mother at midlife but occupational social status was associated with having children with an odds ratio of 0.65 (CI 0.55 to 0.76), after controlling for age and marital status. The added interaction term (intelligence social status) was significant in women (OR = 0.84; CI 0.74 to 0.94) but not in men. That is, the association of intelligence with having offspring was modified by social status in women: mothers with lower occupational social status were on average more intelligent than their childless peers, but the reverse was true for higher occupational social classes.

Table 4 shows mean intelligence levels according to occupational class for having children versus not for men and women. The majority of ACONF members had offspring at midlife with 83.7% of men and 86.9% of women; however, the proportion of fathers generally reduced with decreasing status, whereas the frequency of mothers generally increased with decreasing class. Men who remained childless at midlife were of higher intelligence within the occupational classes, with the exception of the skilled non-manual class where intelligence did not differ for fathers and childless men. Females in the top two classes (professional and intermediate), who had no offspring, were more intelligent than their counterparts with children. In line with the significant interaction of intelligence status, this association reversed for the lowest three classes, in which women without children were of lower mean intelligence than women with children.

In the current sample, 72% of mothers and fathers had one or two children and 28% had three or more children. In a Poisson regression model adjusted for age and marital status, neither intelligence nor occupational social status were meaningfully associated with the number of offspring in both sexes; also the added interaction term was non-significant ($p > .05$, in all cases).

6. Discussion

Never- and ever married men and women did not differ in their average intelligence, while male and female divorcees had significantly lower childhood intelligence than their married counterparts. Men of the lowest occupational status were the least likely to be married at midlife and had the

Table 4
Mean intelligence (Standard Deviation in parentheses) across social occupational class and offspring (yes/no) for men and women.

	Offspring			No offspring		
	N	%	M (SD)	*N*	%	M (SD)
Men						
Professional	214	83.6	118.16 (9.50)	42	16.4	119.06 (11.94)
Intermediate	909	84.7	110.11 (11.34)	164	15.3	112.70 (11.18)
Skilled non-manual	205	76.8	107.69 (10.29)	62	23.2	107.55 (12.33)
Skilled manual	719	86.4	99.34 (10.41)	113	13.6	101.39 (12.85)
Semi-skilled manual	163	75.5	96.92 (11.68)	53	24.5	101.18 (12.15)
Unskilled	57	75.0	91.45 (11.40)	19	25.0	93.07 (8.90)
Total	2267	83.7	105.82 (12.77)	453	16.3	107.59 (13.59)
Women						
Professional	55	84.6	123.04 (8.93)	10	15.4	126.13 (4.00)
Intermediate	791	82.1	112.06 (11.87)	172	17.9	114.43 (10.98)
Skilled non-manual	1016	87.4	106.45 (10.04)	147	12.6	106.47 (9.02)
Skilled manual	187	90.8	98.57 (11.57)	19	9.2	97.39 (10.93)
Semi-skilled manual	344	94.2	101.00 (11.84)	21	5.8	96.44 (10.70)
Unskilled	151	91.5	94.95 (10.39)	14	8.5	89.75 (12.98)
Total	2544	86.9	106.55 (12.36)	383	13.1	108.94 (12.94)

highest rate of divorce, separation and widowhood; in women, similar, albeit non-significant trends, were observed. Furthermore, higher intelligence scores were associated with being married rather than divorced at midlife in both sexes. Overall, men were less likely to be married at midlife than women, who in turn were more likely to be widowed or divorced.

Men with lower childhood intelligence were more likely to have children, but no significant association with occupational social status was found, while in women, lower occupational social status increased the likelihood of having children, but no effect for intelligence was observed. This finding was clarified by a significant interaction in women: women of high status without children were more intelligent than high status mothers, and low status mothers were more intelligent than their childless counterparts. For the number of children, no substantial associations with intelligence or social occupational class were observed in both sexes. All of the observed results had throughout modest effect sizes.

6.1. Marital status

Taylor et al. (2005) showed that never-married women were more intelligent than ever married women, and that never-married men were less intelligent than their married counterparts. Accordingly, Taylor et al. (2005) hypothesized that intelligent women spent more time in education and therefore, delayed getting married, with some never marrying; conversely, less intelligent men were disadvantaged in competing for marriage partners because they failed to adequately provide for a spouse and offspring (Miller, 2000; Taylor et al., 2005). In the current sample, neither men's nor women's mean intelligence differed notably between the married and never-married status. However, married men and women had overall significantly higher childhood intelligence scores than divorcees. Previously, Herrnstein and Murray (1994) observed that high intelligence was associated with reduced odds of getting divorced within the first five years of marriage in the National Longitudinal Survey of Labor Market Experience of Youth (NLSY); these effects remained significant after controlling for social class of origin, age at first marriage, and parental divorce status. It appears that intelligence has little effect on ever marrying but that it contributes to the stability and duration of marital relations.

