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Reduced Midlife Physical Functioning Among Never Married and Childless Men: Evidence from the 1946 British Birth Cohort Study

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Abstract

Background and Aims—Marital and parental role characteristics are important factors in both men and women's health. Most studies to date have either focused on disease specific outcomes or summary measures of self-reported health rather than using functional tests of performance. The goal of this study is to investigate the extent to which marital and parental role characteristics are associated with midlife physical function.

Design: Prospective birth cohort study.

Setting: England, Scotland, and Wales.

Participants: 1353 men and 1411 women followed up since their birth in 1946.

Main outcome measure: Handgrip strength, timed chair rising, and standing balance tests at age 53 years were used to calculate an aggregate physical performance score that ranged from 0 (poorest score) to 2.81.

Results—The mean physical performance score was 1.42 (SD 0.42) for men and 1.30 (SD 0.37) for women. By age 53 years, 11% of men and 8% of women had married but remained childless; 6% of men and 4% of women had never married. Never married ($\bar{x}$ 1.15; 95% CI: 1.06, 1.24) and childless married men ($\bar{x}$ 1.36; 95% CI: 1.30, 1.42) had significantly poorer physical performance score than married men with children ($\bar{x}$ 1.46; 95% CI: 1.43, 1.48). These relationships remained after adjustment for adult social class and employment status, own educational attainment and body mass index at 53 years (beta=−0.18, 95% CI: −0.27, −0.09 for never married and beta= −0.09, 95% CI: −0.16, −0.03 for childless married, compared with married men with children). Of those men who had never married 28% reported they were not working due to long-term health problems compared to 5% in both childless married men and married men with children. There were no marked differences in functional outcomes among women.

Conclusions—In this representative middle-aged population, unmarried and childless men faced greater risk of poor midlife physical function, even after adjustment for confounders. These findings suggest that for men, marriage and parenthood protect against functional decline in midlife. Alternatively, physical performance may be a marker of poorer health in earlier life, which affects the chance of marriage and parenthood.

INTRODUCTION

The effects of marital status and parental status on health outcomes have been extensively studied, particularly in regard to mortality. A meta-analysis of 53 cohort studies with over 250,000 older subjects revealed a 12% reduction in mortality in married versus unmarried persons, with no difference by gender or between Europe and North America (1). The magnitude of elevated risk for widowed, divorced or separated and never married persons was similar. In a large study in over 280,000 persons age 45 years and older in the U.S., it was also found that, compared to married persons, non-married women had similar excess risks to non-married men, and these risks remained significant even after adjustment for income, education and labor force participation (2). However, other mortality research has found a larger impact in unmarried men than in women. In a study of 80,000 participants of the U.S. National Health Interview Survey with up to 8 years of mortality follow-up, the mortality risk in unmarried versus married men was higher than the risk for unmarried versus married women (3). The elevated risk in younger men was related to infectious diseases (with AIDS probably the cause) but in middle-aged and older men cardiovascular disease played an important role. This and other studies have also shown that, among all unmarried persons, risk is greatest for never married men. In the British Regional Heart Study, for example, never married men and recently divorced men were the only groups of unmarried men with increased risk of cardiovascular mortality (4).

Studies of the impact of parental status on health outcomes have shown more variable results. In general, no strong health benefit or disadvantage has been shown for having children at home in some studies (5,6), but in others lower mortality in women with children below 16 has been documented (7), even after adjustment for education and occupation. Lone mothers and fathers have poorer health than parents who cohabit with their spouse (8,9). In a large study in Sweden it was found that lone non-custodial fathers and lone childless men faced substantially greater mortality risk than other men, although these risks were attenuated after adjustment for socioeconomic status (10).

Most of the research on health risks associated with marital and parental status uses mortality as the outcome and much less work has been done on other health outcomes, especially functional status and disability (11). This paper uses data from an ongoing birth cohort to examine the relationship of objectively measured functional status at age 53 with ever being married and having children, ever being married but having no children, and never having been married. In taking this approach it allows for the separate assessment of the impact of childlessness in the setting of marriage and the impact of never marrying. This study utilizes performance measures of functional limitations, which reduce the confounding influence of affective status on self-reporting of disability and provide standardized assessments that reflect the overall impact of multiple diseases and conditions on functioning (12). This choice of outcomes provides an objective and meaningful measure of physical abilities and health status in middle-aged and older persons.

