

# Pathways of Paid Work, Care Provision, and Volunteering in Later Careers: Activity Substitution or Extension?

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## ABSTRACT

It is well established that what happens to older people in one domain (like paid work) is likely to be related to what happens in another domain (like family caring or voluntary work). There is, however, limited research on the interplay between multiple activity domains in later careers. Research tends to focus on one domain (such as employment), and bring in aspects from other domains (such as volunteering) to explain outcomes. This article instead examines the interplay between 3 domains—paid work, care provision, and volunteering—using sequence analyses, cluster analyses, and loglinear modeling. It assesses 2 competing perspectives. The role substitution perspective suggests people take on activities (such as volunteering) to replace the loss of other activities (such as paid work). The role extension perspective alternatively suggests that people that are active in one area are likely to be active in others as well. Using the first 6 waves of the English Longitudinal Study of Ageing (ELSA), we examine 10-year pathways taken by individuals aged 50+ in relation to paid work, care provision, and volunteering. We find little support for either view of role substitution or extension. The 3 activity domains were largely independent of each other, suggesting that the factors influencing involvement in different combinations of activities are more complex. Nevertheless, we found some indicative evidence that part-time work and volunteering were complementary. Gender was important for the combination of pathways in paid work and care provision.

Active aging is a concept that was originally developed as a framework to counter the more negative view of older individuals as inactive and disengaged (Foster & Walker, 2013). Although it was not meant to be restricted to extending working lives, active aging has come to be mainly focused on paid work or productive aging (Foster & Walker, 2013; Harper, 2009; Moulaert & Biggs, 2013), and policymakers have been seeking to extend active aging to also include volunteering and civic engagement (Stephens, Breheny, & Mansvelt, 2015). From a gender perspective, care provision is often included as well.

An important question regarding active aging is whether older individuals can do paid work, care for others, and volunteer, all at the same time (Lindley, Baldauf, Galloway, & Li, 2014). Boudiny (2013) stresses that “active ageing cannot be reduced to the sum of its indicators as various forms of activity are not necessarily complementary (e.g. possible tension between work and care responsibilities). Investigating further the *interplay* between different domains of life might hence be more interesting” (p. 1094). In this article, we adhere to this call by

looking at the interplay between paid work, volunteering, and care provision in later career pathways.

Most research that has examined interrelations between activity domains are cross-sectional in nature (e.g., Burr, Mutchler, & Caro, 2007; Hank & Stuck, 2008; Jegermalm & Jeppsson Grassman, 2009). Previous longitudinal quantitative research mostly looks at how one state is related to another state over time (e.g., Burr, Choi, Mutchler, & Caro, 2005). We focus instead on the combinations of *pathways* rather than *states*. When looking at combinations of pathways, we provide information about “global interdependence”: The assumption that things need to happen at the same time is released, and instead, overall relationships can be investigated (Robette, Bry, & Lelièvre, 2015). This allows us to see the overall relationships between activities that cover a longer time period. To the best of our knowledge, we are the first to investigate how pathways in these three activity domains are related to one another. We also explicitly take gender and having a long-standing illness into account. Traditional gender roles see men as the main

breadwinner and women as homemaker (Van der Horst, 2014), which would suggest that men and women have a different combination of activity domains. In addition, having a long-standing illness may limit an individual's ability to participate in any of the activity domains.

## THEORETICAL CONTEXT

### Combining Domains in Later Careers: Activity Substitution or Activity Extension?

There is an extensive literature going back many decades which considers how activity domains are reconstituted in the transition to retirement. The establishment of retirement as an institutionalised phase of the life course (Phillipson, 1982) led to an academic interest in how people adjusted to this phase and whether retirement was characterized by disengagement from or continuity with previous roles and activities (Atchley, 1989; Estes, Biggs, & Phillipson, 2003). Retirement came to be defined by what people were not doing: They were no longer at work (McVittie & Goodall, 2012). More recently research on retirement transitions has emphasized the need to see retirement as a process rather than an event (e.g., Hasselhorn & Apt, 2015; Moen, 2004; Wang & Shultz, 2010) and therefore we concentrate on later careers rather than the point of retirement. This takes the focus off the dichotomy of presence or absence of paid work (Madero-Cabib, 2015) and allows us to look at the pathways people are taking in a number of different activity domains. If the transition to retirement is now more commonly a process which may involve movement back and forth across activity domains it is important to start by understanding the pattern of pathways in different domains. This is also informed by the literature that argues that retirement experiences are becoming more fragmented and/or differentiated. Fragmentation suggests that at the individual level the transition to retirement is more complex and that cliff edge retirement is increasingly uncommon (Hasselhorn & Apt, 2015; Maestas, 2010; Vickerstaff, 2015; Zhan & Wang, 2015). Differentiation on the other hand would suggest a greater range of pathways resulting in greater heterogeneity in later careers across the cohort (Moen, 2004; Vickerstaff & Cox, 2005).

Much of the literature has focused on the differences in activity before and after retirement and there are contrasting ideas as to how different activity domains may be related to one another at the end of working life. The first perspective, termed "role substitution" by Hank and Stuck (2008), suggests that with the loss of a paid work role individuals will seek out other roles. For example, Mutchler, Burr, and Caro (2003) hypothesized that volunteering may increase after exiting the labor force. They call this the "activity substitution" hypothesis (p. 1271). In theory, this could hold for any combination of paid work, volunteering, and care provision. This theory corresponds to earlier research using continuity theory. According to Atchley (1989, p. 184), a key proponent of continuity theory, "ageing people use continuity strategies to adapt to changes associated with normal ageing." Researchers drawing on this theory have often focused on the transition from work to retirement, and examined how individuals maintain "a continuity of self" through the replacement of paid work with voluntary work or other activities (Cook, 2015). There is some debate as to the degree of continuity between paid work and voluntary activities. Cook (2015), for example, argues that the career self-concept changes as people move into voluntary work. Nevertheless, Cook's analysis of older volunteers in Canada provides supporting evidence for the idea of role substitution.

Cook finds that "the majority of participants began volunteering during retirement or as retirement approached" (p. 369). It should, however, be noted that Cook's sample was located in a particular country context (Canada) and was disproportionately comprised of highly educated individuals. Ekerdt's (1986) arguments about a "busy ethic" in the United States may give us reasons to believe that role substitution has broader relevance. Ekerdt argues that retirees justify their status by remaining busy, which obviously has potential relevance for volunteering and caring. In sum, role substitution suggests that people leave paid work and then pursue voluntary and/or caring activities.

The second perspective is referred to as the "role extension" perspective (Hank & Stuck, 2008) or the "more-more"-principle. This approach suggests that individuals who are active in paid work are more likely to be active in other domains as well (Robinson & Godbey, 2000). This focuses on the nature of individuals—those people who have energy, interest, motivation, etc. for one activity will also have this for other activities (cf. Meyersohn, 1968). Mutchler and colleagues (2003) have used this to formulate the hypothesis that individuals who are active in paid work are also more likely to volunteer. Again, in theory, this could hold for all three activity domains; paid work, care provision, and volunteering. In support of this, Nazroo (2015) found that individuals who were not employed were less likely to volunteer. Likewise, Jensen, Lamura, and Principi (2014) state that retirees who are most likely to volunteer are those that also volunteered before retirement.

Much of the literature on role substitution or extension is concerned with activities before and after retirement. We do not focus on the postretirement phase of activity here but rather the pathways that people take up to and beyond a cessation of paid employment, considering the interrelations over time between paid work, volunteering, and caring in the English case.

