Social engagement from childhood to middle age and the effect of childhood socio-economic status on middle age social engagement: results from the National Child Development study

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ABSTRACT

Social engagement has powerful effects on wellbeing, but variation in individual engagement throughout the lifecourse is wide. The trajectories may differ by gender and be affected by socio-economic status (SES). However, long-term development of social engagement is little studied and the effect of childhood SES on later-life social engagement remains obscure. We aimed to describe the social engagement development from childhood to middle age by gender and test the effect of childhood SES on middle age social engagement. Data (N = 16,440, 51.3% male) are drawn from the on-going National Child Development Study, following British babies born in 1958. Social engagement was measured by social activities, voluntary work and social contacts, with follow-ups at age 11, 16, 23 and 50. SES was measured by father's occupational social class and tenure status. Structural equation modelling suggested inter-individual stability in social engagement, showing that development of social engagement started in childhood and increased social engagement in middle age through adolescence and early adulthood. Longitudinal effects were detected within and across the social engagement domains. Lower childhood SES was significantly related to a lower level of voluntary work and social activity in middle age, but to higher levels of social contacts. Although stability in social engagement is moderate over the lifecourse, variation within and across the different social engagement domains is shaped by differences in childhood SES.

KEY WORDS – social engagement, social activities, volunteer work, social contacts, middle age, socio-economic status, lifecourse.

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Introduction

Social engagement is an important factor for the wellbeing of individuals (Mendes de Leon, Berkman and Glass 2003; Sacker and Cable 2006). In fact, social engagement has such a powerful effect on wellbeing, and even mortality, that some scholars claim that social engagement is a universal human need. Consequently, lack of human bonds in childhood may, for instance, form a basis for many psychiatric diseases (Bowlby 1969) and loneliness (Asher, Hymel and Renshaw 1984) in later life. However, the extent to which people are socially engaged varies widely. Enhancing social engagement may therefore be a potential tool for promoting individual wellbeing. To do this, a better understanding of how social engagement evolves from childhood to middle age is needed. It is important to identify the patterns of development and interplay of different dimensions of social engagement. A focal question in seeking to understand the development of engagement is whether variation in later-life engagement can be explained by such factors as socio-economic status (SES) that may potentially have cumulative effects on subsequent social engagement, as suggested by the theory of cumulative advantages and disadvantages (Dannefer 1987, 2003).

There has been considerable debate on the construct of social engagement, which has typically been defined as various domains of participation, such as social or leisure activities, voluntary work and social contacts. Research on the 'nature' of this multifaceted construct seems to support the idea of distinguishing between different domains of engagement. The argument for so doing rests on assumptions that different domains may function in different ways (Glass *et al.* 1999; Li, Savage and Warde 2008; Mendes de Leon *et al.* 1999; Menec 2003), and also, potentially, follow developmental paths of their own.

The existing results on the development of different domains of social engagement are somewhat mixed. The findings across earlier life stages suggest that in childhood inter-individual differences in the level of participation in organised social activities are relatively stable (Kjønniksen, Anderssen and Wold 2009; Simpkins *et al.* 2005). With respect to volunteering, the effect of earlier participation has been found to be substantial, that is, during the period from late adolescence to adulthood individuals were almost eight times more likely to participate in volunteer work in a given year, if they had volunteered the previous year (Oesterle, Kirkpatrick Johnson and Mortimer 2004). In studies accounting for the later end of the lifecycle from early middle age onwards, leisure participation has generally been preceded by participation 10 and 34 years earlier (Agahi, Ahacic and Parker 2006). Similarly, considerable stability has been found in volunteering in adults (Wilson and Musick 1997) and in participation

in social activities and in contacts in people who were 50 years old or more at baseline (Janke, Davey and Kleiber 2006). However, despite the moderately high intra-individual stability in the level of participation, research has also revealed significant inter-individual variation over time in the development of social engagement (Janke, Davey and Kleiber 2006). In addition, Carstensen (1992) reported a declining mean trend in the frequency of social contacts from early adulthood to later adulthood.

Due to the overlapping features of the various domains of social engagement, there is good reason to believe that the different domains of social engagement do not develop in isolation over time (*e.g.* Glass *et al.* 1999; Menec 2003). The development of different domains may rather function in more complicated ways, showing cross-lagged effects. Although the long-term longitudinal cross-lagged effects between the various domains of social engagement have been studied very little, this notion is supported by the positive associations between childhood social activity and early adulthood contacts and participation in social activities that have been found over a 19-year follow-up (Pulkkinen, Lyyra and Kokko 2011).

The development of social engagement may differ by gender. The results on the effects of gender on social engagement across the lifecourse are inconclusive. Cross-sectionally, in childhood and adolescence, boys, for instance, participated more in social activities than same-age girls (Seabra *et al.* 2008), whereas girls tend to participate more in creative or faith-based activities (Youniss *et al.* 1999). In midlife and at older ages, women have been found to be more active in participating in social activities and formal organisations than men (Janke, Davey and Kleiber 2006). In a cross-European study carried out by Scheepers, te Grotenhuis and Gelissen (2002) among adults in late middle age, it was found that while gender had no effect on the frequency of contacts with family members, men had more frequent contacts with friends compared to women. In longitudinal settings, women have shown higher levels of leisure participation activities than men (Janke, Davey and Kleiber 2006). However, in another study, the level of leisure participation was found to decrease over time among women and slightly increase among men (Janke, Davey and Kleiber 2006). Conversely, some studies have suggested that gender is not of great importance in the development of social engagement (Bukov, Maas and Lampert 2002; Strain *et al.* 2002).