METHODS

Study Population

This study utilizes data from the Medical Research Council National Survey of Health and Development (NSHD), also known as the 1946 British Birth Cohort Study. The NSHD is a socially stratified sample of births that took place in the first week of March 1946, in England, Scotland and Wales. Six weeks after birth, mothers of 2815 boys and 2547 girls were interviewed and regular follow-up assessments continued through childhood and adulthood to age 53. Marital status and birth of children were determined from assessments at ages 19, 20, 22, 23, 25, 26, 31, 36, 43 and 53. This cohort has been described in detail(13)

and remains generally representative of the British population of similar age (14). In 1999, when cohort members were age 53, 3035 were successfully contacted (Figure 1), of whom 2988 were interviewed and examined at home and a further 47 provided at least some information on their life circumstances and health status. They represent 56.6% of the original cohort and 70.4% of cohort members still alive and resident in England, Scotland or Wales. Of the 2988 persons examined, 2764 had complete data on marital and parental status and all three performance tests, described below. Ethical approval was obtained from relevant UK Multicentre Research Ethics Committees and all participants gave informed consent.

Characterization of study participants

Based on responses to multiple surveys, participants were classified as ever married with children, ever married without children and never married (with or without children). Social class and employment status at age 53 were determined by responses to questions about current employment and occupation, which was classified as manual or non-manual. If data at age 53 were missing, information was sought from previous interviews. Educational attainment at age 26 was classified as none, some qualifications (less than a university degree) and university degree or greater. Presence of potentially disabling health conditions at age 53, described in detail elsewhere (15), was based on self-report of cardiovascular disease (angina, heart attack, stroke or intermittent claudication), cancer, diabetes, respiratory problems and neurological disease; musculoskeletal symptoms were considered separately. Height was measured at age 53 using a portable stadiometer (CMS, London) and weight was measured to the nearest 0.5 kg using the CMS weighing scale (London), without shoes and in light clothing. Body mass index (BMI) was calculated as weight (kg)/height $(m)^2$.

Physical Performance at Age 53

A team of 82 nurses was trained to perform the physical assessments in participants' homes. Physical performance was evaluated utilizing measures of grip strength, balance, and time to rise from a chair 10 times and has been described in detail (15). Grip strength was measured isometrically using an electronic handgrip dynamometer (16). Two measurements were done with each hand and the highest value was used for these analyses. Using a stopwatch, balance standing on one leg was assessed for up to 30 seconds, first with the eyes open and then with the eyes closed (17). Since most participants were able to maintain the single leg stand with eyes open for 30 seconds this test had limited power of discrimination. Therefore, we utilized the more difficult test, the one-legged stand with eyes closed. Chair rise time was the time it took to rise from a chair to a standing position with straight back and legs and then sit down again 10 complete times.

Those interviewed who did not have complete performance data were no different from those with complete data in terms of gender (p=0.54), own occupational status (p=0.20) and marital/parental status (p=0.29).

Statistical Analyses

Outcomes on each of the three performance tests were rescaled to a 0 to 1 scale that has previously been described in detail (18). Grip strength was adjusted for body size by dividing strength in kg by height in cm. The re-scaling was done separately for men and women, where adjusted grip strength was divided by the sex-specific 99^{th} percentile value of adjusted grip strength (0.4346 kg/cm for men and 0.2838 kg/cm for women), with persons over these values being assigned a score of 1 and persons unable to do the test assigned a 0. Balance was rescaled by dividing the total time the stand with eyes closed was held by 30 seconds, the maximum possible time. Persons unable to hold the position at all were

assigned a 0. Rescaled chair rise time was calculated using the equation 1-(time/48.0 seconds), where 48.0 was the 99th percentile of time. Persons unable to rise from a chair 10 times or taking longer than 48.0 seconds were assigned a time of 48.0 seconds. The three rescaled performance scores were summated to create a summary functional performance score, which was normally distributed (18). Factor analysis supported a single domain of performance and factor loadings were nearly identical for all three components, supporting equal weighting.