#### *Paid work*

Research in this area often starts from the assumption that paid work, and in particular full-time paid work, is time-demanding and difficult to combine with other activity domains (Burr et al., 2007), which has potential relevance for the role substitution perspective. In this context, it is interesting to note that relatively few U.K. workers appear to reduce their hours in older age or return to work after retirement (Kanabar, 2012; Van der Horst, Vickerstaff, Lain, Clark, & Baumberg Geiger, n.d.). This is different from some other countries like the US where individuals appear more likely to "unretire" (e.g., Kanabar, 2012; Maestas, 2010). If retirement involves volunteering and care provision that is hard to combine with employment, this may, in part, help explain why so few return.

Previous research has suggested that there are gender differences in paid work due to differences in gender roles. For example, studies have suggested that women may exit the labour market early for caring obligations for grandchildren and/or elderly parents (De Preter, Van Looy, Mortelmans, & Denaeghel, 2013), which suggests role substitution for women. Another reason why women may exit the labor force early is to get out of an unfulfilling job where they may have ended up as a result of caring responsibilities (Loretto, 2010). Health is also important: Having a long-standing illness may limit an individual's ability to work (e.g., Brown & Vickerstaff, 2011; Chandler & Tetlow, 2014; Moen, 2004).

### Volunteering

Volunteering is increasingly mentioned in combination with active and healthy aging (Jensen et al., 2014). As Moen and Fields (2002) described it:

For those not seeking employment following retirement, formal community participation as a volunteer for one or more organizations may serve many of the same integrative functions as paid work, providing role identities, routines, relationships, meaningful activity, and a sense of purpose. (p. 22)

This reasoning seems again mostly in accordance with the role substitution perspective. Volunteering is seen as a way for older individuals to maintain a good health and a good quality of life (Cattan, Hogg, & Hardill, 2011) and is shown to be positively related to psychological well-being of retirees (Moen & Fields, 2002). Volunteering can be defined as “an activity that is freely chosen, does not involve remuneration and helps or benefits those beyond an individual’s immediate family” (Cattan et al., 2011, p. 329). Some research has claimed that men are more likely to volunteer than women (Foster & Walker, 2013) while other research has stated that there are no clear gendered patterns (Ehlers, Naegele, & Reichert, 2011). Being in good health appears to be an important precondition to volunteer (Jensen et al., 2014).

Using an American sample, Moen and Fields (2002) found no difference in volunteering rates between individuals who were retired and individuals who were not (yet) retired, which goes against the role substitution perspective, but also does not support the role extension perspective. Nazroo (2015) concludes in his review of the literature that the activity domains volunteering and paid work seem to be complementary (which could support the role extension perspective), although he also notes that when individuals spend more time on volunteering they spend less *time* in paid work (which could support the role substitution perspective). This is not found by everyone though, as Hank and Stuck (2008) found on European data (not including the United Kingdom) that being employed (or self-employed) rather than retired was negatively related to volunteering (again mostly supporting the role substitution perspective). This reinforces the need to look at volunteering in combination with other activity domains (Dury et al., 2016; Morrow-Howell, Hong, McCrary, & Blinne, 2012).

### Caring tasks

Next to volunteering, previous research also mentioned that caring tasks should be taken into account more, particularly from a gender perspective. In England, the peak age at which individuals care for an ill, disabled, or older person is 45–64, with women being more likely to provide care for others than men (Lindley et al., 2014). Of course, caring could also refer to caring for children or grandchildren.

In his review of the literature, Nazroo (2015) concludes that care provision is negatively related to paid work (Burr et al., 2007; Hank & Stuck, 2008), supporting the role substitution perspective. However, the strength of the relationship appears to depend on the societal context, with stronger relationships in Southern European countries and weaker relationships in Nordic countries. It has been hypothesized that these differences are related to the amount of formal care offered by the country and differences in gendered-care norms (Kotsadam, 2011). For the United Kingdom, Michaud, Heitmueller, and Nazarov (2010)

found that this relationship appears to be bi-directional and small in nature. It is also the case that *caring* is a highly differentiated activity, in terms of formality and informality, who is cared for and the intensity of care with respect to time spent and the needs of the people being cared for (Morrow-Howell et al., 2014; Pinquart & Sörensen, 2003).

Pertaining to the combination of care provision with volunteering, research is mixed. However, lots of research has found a positive relationship (e.g., on American data, Burr et al., 2005); on European data [not including the United Kingdom], Hank & Stuck, 2008), supporting the role extension perspective. Three reasons are hypothesized for the positive relationship between care provision and volunteering. First, participating in a voluntary activity may relieve the burden and stress experienced from active care provision (Hank & Stuck, 2008). Second, active care provision may put individuals in contact with other people, including voluntary organizations, that may lead to opportunities for volunteering and information about voluntary organizations (Burr et al., 2005; Hank & Stuck, 2008). Experience with voluntary organizations through the role of care provider may make individuals appreciative of these organizations and keen to repay that debt (Burr et al., 2005). Third, individuals may be socialized to help others (in childhood, education, and family background), increasing the likelihood of both volunteering and care provision (Burr et al., 2005). It is important to note, however, that not all researchers found a positive relationship (see e.g., Choi, Burr, Mutchler, & Caro, 2007; Jensen et al., 2014).

### Research Question

There are two contrasting basic perspectives on combining activities in late career. The role substitution perspective suggests that low activity in one domain may be substituted with high activity in another domain. Given the importance of paid work at earlier life-stages, this would typically involve the replacement of paid work with volunteering and/or care responsibilities, particularly for men. The role extension perspective, on the other hand, suggests that the types of individuals that are active in one domain are likely to be active in others. The research reviewed above presents mixed indications about which theoretical perspective is more dominant and has been biased toward considerations of the move from work to retirement. To an important extent this literature is imperfect at capturing role extension/substitution because it typically examines work/care/volunteering at a particular point in time. Role extension instead suggests multiple activities to be performed over a sustained period of time, while substitution requires examination of movements between activities.

The research question is to test empirically how different activity domains relate to one another in late careers in the English context. We define late careers as being after age 50, a period previous research has shown to be qualitatively different from earlier ages in terms of work and caring responsibilities (Phillipson, Vickerstaff, & Lain, 2016). The existing literature pulls in different directions, so the aim of this article is not to formally test hypotheses but examine the evidence for patterns of role substitution and extension. To look at the combination of activity domains we look at 10-year pathways of older individuals rather than states at a particular point in time. This way we investigate the global relationships between these activity domains. A one-time only period of volunteering or caring combined with paid work does not necessarily indicate role extension; the combination of these activities would be sustained over a longer period, hence the need for examining work, volunteering caring activities over time. Similarly, individuals

may not want inactivity in one domain substituted immediately but only after some time. Thus, we assess for example whether a pathway with much full-time work is related to a pathway with little active care provision. We pay special attention to health and gender as these are important factors in the combination of domains. Where people in bad health may be less able to participate in any of the activity domains, gender roles prescribe different activities for men and women.

## METHOD

### Data

This article makes use of all the six waves of the English Longitudinal Study of Ageing (ELSA) that are currently available (Marmot et al., 2015). Collection of these data occurred between 2002 and 2013. When we look at all these six waves together, the data had 62,053 observations (Individuals  $\times$  Wave) nested within 16,806 respondents. We made several selections. First, we focused on individuals who were aged between 50 and 60 (inclusive) in the first wave. This left us with 34,569 observations nested in 9,347 respondents. Second, proxy interviews were deleted because it was not the individual him- or herself answering the questions. This selection led to 33,458 observations nested in 9,123 respondents. Third, to be able to track their trajectories we only selected those individuals who participated in all six waves. This left us with 15,018 observations nested in 2,503 respondents. Finally, only individuals who were core members of the dataset (sample respondents at Wave 1 or one of the refreshment samples) were selected because these individuals were the targeted respondents (this excludes partners of core members and a small group of additional people in the household of core members such as parents or siblings of core members—if the other household member is a core member him- or herself this person is still included in the data). This resulted in 14,742 observations nested in 2,457 respondents. There were some item missing data; not every respondent answered all questions used in this article. Because of deletion of missing data, we ended up with 13,986 observations nested in 2,331 respondents.