In addition to gender, SES may be an important factor in the development of social engagement. According to the theory of cumulative advantages and disadvantages (Dannefer 1987, 2003), which seeks to explain the interplay of social processes and forces and the various developmental paths in life, these social processes and forces not only form people's lives but also provide opportunities for individuals. The theory defines the development

of advantages/disadvantages as a 'systematic tendency for inter-individual divergence in a given characteristic (e.g. social engagement) with the passage of time' (Dannefer 2003). This statement implies that developmental processes are not to be characterised as features of an individual, but as features of larger communities, such as a population or cohort. However, the interest of the theory of cumulative advantages and disadvantages lies in the sources of individual disparities and in equity of opportunities, including the recognition of vulnerability factors, such as SES indicators, that may to a great extent determine the later life of individuals, with accumulation already starting to develop in childhood. Thus, the accumulation of advantages or disadvantages starts at an early age. One of the central questions of this paper is therefore to untangle the extent to which age-related variability is a result of a stratification of opportunity structures that has already begun in childhood, leading to differences in the processes of development of social engagement both within and between individuals (Dannefer 1987). In this study, adopting such a lifecourse perspective allows us to assume that if there is rank order stability in social engagement over the lifecourse, then there is also stability in inter-individual differences in social engagement from childhood to middle age. We also assume that childhood SES has a significant longitudinal effect on engagement in middle age, indicating life-long developmental paths between the domains of social engagement and SES that may reflect the view that childhood acts as a sensitivity period for later-life outcomes (*e.g.* Kuh and the New Dynamics of Ageing Preparatory Network 2007).

Empirical results on the associations between SES and social engagement are not inconclusive, especially with respect to the longitudinal effects of SES in early life. Cross-sectional studies have shown that in earlier life higher SES is associated with greater participation in organised social activities, whereas children from lower socio-economic groups are more likely to become involved in unstructured and informal activities (Seabra *et al.* 2008; Simpkins *et al.* 2005). Among British adults, those with higher SES tended to have denser contacts with friends than with neighbours or relatives (Li, Pickles and Savage 2005; Pahl and Pevalin 2005), whereas denser contacts with one's family were among those with lower SES (Grundy and Read 2012). These findings have not, however, been replicated by all studies (Scheepers, te Grotenhuis and Gelissen 2002). The associations between formal or organisational engagement and SES have been of particular interest. Higher SES has somewhat consistently fostered civic engagement, despite age (Rotolo and Wilson 2004; Li and Ferraro 2006) and participation in other forms of social activities (Bennett and Silva 2006; Janke, Davey and Kleiber 2006). To the best of our knowledge, the long-term effects of childhood SES on social engagement in later life have not been reported earlier.

Despite the several extensive scientific enquiries conducted thus far, the literature on social engagement continues to exhibit many limitations. First, although the existence of life-long developmental paths has been suggested by earlier studies (*e.g.* Holahan and Chapman 2002; Verbrugge, Gruber-Baldini and Fozard 1996), current knowledge on the development of social engagement is mostly based on relatively short follow-up periods, providing evidence for stability either in older age (*e.g.* Holahan and Chapman 2002) or across earlier life stages (*e.g.* Kjønniksen, Anderssen and Wold 2009) rather than from childhood onwards across different life stages. Second, we do not know how the diverse domains of social engagement develop in relation to each other, for example whether different domains of social engagement longitudinally predict each other, thereby leading to the accumulation of social engagement or disengagement, or whether one domain of social engagement could potentially be replaced with another across the development of social engagement from childhood to adulthood. Third, although several papers have suggested that exposure to adversities in early life influences various later-life conditions (*e.g.* Kuh and the New Dynamics of Ageing Preparatory Network 2007; Mayer 2009), the lifecourse perspective has hardly been applied to the study of social engagement. For instance, whereas cumulative effects of lifelong low social economic position on adult poor health have been found (Power, Manor and Matthews 1999), the existing cross-sectional findings do not permit conclusions to be drawn on the long-term effects of SES in early life on social engagement in later life. In fact, research on the impact of SES in early life on subsequent social engagement is strikingly absent from the gerontological literature. Accounting for all these factors may not only provide more insight into the development of social engagement over the lifecourse, but may also suggest how social engagement in later life could be promoted earlier in life in men and women from different socio-economic backgrounds.

Research questions and hypotheses

- Research question 1: How does social engagement evolve from childhood to middle age within and across the various domains of social engagement in men and women?
- Hypothesis 1: Owing to the scarcity of previous research, no hypothesis was set.
- Research question 2: Does childhood SES explain the variation in social engagement in middle age?
- Hypothesis 2: Higher SES in childhood leads to higher levels of social engagement in middle age. Childhood SES has a cumulative effect on

social engagement in middle age, indicated by stronger β-coefficients in middle age than cross-sectionally in childhood.

Material and methods

Sample

The data are drawn from the National Child Development Study (NCDS), which is an on-going multidisciplinary longitudinal study aiming to improve understanding of the factors that affect human development over the whole lifecourse. The study aims to follow all the approximately 17,000 individuals born in a single week in 1958 in England, Scotland and Wales and all the immigrants who were born the same week and had moved to England, Scotland or Wales by the third data collection sweep. From the 1958 baseline until 2008, eight waves of data collection have been carried out. Ethical guidelines have been met by internal ethical review for the follow-ups until 1991. For the surveys from 2000 onwards, ethical approval has been sought from the London and South-East Multi-Centre Ethics Committees. The study population is described in more detail in Power and Elliott (2006).

Four data waves and life stages were used in the present study: childhood (age 11 in 1969), adolescence (age 16 in 1974), early adulthood (age 23 in 1981, for the measure of informal social contacts only) and middle age (age 50 in 2008–2009). All the 16,440 individuals for whom at least one social engagement measure was available were included in the present study, resulting in a study sample of 8,426 men (51.3%) and 8,014 women. Longitudinal samples were constructed for each social engagement domain, resulting in three different samples (N for each time-point and domain is presented in Table 1). An individual was included in the longitudinal sample of a particular domain, for example voluntary work, if he or she had provided information for that domain at at least one time-point.

Social engagement measures

Social engagement indicators were constructed from observed measures of social activities, voluntary work and informal social contacts with follow-ups at age of 11, 16, 23 and 50. For social activity, an index indicator was calculated. For voluntary work and social contacts, single-item measures were used.