The relationships of marital/parental status with other measures were evaluated with chi square tests for categorical variables and analysis of variance for continuous measures. The relationship of independent variables with the summary functional performance measure was assessed using multiple linear regression, with categorical independent variables coded as indicator variables. All p values and confidence intervals were weighted to allow for the initial sampling procedure using Stata software, Version 8.0 (Stata Corporation, College Station, TX).

RESULTS

Among the 1353 men in this analysis at age 53, 1121 (82.9%) were ever married with children (of whom 85.6% were currently married), 151 (11.2%) were ever married with no children (of whom 80.1% currently married), and 81 (6.0%) were never married,. Among the 1411 women, 1233 (87.4%) were ever married with children (of whom 80.4% were currently married) 118 (8.4%) were ever married with no children (of whom 73.7% were currently married)., and 60 (4.3%) were never married, The mean physical performance score at 53 years was 1.42 (SD 0.42) for men and 1.30 (SD 0.37) for women.

In men, there was a clear stepwise decrease in the summary functional performance measure going from ever married with children to ever married without children to never married (Figure 2). This relationship was not present for women. Table 1 demonstrates that in men social class at age 53, BMI, grip strength, chair rise time and the summary functional performance measure were significantly associated with marital/parental status. In women, only social class, educational attainment, and balance were significantly associated with marital/parental status. The proportion of persons who stated they did not work because of long-term illness was substantially larger in never married than in ever married persons. Larger proportions of men and women who were ever married without children or never married had potentially disabling health conditions compared to ever married persons with children. Never married women were significantly more likely to have a degree than the married women, while never married men were less likely to have a degree than the married men, although this difference did not reach conventional statistical significance.

Table 2 shows the relationship of marital/parental status with functional performance, adjusting for covariates that were significantly associated with marital/parental status in either men or women in Table 1. In the fully adjusted model, compared to men who were ever married with children, men who were ever married without children had a significantly lower summary performance score (−0.09 points, 95% confidence interval (CI): −0.16,−0.03), and never married men had a significant and even larger deficit compared to the ever married men with children (−0.18 points, 95%CI: −0.27,−0.09). For the ever married without children the adjusted difference was no different than the unadjusted, but the difference for the never married was attenuated when going from the unadjusted to the adjusted models. In women, there was no overall effect of marital/parental status. Being unmarried had no impact on functioning but in the fully adjusted model ever married women without children had a small but significant decrement in performance. (−0.07 points, 95%CI:−0.13,−0.01).

DISCUSSION

We categorized participants in this birth cohort study in order to be able to examine the effects of both parental status and marital status. Among the ever married group without children, 80% of men and 74% of women were currently married, so this was predominantly a group of currently married persons who had never had a child. The never married group was predominantly childless, with only 6 of 81 men and 3 of 60 women reporting that they had children. In men, in both unadjusted and adjusted analyses, objectively measured physical function declined across these three groups. No similar effect was seen in women.

The majority of studies on the impact of marital status and parenthood have used mortality as the outcome. These studies have generally shown that both unmarried men and women do more poorly than their married peers, but one large study showed greater risk only in unmarried men but not women (3), as our study demonstrated. Mortality is a definitive outcome that can be obtained from public records and is therefore advantageous to use in large studies, but utilizing a functional outcome may provide additional insight into risk associated with marital and parental status. Functional outcomes in older persons represent a final common pathway for the effects of many diseases of differing severities and impact and are therefore valuable summary measures of morbidity in the population (19). Because women live longer than men but have a higher prevalence of disability and survive longer with disease and disability (20), differing results may be seen when studying functional outcomes versus mortality. In the study by Bennett, self-reported functional variables such as climbing stairs and walking more than 10 minutes were used to measure health limitations. Divorced and never married persons were found to be at a higher risk of these limitations, but unlike our study there were no gender differences (111). Our study goes one further step in assessing functional outcomes by utilizing objective, performance-based measures, avoiding the potential confounding between marital status and how people self-report their functional limitations and health.