### Variables

We have three different 10-year pathways which we are interested in (paid work, care provision, and volunteering) each of which consists of various mutually exclusive states that individuals can be in. For each activity domain pathway we also include the possibility that someone died, in order to reduce biases in the analysis that would come from focusing exclusively only on healthier “survivors” who may be more active.

#### *Paid work*

For the sequence on how much time individuals spend on paid work, we looked at the states being in paid employment (full-time or part-time), in self-employment (full-time or part-time), not employed, or dead. Whether someone was employed, self-employed or not employed was taken from a derived variable in the dataset (this was either asked directly or derived from for example running a business or being a director of a company); the people who were not in paid work or self-employment and not missing were considered not-employed.

Individuals in paid employment received a question on how many hours they usually work in a week, excluding meal breaks, but including paid overtime. (Although we would have liked to also include unpaid overtime, this is not asked in ELSA.) This variable was divided in three

categories: (a) small part-time work (1–15 hr/week), (b) large part-time work (16–34 hr/week), and (c) full-time (35 hr/week or more). Individuals who were self-employed received instead a question about how much time they usually worked in a week, including doing the books, etc. This variable was again divided in three categories: (a) small part-time work (1–15 hr/week), (b) large part-time work (16–34 hr/week), and (c) full-time (35 hr/week or more).

#### *Volunteering*

All respondents received a question how often—if at all—they did any voluntary work. Volunteering was defined in Wave 1 documentation of ELSA as “any kind of unpaid work, whether formal (e.g., 1 day a week volunteering for the local charity shop) or informal—helping out at a village hall or on a committee etc.” (p. 419). This question is only asked in ELSA for formal and informal volunteering together. Respondents answered on a six-category response, from never to twice a month or more. We recoded this into three categories: never, sometimes (about once a month, every few months, about once or twice a year, or less than once a year), and often (twice a month or more).

#### *Care*

Respondents reported whether they looked after anyone in the week before the interview. It was specified that this included individuals in the household and only the active provision of care should be taken into account. Because in more than 80% of the observations (Wave  $\times$  Respondent) a respondent did not provide any care, we made no further distinction in the number of hours an individual provided care in this week.

We also investigated the role of having a long-standing illness (measured at Wave 1; the start of the sequence) and gender. *Long-standing illness*, was measured with the question “Do you have any long-standing illness, disability or infirmity? By long-standing I mean anything that has troubled you over a period of time, or that is likely to affect you over a period of time?” If the respondent answered “Yes” they received the question “(Does this/Do these) illness(es) or disability(ies) limit your activities in any way?” If the respondent also answered “Yes” to this question, the respondent was considered to have a *long-standing illness* in this study (in the data about 21%). *Gender* consists of men (in the data about 46%) and women (in the data about 54%).

### Research Design

The analysis consisted of various steps. The main goal of this article is to investigate how various domains relate to one another (role substitution or role extension). We do this by looking at overall relationships between the activity domains. This should inform us of the general relationships between the activity domains. Another option is to see how activity domains are related to one another at each point in time. However, as discussed above, this captures individuals only engaged in a one-off period of caring or volunteering, and role extension theory suggests a sustained period of combining activities. Likewise, it relaxes the assumption that people necessarily move seamlessly between activities. Instead, it may take time for role substitution to occur—people may, for example, engage in volunteering sometime after leaving work. Alternatively, people might start volunteering at the very end of their working life in order to ease into retirement. Cook (2015) found

from her sample of predominantly highly educated Canadians that individuals typically started volunteering *around* the time of retirement, not necessarily exactly *at* the time of retirement. Taking this looser approach, evidence for role substitution is likely to involve a high concentration of paid work only in early waves, followed by volunteering and/or caring only in later waves. In contrast, evidence for role extension is likely to involve sustained periods of combining activities.

Before looking at how pathways in different domains relate to one another, the first step is to summarize the different pathways (“sequences”) in each domain. This is a simple aim that is highly complex in practice: There are an enormous variety of different sequences across six waves of data even within a single domain. For example, for individuals volunteering in most waves during the 10-year period there are nevertheless many possible patterns of being absent from volunteering at particular waves. Data reduction techniques are therefore needed to reduce the bewildering complexity to a comprehensible set of summary sequences. To obtain these summary sequences, we conduct a sequence analysis to examine how similar each sequence in that domain is to other sequences, and then use this to conduct a cluster analysis that produces a small number of sequence clusters that group together sequences that are relatively similar to one another. To use the example above, we want to capture the fact that an individual volunteering in most waves is similar to another individual volunteering in most waves, even if the waves in which volunteering occurs do not match exactly. Likewise, we would want to group individuals active in early waves but inactive at later waves, even if the patterns do not match completely.

The specific type of sequence analysis used in this article is the longest common subsequence (LCS, [Elzinga, 2007](#)). A subsequence is a part of the complete sequence that occurs in the same order when reading from left to right ([Elzinga, 2007](#)); the longer the subsequence that is the same between two sequences, the more similar these sequences are. A dynamic algorithm is used to assess this (see [Elzinga, 2007](#) for more detail).

For the cluster analysis that follows, we performed partitioning around medoids (PAM) clustering. To determine the number of clusters per activity domain needed to describe the data, we looked at the silhouette width and the ratio of within/between variance of the cluster solution. We combined the information given by these two indicators with looking more substantively at the meaning of the clusters. The silhouette width gives information on how well a respondent fits in the cluster in which they are placed relative to the neighbouring cluster. The closer the value is to 1, the better the fit with the original cluster. An average silhouette width of 0.5 indicates a reasonable classification while a silhouette width of lower than 0.2 indicates there is not really a cluster structure (Kaufmann & Rousseeuw, 1990 as cited in [Everitt, Landau, Leese, & Stahl, 2011](#)). The within/between variance is a commonly used indicator and it has been suggested that the “mean within cluster distance should not be higher than half of mean between cluster distances, in order to indicate a valid identification of distinct sequence patterns” ([Aisenbrey & Fasang, 2007](#), p. 25). See [Van der Horst and colleagues \(n.d.\)](#) for a similar strategy.

The second step is to see how these clusters relate to those in *different* activity domains. Although sequence analysis is becoming ever-more common, few previous studies have attempted to look at the relationships between sequences in different domains. Here, we perform loglinear analyses. We compare various specifications of how the categorical variables could be related to one another (based on

combinations of main effects and interactions); the most parsimonious model that does not significantly deviate from the observed data is chosen. It is important to note that with large sample sizes, unimportant differences can still be significant ([Agresti, 2013](#)). We also look at the Akaike information criterion (AIC), which compares the observed values with the fitted values. The lower the AIC the better, but again, models with similar AIC may be of interest and one would consider a model that has a slightly higher AIC but is more parsimonious ([Agresti, 2013](#)). The interpretation focuses on the highest-order interaction(s) still in the final model. See, for example, [Agresti \(2013\)](#) for more detail.

In a final step, we wanted to see the role of long-standing illness and gender. Although there are many factors that may be related to these activity domains, we needed to restrict our focus to avoid sample size problems; we therefore focus on long-standing illness and gender given their particular importance (described above). We treat gender and long-standing illness as explanatory variables and therefore keep the interaction between gender and long-standing illness in all models we assess. This way we ensure that the fitted values for combinations of gender and having a long-standing illness are as observed in the data (cf. [Agresti, 2013](#)).