The social activity items were measured by asking the respondent to state frequency of participation in specific social activities (*see* Table 1). For the purpose of this study, the four social activity items at age 11 were coded

TABLE 1. *Descriptive statistics: observed outcome variables*

Outcome and variable description	Observations		Mean (SD)		Minimum	Maximum	p (χ^2 test)
	Male sample N (%)	Female sample N	Male	Female			
Social activities:							
How often the respondent: goes to the cinema; goes to clubs outside school; goes to school clubs outside school hours; plays outdoor games or sports							
NCDS 1965 age 11	7,104 (51.2)	6,782	2.63 (0.53)	2.51 (0.57)	1	3	–
How often the respondent plays indoor games or sport; plays outdoor games or sport; goes to friends' parties; goes dancing or to discos, *etc.*							
NCDS 1974 age 16	6,098 (51.1)	5,847	2.68 (0.55)	2.63 (0.56)	1	3	<0.001
How often the respondent: goes to watch live sport; goes to the cinema; goes to a concert, theatre or other live performance; has a meal in restaurant, cafe or pub; attends leisure activity groups such as evening classes and yoga; goes for a drink in a pub							
NCDS 2008 age 50	4,217 (48.1)	4,551	4.62 (0.71)	4.57 (0.75)	1	5	<0.01
Voluntary work:							
How often the respondent: goes to clubs outside school hours (age 11); does (unpaid) voluntary work (ages 16 and 50)							
Age 11	6,896 (51.3)	6,556	1.70 (0.83)	1.78 (0.84)	1	3	<0.001
Age 16	4,932 (53.0)	4,370	1.43 (0.61)	1.67 (0.68)	1	3	<0.001
Age 50	4,179 (48.2)	4,489	1.52 (1.10)	1.65 (1.21)	1	5	<0.001
Social contacts:							
How often the respondent plays with and talks to friends outside school hours							
NCDS 1965 age 11	6,918 (51.1)	6,607	2.66 (0.54)	2.60 (0.56)	1	3	<0.001
How often the respondent visited friends or kin in the last four weeks or had them on a visit							
NCDS 1981 age 23	6,255 (50.0)	6,265	3.87 (1.40)	4.15 (1.22)	1	6	<0.001
How often the respondent visits friends or relations or has them on a visit							
NCDS 2008 age 50	4,210 (48.1)	4,540	3.95 (0.95)	4.26 (0.88)	1	5	<0.001

Notes: NCDS: National Child Development Study. SD: standard deviation. Scales at age 11: 1=hardly ever, 2=sometimes, 3=most days; scales at age 16: 1=hardly ever, 2=sometimes, 3=often; scale at age 23: 1=no contacts in last four weeks, 2=once in last four weeks, 3=one to two times in last four weeks, 4=two to three times in last four weeks, 5=three to four times in last four weeks, 6=five or more times in last four weeks; scales at age 50: 1=never/almost never, 2=once a year or less, 3=several times a year, 4=at least once a month, 5=at least once a week.

as follows: 1 = hardly ever, 2 = sometimes, 3 = most days. The corresponding values for the four activity items at age 16 were: 1 = hardly ever, 2 = sometimes, 3 = often. 'No chance' answers to the social activity items (N = 373 − 1153) were treated as missing values in the recoded variable. Although the numbers of missing values were relatively high, the recoding was nevertheless done, as these study participants seemed to differ from those who reported non-participation, as suggested by the changes in the correlations of the outcome measures between the two groups. At age 50, the scale for the six social activity items was coded as follows: 1 = never/almost never, 2 = once a year or less, 3 = several times a year, 4 = at least once a month, 5 = at least once a week. After rescaling the activity items, an index for participation in social activities was calculated for all the individuals who provided information on at least one item at the time-point in question. The index indicates the highest reported frequency of participation (*i.e.* in any of the items included in the new index variable). For example, a respondent who reported participating often in any one of the activity items, but hardly ever in the other activity items, would have had been scored as participating often (value 3) in the new social activities index.

Participating in voluntary work was measured by asking the respondent to state frequency of participating in voluntary work or in clubs in childhood, as extracurricular activities is correlated with voluntary work later in life (Hart and Donnelly 2007). For the purpose of this study, the variable at age 11 was coded as follows: 1 = hardly ever, 2 = sometimes, 3 = most days. The corresponding values at age 16 were coded as: 1 = hardly ever, 2 = sometimes, 3 = often. For 'no chance' answers N = 1,765. At age 50, the scale for voluntary work was coded as follows: 1 = never/almost never, 2 = once a year or less, 3 = several times a year, 4 = at least once a month, 5 = at least once a week (*see* Table 1).

Informal social contacts were measured by asking the respondent how often he or she had contacts with friends in childhood and with friends and kin in early adulthood and midlife (*see* Table 1). For the purpose of this study, the variable at age 11 was coded as follows: 1 = hardly ever, 2 = sometimes, 3 = most days. As no measure of contacts in adolescence was available, a measure for early adulthood was used instead; at age 23, the variable was coded as follows: 1 = no contacts in last four weeks, 2 = once in last four weeks, 3 = one to two times in last four weeks, 4 = two to three times in last four weeks, 5 = three to four times in last four weeks, 6 = five or more times in last four weeks. At age 50, the scale for contacts was coded as: 1 = never/almost never, 2 = once a year or less, 3 = several times a year, 4 = at least once a month, 5 = at least once a week (*see* the descriptive information in Table 1).

SES measures

To investigate the effect of SES on various outcomes, the use of different SES indicators has been suggested in the literature (Dalstra, Kunst and Mackenbach 2006; Muntaner *et al.* 2010). Here, we used two separate indicators of childhood SES, as reported by the parent/guardian when the respondents were at age 11 (Table 2). Tenure status, which is a good indicator of SES in the British context (Dalstra, Kunst and Mackenbach 2006), measured the tenure of accommodation occupied by the family. The initial variable with six categories was recoded into a dichotomous variable (1 = owner occupier; 2 = not owner) (missing N = 2,755). Occupational socio-economic class, a good indicator of SES and social class (Muntaner *et al.* 2010), was measured with the Registrar General's social class classification (Office of Population Censuses and Surveys 1970). For the purpose of this study, the measure of occupational social class was recoded into four dichotomous variables indicating the occupational socio-economic class of the male head (missing N = 1,267). The category non-manual was used as a reference group in comparison with the other classes (Table 2).