The observed differences between Taylor et al.'s (2005) and the current results are likely to be partially due to the time interval of almost thirty years between the two cohorts: one was born in 1921, and the other between 1950 and 1956. Within this thirty year period, matrimony was subject to considerable demographic, legal and societal changes, for example a general increase in age at first marriage, and the Marriage (Scotland) Act 1939.

The significant odds of occupational social status on marital categories in men but not in women suggest that females select long-term partners or marital spouses according to their social position, while males are less concerned with their spouses' occupational social status. This might be due to different societal roles for men and women in 20th century Scotland, where women's responsibilities were mostly concentrated in the home and childcare, whereas men's tasks were generally understood in terms of providing economical resources. Therefore, males' probability of obtaining and keeping a wife are is likely to be more affected by men's occupational social status, which indicates their availability of resources, whereas in women other factors might more strongly determine marriage options, for example physical fitness and fertility. In line with this reasoning, the strong effect of lower status for the likelihood of being a widower at midlife might be interpreted with low status males' reduced chances of attracting a high quality partner, with a correspondingly long life-expectancy.

6.2. Reproduction

It has been suggested that intelligence is an indicator of general fitness (Miller, 2000), which is understood to enhance reproductive success. Here, childless men were on average more intelligent than those who had children across occupational classes, and lower intelligence was associated with a higher probability for having children. In women, the same pattern was observable for the top two occupational classes; in the three lower classes women with children were found to be more intelligent than those without. These findings bear two questions: first, why are intelligent men less likely to have children and second, why are women of lower social status more likely to have offspring? With regard to the first question, the overall percentage of childless men in the current sample was 16.3%, which is only slightly above the nationwide estimate of infertility 14% in couples[2], who try and fail to have biological children (NHS, 2004). That is, we can assume that a large proportion of childless men in the current sample were unable to reproduce rather than deciding not to have biological children. It is somewhat counterintuitive to find those men without offspring to be more intelligent than those with, considering notions of intelligence as a marker of general fitness (Arden et al., 2009; Miller, 2000). It may well be that intelligence is positively related to sperm quality (Arden et al., 2009) but that alone does not imply fertility.

With regard to the second question, the lower occupational status of mothers compared to childless women might result from the fact that they are mothers and therefore, have less time to focus on educational training and professional development. That is, low status per se does not make a higher frequency of mothers but motherhood hampers status attainment, at least in recent Scotland. Such notion is somewhat supported by the higher average intelligence of mothers in low classes compared to childless children: these women have the intellectual capacity for higher status but seem to have sacrificed occupational achievement for raising children. That said, the current study design only allows speculating about this reverse effect.

Previously, intelligence was shown to be non-significantly or even negatively related to the number of offspring (Hopcroft, 2006; Lynn & van Court, 2004; Kanazawa, 2004; Meisenberg, 2010). Here, no associations of intelligence and occupational status with the number of offspring were found in either sex. It seems that ability and status are irrelevant for

[2] In 25% of cases, the infertility is due to the male partner, while it depends on the female in 50% of cases; for the remaining couples, reasons of infertility remain speculative.

the size of one's biological offspring but rather affect the probability of marriage and having offspring in principle.

6.3. Strengths and limitations

On the one hand, this study's strengths include its large, representative cohort sample and its longitudinal design with a sufficiently long follow-up period to study marriage and reproduction patterns. On the other, this is to our knowledge the first study examining associations of intelligence and social status with reproduction treating the number of children as a categorical rather than continuous variable.

This study is also not without its weaknesses. As all longitudinal studies, the current sample experienced attrition resulting in the omission of study members with missing data. However, the sample has been previously shown to remain representative although individuals from less privileged social backgrounds are somewhat underrepresented (Batty et al., 2004). Furthermore, the ACONF members were followed up at the ages of 46 to 51 years, which makes most women likely to have completed their sexual reproduction but for men this assumption may be premature. Finally, it is impossible to disentangle if sample members stayed childless or unmarried out of choice or by force; related hypotheses must therefore remain speculative.

6.4. Conclusions

Intelligence did not differentiate ever- and never-marrying men and women but low childhood intelligence was associated with divorce or unstable marital relations at midlife. Men, who did not father biological children, were on average more intelligent than those with biological children. This study only allows speculating about why more intelligent men did not have offspring; future research might investigate this question with reference to the general fitness factor and making a conscious choice for or against reproduction. Similarly to men, childless women were more intelligent than respective mothers—in high occupational social classes. In lower occupational social levels, mothers were more intelligent on average than their childless peers, suggesting that low status in women may be a consequence of having children rather than it being conducive for becoming a mother.

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