All analyses are performed in R (version 3.2.2, [R Core Team, 2015](#)), using the packages *car* ([Fox & Weisberg, 2011](#)), *TraMineR* (version 1.8–9, [Gabadinho, Ritschard, Müller, & Studer, 2011](#)), *RColorBrewer* ([Neuwirth, 2014](#)), *cluster* ([Maechler, Rousseeuw, Struyf, Hubert, & Hornik, 2015](#)), *fpc* ([Hennig, 2015](#)), *gmodels* ([Warnes, Bolker, Lumley, & Johnson, 2015](#)), and *MASS* ([Venables & Ripley, 2002](#)).

## RESULTS

This section will present the results of the various steps described in the Method section. First, we describe the summation of pathways per activity domain into clusters of pathways. Second, we describe the results of how clusters of pathways developed in the previous step are related to one another across activity domains. Finally, we include gender and health as important covariates. To reiterate: Strongest evidence of role extension would involve pathways where individuals were involved in multiple activities for most of the waves. The clearest evidence of role substitution would involve the combination of paid work only in earlier waves and volunteering and/or caring in later waves. It is of course theoretically possible that people substituted paid work for volunteering before the first wave of the survey; this would require that individuals left work relatively early (roughly between the ages of 49 and 59). Weaker evidence of role substitution would therefore be if individuals were out of work in all (or most) waves, but involved in large amounts volunteering and/or caring across the period examined.

### Summation of Pathways Per Activity Domain into Clusters of Pathways

#### *Paid Work*

The first activity domain we describe is *paid work*. There were 546 unique sequences in the data. The most common sequence was not being employed in any of the six waves (21.2% of the cases). The second most common sequence was being full-time employed in all six waves, but this only accounted for 5.8% of the cases. When doing the cluster analysis, several clusters fit our criteria. [Table 1](#) shows the within and between variance as well as the average

Table 1. Cluster Solution Paid Work

Number of Clusters	Within Variance	Between Variance	Within/ Between Variance	Average Silhouette Width
2	.50	.81	.62	.37
3	.42	.79	.53	.40
4	.34	.79	.42	.46
5	.28	.79	.35	.51
6	.26	.76	.34	.46
7	.24	.76	.31	.48
8	.22	.76	.30	.44
9	.20	.76	.26	.46
10	.17	.75	.23	.47
11	.16	.74	.22	.48
12	.15	.72	.20	.44
13	.14	.71	.19	.44
14	.13	.71	.18	.44
15	.12	.71	.17	.47
16	.11	.70	.16	.48
17	.10	.70	.15	.48
18	.10	.70	.14	.47
19	.10	.70	.14	.49
20	.09	.70	.13	.50
21	.08	.70	.12	.50
22	.08	.70	.12	.50
23	.08	.70	.11	.51
24	.07	.70	.10	.51
25	.07	.70	.10	.51
26	.06	.70	.09	.51
27	.06	.70	.09	.51
28	.06	.70	.08	.52
29	.06	.70	.09	.52
30	.06	.70	.09	.52

Source. ELSA Waves 1–6.

silhouette width of various cluster solutions. We decided to go for the 11 cluster solution based on the between/within variance being below 0.50, the silhouette width being almost 0.50 and the clusters being easily interpretable. Two clusters seemed rather similar to one another; “employed full-time for exactly four waves followed by at least one wave of not being employed” and “mostly employed full-time for less than four waves followed by at least one wave of not being employed.” Because we are not interested in whether someone is employed for exactly four waves we combined these two clusters. Hence, we ended up with 10 clusters that are listed on Table 2, alongside the frequencies/percentages in each category. The six clusters at the top of the Table 2, 36.2% in total, are comprised by consistency of paid work over the period, being *mostly*: full-time employed, part-time self-employed, full-time self-employed, employed in a part-time job (“large” or “small”) or moving from full-time to large part-time work. These clusters *would* be broadly consistent with extension theory if individuals also had high levels of volunteering and/or caring over the period. The next two clusters, 25.6% of the total, mostly involve moving from paid work (full or large-part-time) into nonemployment. These pathways *would* provide evidence of substitution theory,

Table 2. Paid Work Cluster Pathways

	%	<i>n</i>
<b>Consistent with extension theory (if combined with high density of other activities)</b>	(36.2)	
Mostly full-time employed	12.7	295
Mostly part-time self-employed	3.3	77
Mostly full-time self-employed	5.2	122
Mostly employed large part-time	4.9	114
Mostly employed small part-time	5.1	120
Mostly employed full-time followed by being employed in large part-time	5.0	117
<b>Consistent with substitution theory (if followed by introduction of volunteering/caring in later waves)</b>	(25.6)	
Mostly employed in full-time job followed by not employed	15.7	366
Mostly employed in large part-time job followed by not being employed	9.9	231
<b>Weaker evidence of substitution theory (if high density of other activities)</b>	(32.0)	
Mostly not employed	32.0	745
<b>Irrelevant for theories</b>		
Died in observation period	6.2	144
<b>Total</b>	<b>100</b>	<b>2,331</b>

Source. ELSA Waves 1–6.

if we find that these transitions were matched with pathways showing that individuals had typically started volunteering/caring in later waves (after they had typically left work). After this we have the cluster pathway “mostly not employed,” indicating a very weak or nonexistent attachment to the labor market; this accounts for almost a third of individuals. These individuals *might* have substituted paid work for other activities if they had left work before the first wave and we see evidence of volunteering/caring during the panel period. This would typically have involved leaving a job between the ages of 49 and 59 or earlier, which would indicate relatively early exit. Within this cluster we can therefore expect some individuals to be involved in job substitution if they volunteer/care, while this would not be the case for others who show longer-term weak attachment to volunteering and care provision. The final cluster represents people that died during the observation period (6.2%).

### Volunteering

There were 394 unique sequences. The most common sequence was never volunteering in all six waves (37.2% of the cases). The second most common sequence was volunteering twice a month or more in all six waves, although this high-level of volunteering was only present in 4.8% of cases. When performing a cluster analysis, we found again multiple cluster solutions that fit our criteria (Table 3). The four or the five cluster solutions seemed most feasible. Looking at the substantive meanings of these cluster solutions, we decided to go for the four cluster solution, as shown on Table 4.

It is notable that no clear clusters appeared in which volunteering emerged in later waves, which is not hopeful for finding strong

evidence for role substitution. For most individuals volunteering is also not something individuals appear do in large volumes over extended periods of time. The cluster “mostly not volunteering,” 58.6% of the sample, contains about two-thirds saying they “never” volunteer at each wave and the remainder typically said they did a modest amount of volunteering (once a month or less) in one or two waves. The cluster with the highest concentration of volunteering is “at least some volunteering—twice a month” (19% of the total), and also in this cluster most only did this for some waves—only about a quarter of the

19% in this group volunteered twice a month in each wave. Finally, the group “at least some volunteering” (16.1%) contained individuals volunteering “once a month or less” in some—but usually not all—waves. The relatively low rates of regular volunteering do not therefore provide strong expectations that “role extension” with volunteering will be common, and the lack of a peak in volunteering in later waves is also not indicative of potential role substitution.