Never married men had the poorest functional outcomes of any subgroup when compared to ever married persons with children. This may be explained by selection effects, with men with disabilities or other health problems being less likely to marry, or to the lack of the beneficial health effects of being married and having children, or both. It has been previously demonstrated in this cohort that a substantially higher proportion of individuals who remained single had special education accommodations as children compared to those who ever married (in men, 15% vs. 6% and in women 22% vs. 4%, (21)). However, the ever married group is much larger than the never married group and overall four-fifths of persons with special education did marry. It is of interest that objectively measured poorer function was not seen in never married women compared with married women with children. Other research on this cohort suggests that women with multiple roles report better health status by their early fifties than other women, although a specific comparison to never married women was not made (22). Women who never married were more highly educated than the ever married women in the study and may be a somewhat different group than the never married men, choosing higher education and careers instead of marriage. Adjusting for employment status (including not working due to long-term health problems) and education did not, however, alter the lack of association of never married status with function in women, but it did reduce the strength of the association, without eliminating it, in men. Other research has found differences in never married women compared to men that would be consistent with poorer outcomes in men. In a study of over 4,000 men and women in the British Household Panel Survey, never married women had good levels of mental health compared to other women, but never married men had poorer mental health than married men (23). Never married Swedish men aged 40–64 reported no differences in health status compared to other men but they did have less education, were unemployed more often, and had emotional

relationships of lower quality (24). Findings on the impact of never married status in women, however, are mixed. Pudrovska (25), using a multifactorial measure of strain that assessed social life, intimacy, caregiving, and shared experiences, found more strain in older never married women than men. On the other hand, older never married women were found to be healthier and to have a more positive outlook on life than widows (26) or married women with children (27). Never married and widowed persons were found to have larger caregiving network size as compared with married and divorced persons (28). However, unmarried women also had larger caregiving networks than unmarried men, which may give them some protection from functional decline. Further research on the heterogeneity of the never married female population would be useful to further understand this subset of the population.

We chose to examine the long-term effects of being unmarried and being married but having no children, so we separated the population into three groups to reflect these states. A limitation of the study is that the number of persons who were ever married without children was too small to stratify into currently married, widowed and divorced subgroups, so ever married persons were only stratified according to parental status. The ever married groups were primarily currently married but also contained persons who were widowed and divorced. A number of studies have shown poorer health outcomes in widowed and divorced persons, so our results would tend to be conservative in comparing never married to all persons who were ever married. A strength of this study is that it used an objective outcome of functioning that has been shown to be related to childhood and adult socioeconomic status and multiple indicators of health and disease status (18). Furthermore, critical covariates were available in the study to examine potential confounding of the relationship of marital and parental status with function.

Using current and projected data from the U.K. Government Actuary's Department (29) it was estimated that, for the year 2003, 6.2% of persons age 50 and older were never married and that by 2030 the projected percentage of never married in this age group will rise to 15.2%, a 2½ fold increase. The findings from this study indicate that at age 53 men who never married are already disadvantaged in terms of physical functioning and it will be important to see if this association continues in future cohorts. It has been well established that impairments and functional limitations such as the ones assessed in the three performance tests used in this research are predictors of future disability (30,31). It is thus of value to better understand what characteristics of never married men put them at greater risk of functional decline.

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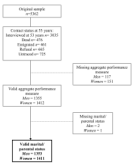

Figure 1.
Sample follow-up in the MRC National Survey of Health & Development

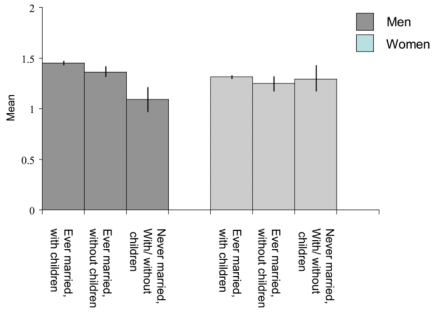

Figure 2.
Mean functional performance in the NSHD, at age 53 years, by marital and parental status