Covariates

In studying the long-term effects of social engagement, we took into account the effect of covariates across the lifecourse that are known to be associated with later-life social engagement. Better health has predicted higher social engagement in older ages (Erlinhagen and Hank 2006; Hyyppä *et al.* 2006), and the correlations with depression and social engagement have shown similar patterns (*e.g.* Erlinhagen and Hank 2006). At ages 11 and 16, health was measured by absence from school during the past year because of ill-health (1 = less than a week, 5 = does not attend) (Table 2). At age 23 a dichotomous measurement, whether the study participant was healthy or not (0 = no, 1 = yes), was used. At age 50, health was measured by asking the respondent whether health limited everyday activities (1 = yes, 2 = no). To control for the effect of depression at age 11, the depression score of the Bristol Social Adjustment Guide (BSAG) was used (Table 2). At age 16, an item from the Rutter Behaviour Scales, an index for different behaviour difficulties (Rutter, Tizard and Whitmore 1970), was used to measure depression. The parent was asked whether the child appeared miserable, unhappy and tearful (1 = doesn't apply, 3 = certainly applies). In order to maintain consistency in the depression measures across the different time-points, an item from the Malaise Scale (Rutter, Tizard and Whitmore 1970) was used at ages 23 and 50. The participant assessed whether he or she often felt miserable or depressed (1 = yes, 2 = no). In earlier studies,

TABLE 2. *Descriptive statistics: predictors and covariates: means and standard deviations by gender and significant cross-sectional associations between outcome variables and covariates in the final model*

Age measured		Mean (% or SD)		Social activity		Voluntary work		Social contacts	
		Male	Female	Male	Female	Male	Female	Male	Female
Tenure status (%):[1,2,3]									
Age 11	1=owner, 2=non-owner	3,246 (46.4)	3,026 (45.3)						
Occupational social class (%):[1,3]									
Age 11	Non-manual (reference group)	2,285 (29.3)	2,225 (27.8)						
	Manual	4,262 (54.7)	3,996 (49.9)						
	No father/male head	332 (4.3)	362 (4.5)						
	Class unclear	907 (11.6)	794 (10.8)						
Health (SD):									
Age 11	1=absent from school less than a week, 5=doesn't attend	1.41 (0.62)	1.47 (0.63)	−0.03**	−0.04***	−0.07***	−0.04**	−0.01	−0.02*
Age 16	1=absent from school less than a week, 5=doesn't attend	1.50 (0.72)	1.65 (0.78)	ns	ns	ns	ns	ns	ns
Age 23	0=not healthy, 1=healthy	0.24 (0.42)	0.06 (0.24)	ns	ns	ns	ns	ns	ns
Age 50	1=health limits everyday activities, 2=health doesn't limit	1.84 (0.37)	1.81 (0.39)	0.04***	0.03*	0.02	−0.01	−0.01	0.00
Depression (SD):									
Age 11	0=min, 10=max (BSAG)	1.20 (1.61)	0.89 (1.45)	−0.02****[4]	−0.02****[4]	−0.01[4]	−0.02***	−0.01**	−0.01**
Age 16	1=doesn't appear miserable, 3=certainly appears miserable	1.12 (0.38)	1.24 (0.50)	ns	−0.01	ns	−0.02**	nm	nm
Age 23	1=often miserable or depressed, 2=not often miserable or depressed	1.9 (0.30)	1.81 (0.39)	ns	ns	ns	ns	ns	ns
Age 50	1=often miserable or depressed, 2=not often miserable or depressed	1.84 (0.36)	1.78 (0.42)	0.18***	0.15***	0.12*	0.09*	0.13**	0.10**
Middle age controls (%):									
Partner status[2]	0=doesn't live with a spouse or partner, 1=lives with spouse or partner	3,844 (80.3)	3,874 (78.3)	0.05*	0.09***	−0.04	−0.04	0.00	0.03

Notes: 1. Gender difference statistically not significant. 2. Percentages for category 1. 3. Socio-economic status associations shown in Table 3. 4. Association over time with social engagement in middle age. BSAG: Bristol Social Adjustment Guide. nm: contacts not measured at age 16.
Significance levels: * $p<0.05$, ** $p<0.01$, *** $p<0.001$. ns: not significant, effect of covariate deleted from the final model.

partnership status, measured by marital status, has been shown to decrease the frequency of social contacts among middle-aged and older persons, whereas partnership has been associated with increased frequency of participation social activity and formal participation activities (Li, Pickles and Savage 2005; Rotolo and Wilson 2004). Partnership was measured by asking whether the respondent lived with a spouse or partner (1 = no, 2 = yes).

Attrition

Most of the missing information in the entire NCDS population was due to the fact that participants could not to be traced as a result of moving to a new address and not responding to efforts to trace them. While refusal rates in the population were relatively low, they nevertheless contributed to attrition over time (Power and Elliott 2006). In the year 1969, the refusal rate was 3.6, while another 116 individuals did not participate in the survey either due to emigration or because they could not be traced by that year or later. In the year 2008–2009, when the participants had reached the age of 50, the refusal rate was 7.2 and the number of persons who could not be contacted for the reasons already mentioned was 390; 2.4 percent had died by the last follow-up. Complete information on all the outcome measures for all the time-points of the study was available for 1,904 males and 1,961 females. On average, the respondents had data for 6.1 social engagement measures (scale 1–9).

Analytical strategy

The chi-square test in SPSS 18.0 was used for testing gender difference in the observed variables of social engagement. Path analyses with latent variables was used for investigating the long-term effects of social engagement and were carried out within a structural equation modelling (SEM) framework using the Mplus statistical package (version 5.21; Muthén and Muthén 1998–2009). SEM provides a means to separate measurement error variance from the variance of the construct, thereby leading to more reliable estimation results. Aside from estimating stability paths within each social engagement domain, SEM also enables an estimation of cross-lagged longitudinal paths between different social engagement domains. Missingness at Random (MAR) was assumed, which is a weaker condition for missing data than Missingness Completely at Random (MCAR). In the MAR situation, missingness does not depend on the unmeasured variables but can depend on the values of observed variables included in the analyses (Little 1988; Rubin 1974). Assuming MAR, the parameters

of the models were estimated using the full-information maximum likelihood estimation (Muthén and Muthén 1998–2009). This missing-data method uses all the data that are available to estimate the model without imputing data. Moreover, the estimation was conducted with non-normality robust standard errors (Muthén and Muthén 1998–2009).