**Table 3. Cluster Solution Volunteering**

Number of Clusters	Within Variance	Between Variance	Within/ Between Variance	Average Silhouette Width
2	.28	.75	.37	.55
3	.20	.71	.28	.54
4	.17	.70	.24	.59
5	.15	.68	.22	.56
6	.12	.62	.20	.49
7	.11	.62	.18	.48
8	.10	.60	.16	.48
9	.08	.59	.14	.47
10	.07	.58	.12	.49
11	.06	.58	.10	.49
12	.06	.58	.10	.50
13	.05	.58	.09	.50
14	.05	.58	.08	.51
15	.04	.58	.07	.53
16	.04	.58	.07	.53
17	.04	.57	.06	.53
18	.04	.58	.06	.55
19	.03	.57	.06	.56
20	.03	.57	.05	.55
21	.03	.57	.05	.56
22	.03	.57	.05	.56
23	.03	.57	.05	.58
24	.02	.57	.04	.58
25	.02	.57	.04	.58
26	.02	.57	.04	.59
27	.02	.57	.04	.60
28	.02	.57	.03	.60
29	.02	.57	.03	.61
30	.02	.57	.03	.61

Source. ELSA Waves 1–6.

**Table 4. Volunteering Cluster Pathways**

	%	<i>n</i>
Mostly not volunteering (maximum two waves)	58.6	1,367
At least some volunteering	16.1	376
At least some volunteering—twice a month	19.0	444
Died in observation period	6.2	144
Total	100	2,331

Source. ELSA waves 1–6

### Care

There were 88 unique sequences in the data. The most common sequence was not providing any care in any of the six waves (48% of the cases). The second most common sequence was providing active care in the first wave, but not in the subsequent five waves (8% of the cases). Only 16 respondents (0.69% of the cases) were involved in active caring in all six waves. For care, as for the other domains, multiple cluster solutions appeared possible (Table 5).

Table 6 shows that the three cluster solution was easy to interpret and fitted the criteria. These clusters are (a) mostly not caring (maximum of one wave providing active care; 72.3%), (b) at least some

**Table 5. Cluster Solution Providing Active Care**

Number of Clusters	Within Variance	Between Variance	Within/ Between Variance	Average Silhouette Width
2	.14	.51	.27	.60
3	.11	.51	.21	.64
4	.07	.40	.18	.58
5	.05	.39	.12	.64
6	.04	.39	.10	.65
7	.03	.38	.08	.66
8	.02	.38	.06	.71
9	.02	.38	.05	.71
10	.02	.38	.04	.73
11	.01	.38	.03	.74
12	.01	.38	.03	.76
13	.01	.38	.02	.77
14	.01	.38	.02	.79
15	.01	.38	.02	.79
16	.01	.38	.02	.80
17	.01	.38	.02	.81
18	.01	.38	.02	.81
19	.01	.38	.01	.81
20	.00	.38	.01	.82
21	.00	.38	.01	.82
22	.00	.38	.01	.83
23	.00	.38	.01	.84
24	.00	.38	.01	.84
25	.00	.38	.01	.85
26	.00	.38	.01	.85
27	.00	.38	.01	.86
28	.00	.38	.01	.86
29	.00	.38	.01	.86
30	.00	.38	.01	.87

Source. ELSA Waves 1–6.

**Table 6. Caring Cluster Pathways**

	%	<i>n</i>
Mostly not providing care	72.3	1,686
At least some care provision	21.5	501
Died in observation period	6.2	144
Total	100	2,331

Source. ELSA Waves 1–6.

provision of active care (21.5%), and (c) died in observation period (6.2%). Notice that with these clusters we do not see distinct patterns of caring emerging in later waves as an important trend, as you might expect if this was related to role substitution and come after stopping paid work. Likewise, the lack of continuous caring does not suggest role extension dominates. Instead, the one-off nature of much caring suggest that it is not something sought out as an extension or substitution for paid work, but rather in response to particular (family) health crises.

Taking these clusters within various domains together, we find it unlikely to see much role substitution (we only see in paid work a time development) or role extension (we do not see much extended periods of volunteering or care provision). Nevertheless, we can see whether a pathway which is characterized by much activity in one domain is related to more or less activity in another domain. This gives us information about the overall relationships between these variables, independent of the specific timing.

### Combination Sequences Different Domains

The next step is to look how these clusters of sequences relate to one another. Because death cannot be combined with any other activity, we dropped individuals from the dataset who were in any of the “died in observation period”-clusters (144 individuals). However, if an individual died in the observation period but was included in any of the other clusters in all three activity domains (which is most likely when the respondent died in one of the later waves), this person is kept in the analyses. Table 7 gives a three-way cross tabulation between clusters of pathways of paid work, volunteering, and care provision.

The first thing to notice is that, in relation to the most extreme end of role extension, only 12 individuals (7 + 5) were simultaneously in the clusters “mostly employed full-time” or “mostly self-employed full-time,” “mostly volunteering at least twice a month,” and “at least some care provision” (0.5% of the respondents). Indeed, the cell with the most individuals is where people are mostly *not* being active in any of the three domains. About 16.6% of the respondents were in this combination of clusters. This seems to suggest that people who are active in one domain are not very likely to be active in many other domains (going against the role extension hypothesis). It also seems to suggest that individuals that are inactive in paid work are not likely to substitute this with volunteering or care provision (going against the role substitution hypothesis).

To assess the combination of different domains more formally, we performed a series of loglinear analyses. Table 8 shows the breakdown of the various models. We compare the models to see which one best describes the observed data as well as being parsimonious. In a first step, we look at whether the activity domains are completely independent from one another or are related. If we find in this step that at least

some activity domains are related to one another, we then investigate which ones. So first, we start by looking at the model where none of the three domains are related to one another; that is, the model without interactions and only main effects. The top line in Table 8 shows that this model significantly deviates from the observed data. Also, the AIC is highest of all models described in the Table 8. Hence, we reject this model. This suggests that at least some activity domains are related to one another.

The next step is to see how complex this relationship is; are activity domains directly related to one another, or does this also depend on the value of the third activity domain? A model with all two-way interactions tests the first option and suggests that activity domains are directly related to one another and that this relationship does not depend on the cluster in the third activity domain. A model also including three-way interactions tests the second option and suggests a complex relationship where the relationship between two activity domains is also related to the third activity domain. In practice, the model with a three-way interaction fits slightly better than the model with the two-way interactions included ( $p = .041$ ), but the AIC shows that the model with only the two-way interaction is the best choice (103.1 vs. 108.0). Because the two-way interaction model is more parsimonious and the standardized residuals of the model without the three-way interaction showed that none of the cells significantly deviated from the observed data (standardized residuals all below  $|1.960|$ ), we chose the model with two-way interactions.

We now know that at least certain activity domains are related to one another and that this relationship is unlikely to be strongly related to the value on the third activity domain. The next step is to see which activity domains are related to one another. We therefore investigated whether we could delete one or more of the two-way interactions (see lower panel in Table 8). Deleting the interaction between pathways in volunteering and care provision did not seem to noticeably reduce model fit [ $\Delta(2) = 6.50$ ,  $p = .039$ ]. The only cell with a standardized residual over  $|1.960|$  is the cell mostly part-time self-employed, at least some volunteering and at least some care provision, which has more observed people than expected. However, with this many cells it is not surprising that one will be significant and the fitted value is very close to the one with all two-way interactions included (2.81 vs. 3.17). In both cases, we would expect about three persons in this combination of cells. Hence, we deleted the interaction between volunteering and care provision. Thus, our final model included all main effects and two-way interactions between work and volunteering and work and care provision, but excluded the two-way interaction between volunteering and care provision. This model suggests that pathways in paid work *are* related to pathways in volunteering and pathways in care provision. However, pathways in volunteering are *not* related to pathways in care provision, given pathways in paid work. Figure 1 gives the conditional independence graph.