Table 1

Distribution of midlife characteristics among marital/parental status groups in the 1946 British birth cohort (N based on those with marital/parental data and functional performance measures)

	Men (*n*=1353)					Women (*n*=1411)				
		Ever married with children (*n*=1121)	Ever married without children (*n*=151)	Never married with/without children (*n*=81)			Ever married with children (*n*=1233)	Ever married without children (*n*=118)	Never married with/without children (*n*=60)	
	n	%			P X^2	*n*	%			P X^2
Social class & employment status at 53 yrs:					<0.001					<0.001
Employed (Non-manual)	685	53.7	45.0	18.5		773	54.9	59.3	43.3	
Employed (Manual)	412	30.3	32.5	28.4		259	19.2	12.7	11.7	
Unemployed	44	2.7	4.6	8.6		28	1.5	2.5	10.0	
Economically inactive (e.g retired, h/wife)	78	4.8	8.6	13.6		221	16.1	11.9	13.3	
Long term sick	86	4.9	5.3	28.4		100	6.3	10.2	18.3	
Missing	48	3.6	0.7	2.5		30	2.0	3.4	3.3	
Educational attainment:					0.184					<0.001
None	459	32.9	34.4	46.9		488	36.3	22.9	21.7	
Some qualifications	630	47.8	43.1	35.8		773	54.0	63.6	53.3	
Degree or higher	193	14.1	17.2	11.1		71	4.3	8.5	13.3	
Missing	71	5.2	5.3	6.2		79	5.4	5.1	11.7	
Medical conditions at 53 yrs:										
Musculoskeletal symptoms					0.423					0.900
No	704	50.9	56.3	59.3		617	43.4	44.9	48.3	
Yes	638	48.2	43.0	40.7		783	55.8	54.2	51.7	
Missing	11	0.9	0.7	0		11	0.8	0.9	0	
Disabling health conditions					0.052					0.312
No	1044	78.6	72.9	65.4		1125	80.6	76.3	68.3	
Yes	192	13.4	16.5	21.0		180	12.2	16.1	18.3	
Missing	117	8.0	10.6	13.6		106	7.2	7.6	13.3	
	n		Mean (SD)		P-value (trend)	*n*		Mean (SD)		P-value (trend)
Height at 53 years (cm)	1353	174.9 (6.4)	174.6 (6.6)	172.7 (8.6)	0.010	1411	161.7 (5.9)	161.9 (5.9)	161.5 (7.5)	0.921
BMI at 53 years	1353	27.6 (4.1)	26.6 (3.7)	26.3 (3.9)	<0.001	1411	27.5 (5.4)	26.8 (5.6)	27.6 (5.9)	0.573

	Men (*n*=1353)					Women (*n*=1411)				
		Ever married with children (*n*=1121)	**Ever married without children (*n*=151)**	**Never married with/without children (*n*=81)**			**Ever married with children (*n*=1233)**	**Ever married without children (*n*=118)**	**Never married with/without children (*n*=60)**	
	n	**%**			**P X^2**	***n***	**%**			**P X^2**
	n	Height adjusted mean at 53 years (95% CI)			P-value (test for trend)	*n*	Height adjusted mean at 53 years (95% CI)			P-value (test for trend)
Functional performance at 53 yrs:										
Grip Strength (kg)	1353	48.70 (48.00, 49.40)	45.67** (43.78, 47.56)	40.12** (37.41, 42.83)	<0.001	1411	27.98 (27.54, 28.41)	27.30 (25.89, 28.71)	27.08 (25.04, 29.11)	0.488
Balance (s)	1353	1.75 (1.71, 1.80)	1.65 (1.51, 1.78)	1.48** (1.29, 1.68)	0.012	1411	1.50 (1.46, 1.55)	1.46 (1.32, 1.60)	1.76* (1.56, 1.96)	0.038
Chair rises †	1353	5.42 (5.31, 5.52)	5.09* (4.80, 5.37)	4.56** (4.14, 4.97)	<0.001	1411	5.04 (4.95, 5.13)	4.85 (4.55, 5.15)	4.88 (4.47, 5.28)	0.378
Summary functional performance measure	1353	1.46 (1.43, 1.48)	1.36** (1.30, 1.42)	1.15** (1.06, 1.24)	<0.001	1411	1.31 (1.29, 1.33)	1.26 (1.19, 1.32)	1.30 (1.20, 1.39)	0.331

† Reciprocal of time taken for 10 chair rises * 100.