As the observed outcome variables of our study varied by measurement category and content across the time-points and different life stages, latent variables were constructed for each social engagement dimension. For social activity, the index indicator was used in constructing the latent variable, whereas for voluntary work and social contacts the single-item measures were used. The latent variables were then used in the analysis. This was done in order to control for measurement errors of the observed social engagement measures and to study the effects between the true underlying domains of social engagement over time (Telama, Leskinen and Yang 1996). The SEM analyses were carried out along the following steps. First, separate structural equation models for women and men were carried out for each domain of social engagement (social activities, voluntary work and social contacts). These models quantify how the observed variables measure the corresponding latent variable, *e.g.* how well the index of participation in social activities measures the corresponding latent variable of participation, taking into account measurement error at a given time-point. Stability paths were estimated between the subsequent time-points of the latent measures, demonstrating the extent to which the latent social engagement variable in question can be predicted from the previous factors in the model.

Second, after first estimating separate structural equation models for each social engagement domain (social activities, voluntary work and social contacts), the separate structural equation models were combined into one model so that within-time-point correlations between the latent factors of the different domains of social engagement were also estimated, and as earlier, separate analyses were carried out for women and men.

Third, cross-lagged paths were estimated between the different domains of social engagement. Only statistically significant effects between the various social engagement measures were retained. Error variances were allowed to correlate between observed measures of childhood voluntary work and social activities in the cross-lagged model, since the indicators for the domains included shared items.

Finally, the covariates, that is, health, depression and partner status, were added into the previous models of women and men. In the final models, all covariates were controlled for in the cross-lagged models as time-varying variables at the respective time-points. According to the rules of parsimony, only the significant associations between the

various social engagement measures were retained in the final model, the effects of covariates with no significant association with any of the social engagement measures being excluded. Furthermore, modification indices were analysed and longitudinal effects between covariates and social engagement domains were freed to improve the fit of the model, if theoretically appropriate. After achieving the best-fitting model, the effects of childhood SES on social engagement domains were included in the models.

The goodness of fit of the models was assessed using several indices. Because the χ^2 statistic test is sensitive to sample size, we supplemented it with three other goodness-of-fit indicators, as recommended by Hu and Bentler (1999). The Comparative Fit Index (CFI) was used for comparing the adequacy of the specified model to the fit of an independent model, *i.e.* a model in which the variables are presumed to be uncorrelated. The Root Mean Square Error of Approximation (RMSEA), measuring the approximation error of the model, and the Standardised Root Mean Square Residual (SRMR), estimating the standardised difference between the observed correlation and the predicted correlation were also applied. The model fit was considered be sufficient when CFI values were at or more than 0.95 and those for the RMSEA and SRMR below 0.08 (Hu and Bentler 1999). The proportion of the variance explained by the models (R^2) ($p<0.05$) for the outcome measures is shown in Figures 1 and 2.

Results

Descriptive analyses

Table 1 presents the descriptive statistics for the observed outcome measures separately for men and women. The χ^2 test showed that, in general, men participated more in social activities throughout the follow-up period than women. On the contrary, participation in voluntary work was higher among women at all the time-points. With respect to social contacts, men reported meeting their friends more often in childhood than did women. In middle age, the frequency of contact was higher among women than men.

According to the SES measures, slightly less than half of the sample came from families who were home-owners when the respondent was 11 years old. The results for father's occupational social class showed that for around 50 per cent of the sample the respondent's father was in manual employment. The sample was relatively healthy and the level of depression was low across the follow-up period. The vast majority of the sample reported co-habiting at age 50.

Development of social engagement over the 39-year follow-up in men and women

Baseline cross-lagged models. The fit for the final baseline cross-lagged models, including statistically significant social engagement paths only, was excellent for both men ($\chi^2 = 37.92$; degrees of freedom (df) = 18; CFI = 0.99; RMSEA and SRMR = 0.01) and women ($\chi^2 = 49.89$; df = 18; CFI = 0.99; RMSEA and SRMR = 0.02). The results indicated that the rank-order stability in social engagement between the successive time-points was statistically significant for each social engagement domain. The magnitude of stability across time, however, varied across the domains. The highest degree of stability between the last two time-points was found in participation in social activities (women: $\beta = 0.45$; men: $\beta = 0.56$) and in voluntary work (women: $\beta = 0.27$; men: $\beta = 0.54$), especially in men. The stability paths for social activity were also relatively strong in the earlier life stages (women: $\beta = 0.47$; men: $\beta = 0.67$). In turn, the stability paths for voluntary work were very modest in the early life stages (women and men: $\beta = 0.06$). The paths were also very modest for social contacts between early adulthood and middle age (women and men: $\beta = 0.10$). Conversely, the stability paths for social contacts were relatively strong in early life (women: $\beta = 0.53$; men: $\beta = 0.33$), especially among females. In other words, the findings suggest that the development of social engagement in childhood has consequences for social engagement in adolescence/early adulthood, which, in turn, predict social engagement in middle age. Generally, the higher the earlier engagement, the higher the subsequent level of engagement. Also, a direct significant effect from childhood to middle age emerged for volunteer work in women, indicating that childhood voluntary work independently facilitated the corresponding domain in middle-aged women 39 years later ($\beta = 0.12$).

In addition to the effects within the separate social engagement domains, statistically significant cross-lagged effects were also detected between the different domains in earlier life and middle age (*see* Figures 1 and 2). In men, cross-lagged effects were detected for middle-age social contacts and volunteer work ($\beta = 0.03$), indicating that social contacts in earlier life facilitated middle-age voluntary work. Also, participation in adolescence in social activities ($\beta = 0.37$) and in voluntary work $\beta = 0.17$) facilitated social contacts in middle age in men. In women, participation in social activities facilitated social contacts in middle age ($\beta = 0.63$), whereas participation in voluntary work in adolescence was associated with fewer social activities in middle age ($\beta = -0.17$). These results suggest that the development of social engagement over time can be tracked not only within the separate domains, but also, via multiple effect patterns, between the domains.