### Combination Sequences Different Domains—Taking Gender and Illness into Account

In a final step, we wanted to assess the role of gender and having a long-standing illness, by including them in the loglinear model alongside the three pathway domains. Table 9 gives the model comparisons. Similar as the strategy described in the previous section, we first look at how many interactions (none, two-way, three-way, four-way, and



Table 7. Cross Tabulation Clusters of Pathways in Paid Work, Volunteering, and Care Provision

Volunteering Clusters	Mostly Not Volunteering		At Least Some Volunteering		Mostly Volunteering at Least Twice a Month		Total
	Mostly Not Providing Care	At Least Some Care Provision	Mostly Not Providing Care	At Least Some Care Provision	Mostly Not Providing Care	At Least Some Care Provision	
<b>Care Provision Clusters</b>							
Work clusters	Mostly Not Providing Care	At Least Some Care Provision	Mostly Not Providing Care	At Least Some Care Provision	Mostly Not Providing Care	At Least Some Care Provision	Total
Mostly full-time employed	164	26	51	7	40	7	295
Mostly part-time self-employed	36	5	5	7	18	6	77
Mostly full-time self-employed	69	8	19	5	16	5	122
Mostly employed large part-time	61	15	12	8	8	10	114
Mostly employed small part-time	45	22	10	4	27	12	120
Employed full-time → employed large part-time	57	6	25	10	18	1	117
Employed full-time → not employed	181	43	57	16	50	19	366
Employed large part-time → not employed	102	35	35	11	36	12	231
Mostly not employed	362	130	68	26	114	45	745
<b>Total</b>	<b>1,077</b>	<b>290</b>	<b>282</b>	<b>94</b>	<b>327</b>	<b>117</b>	<b>2,187</b>

Source: ELSA Waves 1–6.

five-way) are needed to describe the observed data satisfactorily. As shown in this Table 9, the two-way interaction model is enough to describe the model.

We then deleted two-way interactions to see whether this significantly worsens the model. Looking both at the lowest deviance and the lowest AIC we deleted two-way interactions one-by-one until we could no longer delete an interaction without having a model that significantly deviated from the observed data. The final model includes interactions between work and volunteering, work and long-standing illness, long-standing illness and gender, work and gender, and gender and care provision. Figure 2 gives the conditional independence graph.

The dependence between paid work and volunteering remains. To ease interpretation, and given that this relationship was independent of care pathways, long-standing illness and gender, we looked at the two-way cross-tabulation showing the observed and expected values for each combination of work cluster and volunteering cluster. This cross-tabulation is shown in Table 10. Cells that significantly contributed to the  $\chi^2$  are shown in bold and are shaded. It was found that regardless of the paid work pathway, individuals were more likely to mostly do no volunteering than being in any of the volunteering clusters. Individuals who were mostly not employed were less likely to do “at least some volunteering.” Individuals who were in the cluster “employed full-time → employed large part-time” were more likely to do “at least some volunteering.”

The ones that are more likely to be in the cluster “mostly volunteer at least twice a month” are the ones that are in a cluster “mostly part-time self-employment” or “mostly employed small part-time,” suggesting more time and flexibility for volunteering, which would be in accordance with the role substitution hypothesis. However, individuals who are in the cluster “mostly not employed” are *not* significantly more likely to do more volunteering. Together, thus, these results do not point clearly to either the role substitution or the role extension hypothesis. Nevertheless, it does point to a possible alternative perspective of *complementarity* of paid work and volunteering, in which volunteering is associated with a moderate attachment to paid work in the form of part-time work (see the discussion section below; see also Nazroo, 2015).

Pathways in paid work and care provision were independent, conditional on gender and having a long-standing illness, unlike the initial loglinear model without gender and having a long-standing illness. This does not support either the role substitution hypothesis or the role extension hypothesis. It is consistent with individuals being unlikely to *seek* out caring; instead caring responsibilities often appear to be relatively short and unpredictable in timing (perhaps when a family member becomes ill). Nevertheless, the analysis suggests that there is a strong gender divide. As shown in Table 11, men were more likely than women to be in clusters that are characterized by working full-time and women were more likely than men to be in clusters with not being employed or working part-time. Table 12 shows that women were more likely than men to be in the cluster “at least some care provision.” As shown in the conditional independence graph, having a long-standing illness was more clearly related to the paid work pathway clusters than the care provision pathway clusters.

Together, these results do not seem to point clearly to either the role substitution hypothesis or the role extension hypothesis. It is not the case that individuals who have pathways where they spend much time in paid work are the ones that are more likely to also have pathways with care provision and/or volunteering. Similarly, the ones

**Table 8. Goodness-of-Fit Tests for Loglinear Models**

Loglinear Model	Deviance	$\chi^2$	df	p (deviance)	AIC
Only main effects	124.4	121.7	42	<.001	148.4
<b>All two-way interactions</b>	<b>27.1</b>	<b>27.9</b>	<b>16</b>	<b>.041</b>	<b>103.1</b>
Also three-way interaction	0.0	0.0	0	—	108.0
<b>Two-way interactions, excluding volunteer–care</b>	<b>33.5</b>	<b>35.8</b>	<b>18</b>	<b>.014</b>	<b>105.5</b>
Two-way interactions, excluding work–care	69.1	66.9	24	<.001	129.1
Two-way interactions, excluding work–volunteer	76.8	81.2	32	<.001	120.8

Note. AIC = Akaike information criterion.

Source. ELSA Waves 1–6.

Volunteer pathways ————— Work pathways ————— Care pathways

**Figure 1. Conditional independence graph.**

with pathways that were characterized by not being employed are not more likely to provide care or volunteer. Instead, the activity domains appear largely independent of one another. There does appear to be a clear gender divide in pathways of paid work and care provision. There is also some indicative evidence that there might be a complementarity between part-time work and volunteering, perhaps with this modest attachment to the labor market helping to facilitate volunteering without “crowding out” the time necessary to volunteer (see below; To come to these conclusions we did some robustness checks. We looked whether the random seed mattered or weighting the data influenced the results. This did not change the conclusion presented here. Adding the variables gender and having a long-standing illness led to a partially sparse table with some empty cells. Therefore, as extra robustness check we looked at different specifications of the model (specifically only controlling for gender and only controlling for gender on a subsample of individuals without an activity-limiting illness). These extra analyses provide clear evidence for a relationship between gender and the work clusters and between gender and the care provision clusters. The relationship between the work and volunteering clusters is not always found and should be regarded with more caution. Also, whether there remains a small direct relationship between care and work clusters depends on the model. If there is a remaining relationship though, this relationship is only marginally significant and the relationships between these clusters and gender are stronger. More detail about these robustness checks can be found in the Appendices.)

### Missing Data

We investigated item and wave missing data in this study to get a better understanding of the possible influence of this on our results. Most missing data in this study are due to wave absences. Note that it is not clear yet what the best way is to deal with missing data in sequences. Some researchers look, just as we did in this article, at complete cases (e.g., Fasang & Raab, 2014; Liefbroer & Elzinga, 2012). Another solution that has been proposed and used is to include ‘missing’ or ‘unknown’ as a separate state (Aisenbrey & Fasang, 2007; Bras, Liefbroer, & Elzinga, 2010). Using this method, sequences with missing data are kept in the analyses. For many purposes, multiple imputation is considered the best solution. However, standard multiple imputation methods are considered inappropriate for sequences, and

researchers have proposed (different) alternatives to multiple impute missing data (Halpin, 2012; Welch, Bartlett, & Petersen, 2014). Halpin (2012) showed three ways to deal with missing data in sequences that they can lead to different results. Because it is not clear what the best way is to deal with missing data, we decided not to impute the data, but instead have a closer look at how individuals who were excluded because of missing data differed from included respondents. It is also important to note that Halpin suggested that individuals who change states a lot are more likely to have missing data.