* P-value <0.05 (test for heterogeneity), reference group = ever married with children

** P-value <0.01 (test for heterogeneity), reference group = ever married with children

Table 2

Association between summary functional performance measure at 53 years and marital/parental status, adult social class, educational attainment and BMI.

	MEN (N=1353)					
	Unadjusted			Fully adjusted		
	Coeff.	95% CI	P-value	Coeff.	95% CI	P-value
Marital/parental status:						
Ever married/partnered with children (1121)	Ref		<0.001	Ref		0.001
Ever married/partnered without children (151)	−0.09	(−0.16, −0.02)		−0.09	(−0.16, −0.03)	
Never married/partnered with/without children (81)	−0.36	(−0.45, −0.27)		−0.18	(−0.27, −0.09)	
Social class & employment status at 53 yrs:						
Employed (Non-manual) (685)	Ref		<0.001	Ref		<0.001
Employed (Manual) (412)	−0.09	(−0.13, −0.04)		−0.03	(−0.08, 0.02)	
Unemployed (44)	−0.08	(−0.20, 0.04)		−0.01	(−0.13, 0.10)	
Economically inactive (e.g retired, h/wife) (78)	−0.11	(−0.20, −0.02)		−0.05	(−0.14, 0.04)	
Long term sick (86)	−0.70	(−0.79, −0.62)		−0.57	(−0.66, −0.48)	
Missing (48)	−0.04	(−0.15, 0.07)		−0.04	(−0.15, 0.07)	
Highest educational attainment by age 26 yrs:						
None (459)	Ref		<0.001	Ref		0.002
Some qualifications (630)	0.12	(0.07, 0.17)		0.07	(0.02, 0.11)	
Degree + (193)	0.21	(0.14, 0.28)		0.12	(0.05, 0.20)	
Missing (71)	0.13	(0.02, 0.23)		0.12	(0.02, 0.21)	
BMI at 53 years per 10 units (1353)	−0.07	(−0.12, −0.01)	0.015	−0.06	(−0.11, −0.01)	0.019
	WOMEN (N=1411)					
Marital/parental status:						
Ever married/partnered with children (1233)	Ref		0.234	Ref		0.083
Ever married/partnered without children (118)	−0.06	(−0.13, 0.01)		−0.07	(−0.13, −0.01)	
Never married/partnered with/without children (60)	−0.01	(−0.11, 0.09)		0.03	(−0.06, 0.12)	
Social class & employment status at 53 yrs:						
Employed (Non-manual) (773)	Ref		<0.001	Ref		<0.001
Employed (Manual) (259)	−0.08	(−0.12, −0.03)		−0.04	(−0.08, 0.01)	

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	MEN (N=1353)					
	Unadjusted			Fully adjusted		
	Coeff.	95% CI	P-value	Coeff.	95% CI	P-value
Unemployed (28)	−0.05	(−0.18, 0.08)		−0.03	(−0.16, 0.10)	
Economically inactive (e.g retired, h/wife) (221)	−0.10	(−0.15, −0.05)		−0.08	(−0.12, −0.03)	
Long term sick (100)	−0.63	(−0.70, −0.56)		−0.54	(−0.61, −0.47)	
Missing (30)	0.09	(−0.03, 0.21)		0.10	(−0.01, 0.22)	
Highest educational attainment by age 26 yrs:						
None (488)	Ref		<0.001	Ref		<0.001
Some qualifications (773)	0.15	(0.11, 0.19)		0.08	(0.05, 0.12)	
Degree + (71)	0.27	(0.18, 0.36)		0.18	(0.10, 0.26)	
Missing (79)	0.12	(0.04, 0.21)		0.07	(−0.01, 0.15)	
BMI at 53 years per 10 units (1411)	−0.17	(−0.21, −0.14)	<0.001	−0.12	(−0.15, −0.09)	<0.001