The cross-sectional correlations between the latent variables in the model were statistically significant for both genders, indicating that all the social engagement domains at the respective time-points were associated with each other. The R^2 values ranged from 0.05 to 0.37 for men and from 0.02 to 0.31 for women (*see* Figures 1 and 2), suggesting that the proportions of the variance of social engagement explained by the model ranged from low to moderate.

Cross-lagged models with covariates and SES. The fit for the final models, which included the significant social engagement paths controlled for the effects of the covariates and childhood SES, was very good for both men ($\chi^2 = 72.75$; df = 43; CFI = 0.99; RMSEA and SRMR = 0.01) and women ($\chi^2 = 77.66$; df = 50; CFI = 0.99; RMSEA and SRMR = 0.01). Many of the lifecourse covariates were cross-sectionally associated with the social engagement domains in both genders, as presented in Table 2, excepting health and depression in adolescence and early adulthood. In general, the men and women who were healthier, less depressed and co-habiting were more socially engaged than those with poorer health, depression or not co-habiting. However, the patterns of these associations varied between the social engagement domains. In addition to the cross-sectional associations, childhood depression was associated with less frequent participation in social activities in both genders in middle age and also in voluntary work among men.

The estimates for the final model (Figures 1 and 2) showed that adding the covariates and childhood SES factors had almost no influence over time on the effects obtained with the baseline model. The effects of social engagement over time remained significant, and of rather high magnitude, in the domains of social activities and voluntary work. However, this step resulted in a reduction in the effect of earlier social activities on middle-age activities in women, implying that this was partly explained by the additional factors that were included in the model.

The final results therefore suggest that the development of social engagement starts already in childhood, *i.e.* involvement, especially in social activities and voluntary work, in the early life stages continues not only to increase in those particular domains 34 or 39 years later, but has the effect of increasing social contacts in later life. In fact, the cross-lagged effects imply that social contacts in middle age may be rooted in participation in early life. The remaining significant correlations between the latent social engagement measures suggested that engagement in one domain was cross-sectionally associated with the other domains in the presence of the covariates and SES factors. The significant R^2 values in the final model show that the magnitudes of variance of the social engagement measures explained by the model mostly remained relatively low or moderate.
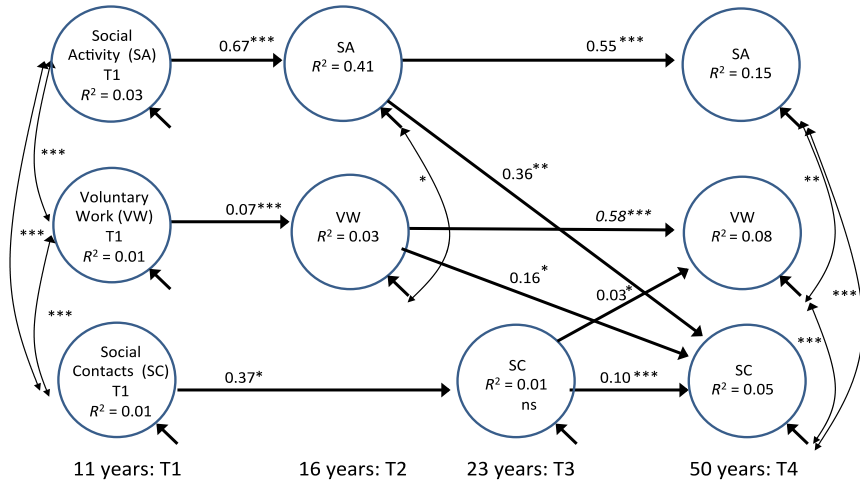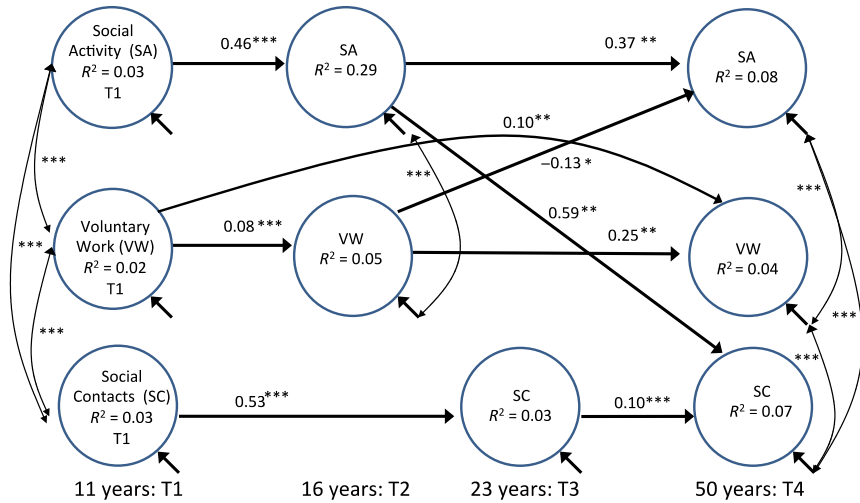
Figure 1. Men's final cross-lagged model for social engagement including covariates and socio-economic status. *Note*: Paths of the model are presented as unstandardised estimates. *Significance levels*: * $p<0.05$, ** $p<0.01$, *** $p<0.001$. ns: not significant.