In the article, we described that selecting only individuals who participated in all six waves led to a reduction of 33,458 observations nested in 9,123 respondents to 15,018 observations nested in 2,503 respondents. When selecting individuals who participated in the first wave (and thus, potentially, could have participated in all six waves), and keeping all other selections, we ended up with 20,538 observations nested in 4,493 respondents.

To gain insight in selectivity in the missing data, we performed a logistic regression, explaining missing data by long-standing illness, gender, educational level, marital status, age, income, paid work status, volunteering, and care provision, all measured at Wave 1. In order to do that, individuals could not have missing data in this wave for these variables. Of the respondents participating in Wave 1, 147 (3.3%) had at least one missing value (most often on income). Of these respondents, 75 did participate in all six waves and 72 did not. We performed a logistic regression on the remaining 4,346 respondents. The results of this are shown in Table 13.

In general, the missing data does not appear to be random, but related to educational level, marital status, income, employment status, and volunteering. No significant relationship was found with gender, having a long-standing illness, age, and whether the respondent provided care. Also note that we only explain a small part of the variance in missing data.

## DISCUSSION

### Findings and Their Theoretical and Practical Implications

This article has investigated the dependency between three activity domains: paid work, volunteering, and care provision. Rather than looking at the activity domains at a specific time-point, this article has followed individuals from age 50–60 to 60–70, to see how the domains were related to one another over 10 years. The role substitution

Table 9. Goodness-of-Fit Tests for Loglinear Models—Including Gender and Having a Long-standing Illness

Loglinear Model	Deviance	$\chi^2$	df	p (deviance)	AIC
Only main effects + female × long-standing illness	907.8	914.2	201	<.001	937.8
<b>All two-way interactions</b>	<b>167.3</b>	<b>162.7</b>	<b>153</b>	<b>.203</b>	<b>293.3</b>
All three-way interactions	63.8	—	75	.818	345.8
All four-way interactions	12.0	—	24	.980	396.0
Also five-way interaction	0.0	—	0	—	432.0
Two-way interactions, excluding work–care	182.0	175.5	161	.123	292.0
Two-way interactions, excluding work–volunteer	215.8	217.8	169	.009	309.8
Two-way interactions, excluding work–female	562.9	544.2	161	<.001	672.9
Two-way interactions, excluding work–long-standing illness	337.3	325.3	161	<.001	447.3
Two-way interactions, excluding care–volunteer	173.9	173.6	155	.142	295.9
Two-way interactions, excluding care–female	207.4	201.1	154	.003	331.4
Two-way interactions, excluding care–long-standing illness	168.1	165.3	154	.206	292.1
<b>Two-way interactions, excluding volunteer–female</b>	<b>167.9</b>	<b>163.9</b>	<b>155</b>	<b>.226</b>	<b>289.9</b>
Two-way interactions excluding volunteer–long-standing illness	174.8	167.8	155	.132	296.8
Two-way interactions, excluding volunteer–female and work–care	182.7	176.6	163	.138	288.7
Two-way interactions, excluding volunteer–female and work–volunteer	216.4	218.1	171	.011	306.4
Two-way interactions, excluding volunteer–female and work–female	563.5	544.4	163	<.001	669.5
Two-way interactions, excluding volunteer–female and work–long-standing illness	337.8	326.3	163	<.001	443.8
Two-way interactions, excluding volunteer–female and care–volunteer	174.6	174.9	157	.160	292.6
Two-way interactions, excluding volunteer–female and care–female	208.0	202.3	156	.003	328.0
<b>Two-way interactions, excluding volunteer–female and care–long-standing illness</b>	<b>168.7</b>	<b>166.5</b>	<b>156</b>	<b>.230</b>	<b>288.7</b>
Two-way interactions, excluding volunteer–female and volunteer–long-standing illness	175.3	169.0	157	.151	293.3
<b>Two-way interactions, excluding volunteer–female, care–long-standing illness, and work–care</b>	<b>185.3</b>	<b>180.2</b>	<b>164</b>	<b>.122</b>	<b>289.3</b>
Two-way interactions, excluding volunteer–female, care–long-standing illness, and work–volunteer	217.3	220.3	172	.011	305.3
Two-way interactions, excluding volunteer–female, care–long-standing illness, and work–female	563.7	547.9	164	<.001	667.7
Two-way interactions, excluding volunteer–female, care–long-standing illness, and work–long-standing illness	340.3	329.0	164	<.001	444.3
Two-way interactions, excluding volunteer–female, care–long-standing illness, and care–volunteer	175.2	176.9	158	.166	291.2
Two-way interactions, excluding volunteer–female, care–long-standing illness, and care–female	208.6	203.9	157	.004	326.6
Two-way interactions, excluding volunteer–female, care–long-standing illness, and volunteer–long-standing illness	175.9	171.1	158	.156	291.9
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, and work–volunteer	233.3	228.5	180	.005	305.3
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, and work–female	605.1	571.3	172	<.001	693.1
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, and work–long-standing illness	356.9	346.8	172	<.001	444.9
<b>Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, and care–volunteer</b>	<b>191.0</b>	<b>189.2</b>	<b>166</b>	<b>.089</b>	<b>291.0</b>
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, and care–female	250.6	235.5	165	<.001	352.6
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, and volunteer–long-standing illness	192.5	185.0	166	.078	292.5

Table 9. Continued

Loglinear Model	Deviance	$\chi^2$	df	p (deviance)	AIC
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and work–volunteer	239.5	237.0	182	.003	307.5
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and work–female	611.2	582.2	174	<.001	695.2
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and work–long-standing illness	362.8	357.9	174	<.001	446.8
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and care–female	256.7	246.5	167	<.001	354.7
<b>Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and volunteer–long-standing illness</b>	<b>198.3</b>	<b>193.5</b>	<b>168</b>	<b>.055</b>	<b>294.3</b>
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, volunteer–long-standing illness, and work–volunteer	247.5	240.6	184	.001	311.5
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, volunteer–long-standing illness, and work–female	618.5	583.4	176	<.001	698.5
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, volunteer–long-standing illness, and work–long-standing illness	370.9	370.8	176	<.001	450.9
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, volunteer–long-standing illness, and care–female	263.9	251.3	169	<.001	357.9

Note. AIC = Akaike information criterion.  
Source: ELSA Waves 1–6.

perspective suggests that people take on activities (such as volunteering or caring) to replace the loss of other activities (such as paid work). The role extension perspective alternatively suggests that people that are active in one area are likely to be active in other areas as well. This article finds little support for either theory—the activity domains were largely independent from one another. For substitution theory to hold true, we would expect sequence analysis to have identified clusters of individuals beginning volunteering and/or caring in later waves; these clusters would then need to be correlated with being in a cluster of leaving paid work earlier on in the period. The analysis found neither of these expectations held true. Evidence for role extension theory would imply that individuals were in multiple clusters that involved sustained periods of significant activity. We did not find this either. Although it is not impossible to combine multiple activity domains, the data did show that being very active in all domains is very unlikely, showing that there are limits in how much an individual can or will take on.