Figure 2. Women's final cross-lagged model for social engagement including covariates and socio-economic status. *Note*: Paths of the model are presented as unstandardised estimates. *Significance levels*: * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Effect of childhood SES on social engagement in middle age

The significant β-coefficient estimates for the effect of childhood SES on social engagement in middle age showed that variance of engagement in middle age was predicted by childhood socio-economic conditions

T A B L E 3 . *The effect of childhood tenure status and father's occupational social class on social engagement domains at ages 11–50 in latent path model*

Social engagement by age	Tenure status		Social class: manual[1]		Social class: no father[1]		Social class: unclear[1]	
	Male	Female	Male	Female	Male	Female	Male	Female
	β-coefficients							
Social activity:								
11	0.01 ns	− 0.01 ns	0.02 ns	0.00 ns	0.04 ns	0.03 ns	0.02 ns	− 0.02 ns
16	0.07***	0.01 ns	0.02 ns	0.01 ns	0.01 ns	0.05 ns	0.04*	0.03 ns
50	− 0.1**	− 0.1**	− 0.1*	− 0.07*	− 0.1**	− 0.2***	− 0.06 ns	− 0.06 ns
Voluntary work:								
11	− 0.1**	− 0.1***	− 0.04 ns	− 0.05 ns	− 0.1*	− 0.03 ns	− 0.07*	− 0.04 ns
16	0.02 ns	0.04 ns	0.02 ns	0.01 ns	− 0.02 ns	0.04 ns	0.02 ns	0.01 ns
50	− 0.1**	− 0.2***	− 0.1*	− 0.15**	− 0.2**	− 0.2*	− 0.07 ns	− 0.06 ns
Social contacts:								
11	0.03*	− 0.01 ns	0.04*	0.06***	0.03 ns	0.09***	0.03 ns	0.02 ns
23	− 0.07 ns	0.10**	0.01 ns	0.11**	0.03 ns	0.11 ns	0.02 ns	0.14**
50	0.00 ns	− 0.03 ns	0.07*	0.11**	0.06 ns	0.10*	0.03 ns	− 0.03 ns

Notes: 1. The reference group is non-manual social class. Associations are adjusted for health, depression and partner status.
Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. ns: not significant.

even up to 39 years later (Table 3). The effect of childhood SES on social engagement in middle age, however, varied across the social engagement domains. Men and women whose father had been in a manual occupation or who did not have a father at age 11 participated less in social activities and voluntary work compared to those with a father in a non-manual occupation (Table 3). A similar effect was also found for the effect of tenure status, *i.e.* respondents whose families were not home-owners when the respondent was 11 years of age participated less than those from home-owning families. In contrast, the effect of childhood SES on middle-age contacts was the reverse. Men and women with a manual worker father had more contacts in middle age than peers with a non-manual worker father. Having no father at age 11 was associated with more contacts in middle age in women than in the reference group. In addition, the results suggested that, in general, the effect of childhood SES on social engagement in the earlier life stages was either non-significant or lower in magnitude than the longitudinal associations between childhood SES and middle-age social engagement (Table 3). Unclear occupational social class did not, with a few exceptions, differ from the non-manual class in engagement across the follow-up period.

Discussion

The aim of our study was to investigate how social engagement develops over time, *i.e.* how participation in the different domains of social engagement in earlier life affect participation in those domains in middle age. We also were interested in whether childhood SES explains the variance of social engagement in middle age, even cumulatively, as proposed by the theory of cumulative advantages and disadvantages.

Due to the scarcity of previous research, no hypothesis was set for our first research question. The results suggested that the degree of stability of inter-individual differences in social engagement ranged from low to moderate over the lifecourse. The development of social engagement starts in childhood, increasing engagement in middle age through adolescence, or even independently from childhood to middle age, as found in women. While the effects from one time-point to the next were equally strong between middle age and the preceding life stages for the volunteer work and social activity domains, for social contacts they remained very modest in both genders. The finding suggests that while for many people social engagement in earlier life leads to increased engagement in middle age, there is also considerable change over time in how people engage later in life (*see also* Carstensen 1992). The results support previous findings on the development of social participation (Janke, Davey and Kleiber 2006; Oesterle, Kirkpatrick Johnson and Mortimer 2004; Wilson and Musick 1997).

In addition to the effects found in the separate domains of engagement, cross-lagged longitudinal effects between domains were detected in both genders. Although only a surprisingly low number of significant longitudinal cross-lagged effects were found, the effects nevertheless indicated that social engagement develops along multiple paths and that the construct is multifaceted. In particular, participation in social activities in adolescence in both genders and in voluntary work in males seemed to increase social contacts in middle age. There may be some gender differences in the interplay between the domains, as suggested by the increasing effect of adulthood contacts on voluntary work in middle age, which was found only in men, and the decreasing effect of voluntary work in adolescence on social activities in middle age, which was found only in women. While the gender differences in the distributions of the observed outcome measures were significant at the different time-points of the study, the paths of the SEM models in the respective domains were similar in both genders, a finding which is consistent with the suggestion that gender is not of great importance in the development of social engagement (Bukov, Maas and Lampert 2002). However, the magnitude of the effects between middle age and the preceding time-points were somewhat higher in men for social activities and volunteer work.

There are several possible explanations for the above findings. First, the continuity in the development of social engagement over time may be explained as an effect of the cultural capital adopted, reflecting tastes or affinities experienced as meaningful already early in life and which, therefore, may continue throughout the lifecourse (Scherger, Narzoo and Higgs 2011; Utz *et al.* 2002). On the other hand, the results may also be discussed with reference to the concept of social capital. Social capital recognises the existence of and disparity between the various domains of social engagement and how they can be mobilised for the benefit of the individual (Bourdieu 1986; Li, Pickles and Savage 2005; Putnam 2000). In particular, a new opening of the concept of 'initial social capital' might prove useful in the debate on the development of lifelong social engagement along with the influence of potential background factors (Pekonen and Pulkkinen 2002; Pulkkinen 2004). According to Pekonen and Pulkkinen (2002) 'a child inherits her/his initial social capital from the social capital at home through bonding with his or her parents'. This idea merits consideration in seeking to explain the effect of childhood engagement and conditions on social engagement in later life. The stronger associations of social activity and contacts with the earlier life stages in the present study indicated greater consistency in social engagement during the earlier stages of life. This may be due to the shorter temporal distance between the earlier life stages compared to that

from adolescence to early adulthood or from early adulthood to middle age. The decrease in the magnitude of association towards middle age in both genders may also partly be explained by the responsibilities that adult life brings.

Our second hypothesis received support, as we expected SES in childhood to explain the variance of subsequent social engagement, with better SES predicting more frequent social engagement in middle age, as suggested by the theory of cumulative advantages and disadvantages (Dannefer 2003) and lifecourse research-related literature (*e.g.* Kuh and the New Dynamics of Ageing Preparatory Network 2007). Interestingly, our results suggested that lower childhood SES was in fact associated with more social contacts in middle age. This finding may reflect the possibility that lower SES is associated with a higher level of unstructured social engagement (Seabra *et al.* 2008; Simpkins *et al.* 2005). The results on different forms of social capital show that people in disadvantaged positions are more likely to derive social capital from weak ties, whereas those in more advantaged positions are more likely to derive social capital from civic engagement (Li, Pickles and Savage 2005). The results may also reflect the content of our measure, in which contacts with family and friends were combined, as different effect patterns have been found between the two types of contacts in some of the earlier studies (*e.g.* Grundy and Read 2012; Pahl and Pevalin 2005). In sum, it seems that early life advantages and disadvantages may have a prolonged, even cumulative, influence on an individual's lifecourse, as our results also suggested that the effect of childhood SES on engagement in middle age was in general stronger than earlier in life (Dannefer 2003). Alternatively, it may also reflect the view that childhood acts as a sensitivity period for later life outcomes (*e.g.* Kuh and the New Dynamics of Ageing Preparatory Network 2007). The effect of childhood SES was somewhat similar in both genders, although the decreasing effect of lower SES was slightly stronger in females, implying that female gender is a potential vulnerability factor for the accumulation of disadvantages (Dannefer 2003).

According to the literature, the manifestation of social engagement is influenced not only by the individual's cohort membership but also by cultural-historic experiences, as well as by societal and cultural frames and a political system that upholds a given social structure (Elder, Kirkpatrick Johnson and Crosnoe 2003; Rasulo, Christensen and Tomassini 2005; Zaranek and Chapleski 2005). Therefore, some of the characteristics of our sample may need to be taken into account if the results are to be generalised across different cohorts and cultural contexts. The cohort in the present study had witnessed major changes in education, gender roles and employment along with technical advances, while a substantial proportion of them had left school at age 16 (66% of men and 60% of women)

(Elliott and Vaitilingam 2008). Although the standard of living had increased markedly during the lives of the cohort members, a simultaneous increase in inequality had also taken place, although currently at an attenuating rate. The results from the British cohorts (including NCDS), suggesting that people's lives are to a considerable extent shaped by their social class origins (Elliott and Vaitilingam 2008), adds to the justification for applying a lifecourse perspective in studies aimed at understanding conditions in later life in different populations.

The limitations in the present study include the use of self-reports, which are often subject to bias. Owing both to the time-points available and to our interest in modelling the associations between middle age and the earlier developmental life stages, the time-span between the different time-points were not equal, but varying. There was, in particular, a long temporal distance between social engagement measures in middle age and in the earlier life stages. Implementing the measure of participation in social activities through the different stages of the lifecourse proved to be challenging. This was due, first, to the varying measures available at the different time-points and, second, to developmental factors, meaning that individuals grow and change and choose to participate in different activities in different life stages. In order to take into account the variation of the scales used over time and the available measures, we constructed latent variables to illustrate the underlying concepts of the dimensions of social engagement at the different time-points. Also, the measure of club participation outside school, which was theorised as containing the same features as volunteering, was only poorly associated with volunteer work in adolescence, indicating the antecedents of volunteering in adolescence warrant further exploration. The proportion of the variation in the social engagement measures explained by the model remained very low, indicating the possibility that other important factors that were not included in the present study may also explain the variance of the outcome measures.

With respect to the cumulative effects of childhood SES on social engagement during the lifecourse, it should be noted that the diversity of the observed social participation measures across the time-points of the study might have had an influence on the longitudinal effects. However, by introducing latent measures into the model it was possible both to account for measurement errors related to the observed measures and to estimate effects for the true construct of social engagement. Some information was missing in our study, as is often the case in longitudinal settings, especially where the follow-up periods are extended. Full-information maximum likelihood was used in the present study to take missingness into account. Most of the missingness across the whole NCDS population was due to the difficulty of tracing participants who had relocated, refusal rates remaining

relatively low (Power and Elliott 2006). One factor that increased the missingness in our data was the procedure of recoding the 'no chance' answers in adolescence as missing values, which were relatively high in number. Those with four or more missing values in the social engagement measures had lower childhood SES, were less healthy and more depressed across the follow-up period, and were also less often co-habiting, than those for whom information was complete ($p < 0.05$, χ^2 test). Therefore, the results may to some extent be more representative of the more advantaged participants and so underestimate the associations between the background and outcome variables.

Among the strengths of our study are the substantial sample size and the long follow-up period of 39 years. In addition, to the best of our knowledge, this is among the first attempts to describe the development of different domains of social engagement simultaneously and separately for men and women over an extended follow-up. We applied a lifecourse perspective to test the effects of SES in early life and social engagement in middle age, taking into account the effect of many covariates.

In sum, we can conclude that childhood social engagement facilitates engagement in adolescence, young adulthood and middle age, and that to a great extent there are similarities between the genders in the development of social engagement. Although social contacts in earlier life did not have strong effect on contacts in middle age, the significant cross-lagged effect suggested that social activity and voluntary work in early life may lay the foundation for, as well as enhance, later-life social contacts, facilitating the acquisition of contacts in adulthood. However, social contacts in early life do not necessarily lead to increased social activity and volunteer work later in life. Interventions to enhance enablement, a pro-social orientation, civic-mindedness and participation, particularly in volunteer work, at a young age, and especially across different socio-economic groups (Dannefer 2003), may have beneficial effects not only for lifelong individual social engagement, which can be seen as an important aim in itself or as social capital to be mobilised (Li, Pickles and Savage 2005), but also for health and wellbeing in later life. Educational institutions arguably come to play a highly important part in efforts to achieve these objectives (Oesterle, Kirkpatrick Johnson and Mortimer 2004). The role of various lifecourse factors on social engagement deserves further investigation in men and women, as there may be gender differences in what factors are associated in later life and in what ways. Factors related to the individual's disposition might be included among these, as suggested by ageing research (Broese van Groenou and Deeg 2010). The development of social engagement in different socio-economic groups may also be of research interest, as there may be variation over time in its effects between persons in different

socio-economic positions and between those showing or not showing socio-economic mobility across their lifecourse.

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