Interestingly, while there was little evidence for substitution or extension, we suggested that there might be a *complementarity* between part-time work and volunteering (Nazroo, 2015). The results in Table 10 showed that people in the “mostly full-time employed” or “mostly full-time self-employed” cluster were *not* significantly more likely to volunteer (as extension theory might suggest), and neither were those mostly not employed (as substitution theory might imply). However, subcategories of those mostly part-time employed (self-employed part-timers and those in small part-time jobs) were significantly more likely to volunteer “mostly twice a month.” Individuals in the cluster for moving from full-time to large part-time work were also significantly over-represented in the category of doing “at least some volunteering.” Full-timers *not* volunteering may relate to time-constraints. Indeed, work commitments are considered among the top reasons to not volunteer more (Cabinet Office, 2013). This can be linked to a “role overload” perspective (Hank & Stuck, 2008), in which individuals with a high involvement with paid work will struggle to commit to other activities. The nonemployed may alternatively lack networks of co-workers to involve them in volunteering, or have a preference for not being involved in either paid work or volunteering. Part-time work may connect people with networks of potential co-volunteers, while taking up less potential volunteering time than full-time work. We find this relationship between part-time work and volunteering in most, but not all, of the robustness checks we perform (see the Appendix). Clearly, this idea of complementarity between part-time paid work and volunteering is an area in need of further empirical examination. We feel that alongside the empirical investigation of role substitution and extension theories, this article makes a theoretical contribution by showing how the idea of complementarity can be an alternative explanation for the relationship between part-time paid work and volunteering.

The relationship between pathways in paid work and care provision was mainly due to gender differences, as we would particularly expect in the context of a “modified male breadwinner” welfare state (O’Connor, Orloff, & Shaver, 1999). Men and women differed in their pathways in paid work as well as in their pathways in care provision. The importance of traditional gender roles for the association between paid work and care provision suggests that these associations may change over time, as newer generations of older individuals are less likely to adhere to the traditional male breadwinner model. However, an American study suggested that care provision increases traditional

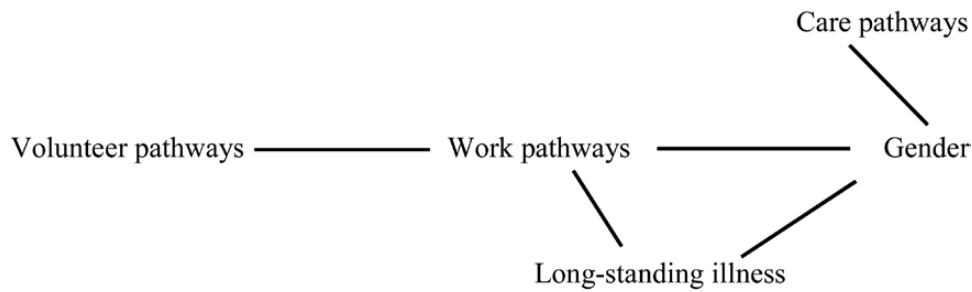


Figure 2. Conditional independence graph—including gender and having a long-standing illness.

Table 10. Clusters Pathways Paid Work by Clusters Pathways Volunteering

	Mostly Not Volunteering	At Least Some Volunteering	Mostly Volunteering at Least Twice a Month	Row Total
Mostly full-time employed				
Observed values	190	58	47	295
Expected values	184.39	50.72	59.89	
Mostly part-time self-employed				
Observed values	41	12	<b>24</b>	77
Expected values	48.13	13.24	<b>15.63</b>	
Mostly full-time self-employed				
Observed values	77	24	21	122
Expected values	76.26	20.98	24.77	
Mostly employed large part-time				
Observed values	76	20	18	114
Expected values	71.26	19.60	23.14	
Mostly employed small part-time				
Observed values	67	14	<b>39</b>	120
Expected values	75.01	20.63	<b>24.36</b>	
Employed full-time → employed large part-time				
Observed values	63	<b>35</b>	19	117
Expected values	73.13	<b>20.12</b>	23.75	
Employed full-time → not employed				
Observed values	224	73	69	366
Expected values	228.77	62.93	74.31	
Employed large part-time → not employed				
Observed values	137	46	48	231
Expected values	144.39	39.72	46.90	
Mostly not employed				
Observed values	492	<b>94</b>	159	745
Expected values	465.67	<b>128.08</b>	151.25	
Column total	1,367	376	444	2,187

Note. Cross-tabulation of clusters in paid work and volunteering, showing both the observed values and the expected values. Cells that significantly contribute to the  $\chi^2$  are shown in bold and are shaded (standardized residual of  $|1.960|$  or above).

Source. ELSA Waves 1–6.

gender role behavior in later life, with men responding to caregiving responsibilities by delaying retirement (taking care of the extra financial burden) while women are more likely to stay home (Dentinger & Clarkberg, 2002).

In a qualitative study in England, Arksey and Glendinning (2008) showed that flexibility at work was necessary for care provision. The association between pathways in paid work and care provision may therefore in the future be less dependent on gender and more direct.

Many carers do want to stay in paid work if possible though, for both financial reasons and for reasons of self-worth (Arksey & Glendinning, 2008; Dentinger & Clarkberg, 2002), suggesting it is about finding a job that allows the combination between paid work and active care provision rather than between working at all and care provision. Kalokerinos, Von Hippel, and Henry (2015) showed for their Australian sample that many older employees are interested in end of career flexibility (bridge employment or phased retirement), which

**Table 11. Percentage of Respondents in Work Cluster by Gender and Having a Long-Standing Illness**

	Female		Male	
	No Illness	Illness	No Illness	Illness
Mostly full-time employed	6.66	3.34	26.20	12.55
Mostly part-time self-employed	4.36	1.82	3.61	2.51
Mostly full-time self-employed	2.53	0.30	10.83	7.53
Mostly employed large part-time	9.18	3.95	2.41	1.26
Mostly employed small part-time	9.53	7.60	1.20	1.26
Employed full-time → employed large part-time	5.51	3.04	6.68	3.77
Employed full-time → not employed	13.32	8.51	25.53	12.97
Employed large part-time → not employed	16.42	12.77	4.41	5.44
Mostly not employed	32.49	58.66	19.12	52.72
Total	100	100	100	100

Note. Total percentages may be slightly more or less than 100% due to rounding.  
Source. ELSA Waves 1–6.

**Table 12. Percentage of Respondents in Care Cluster by Gender and Having a Long-Standing Illness**

	Female		Male	
	No Illness	Illness	No Illness	Illness
Mostly not providing care	70.61	70.52	86.63	79.92
At least some care provision	29.39	29.48	13.37	20.08
Total	100	100	100	100

Note. Total percentages may be slightly more or less than 100% due to rounding.  
Source. ELSA Waves 1–6.

may be one way to achieve this flexibility for combining paid work with care provision. Moen, Kojola, Kelly, and Karakaya (2016) showed for an information technology (IT) division in the United States how such flexibility and organizational support could also be related to an expectation to retire later (but see Earl & Taylor, 2015 on possible negative consequences next to such positive consequences of working flexibly based on Australian research).

It is important to note that there is something inherently different between the various activity domains. Where both care giving and paid work are likely to be considered obligatory activities, volunteering is more discretionary (Burr et al., 2007; Choi et al., 2007). Hence, volunteering may be combined with paid work when there is opportunity to do so. The necessity to provide care is likely to come up unexpectedly and individuals may experience less control over whether they will provide care and when they will do so. This may explain why care and work were not directly related (regardless of the working pathway, individuals take up care when necessary) but volunteering and work were directly related (when having enough flexibility to take up volunteering one is more likely to do so).

Regarding active aging, these results suggest that choices to participate more in an activity domain do not necessarily come at the cost of other activity domains. However, it is likely that there are relationships at the individual level (a person needing to take up full-time care for an ill spouse may work less for a period) but that these do not generalize to large overall relationships between the domains. There are likely many influences occurring simultaneously and these influences may work

in different directions. These (possible opposing) influences include financial trade-offs, time involvement, role overload, preferences, emotional bond, and so on (Dentinger & Clarkberg, 2002). More insight is needed on these complicated circumstances for individuals.

Future research, as noted above, should investigate the complementarity between activities. In particular, the relationship between part-time/flexible work and volunteering needs further empirical study. The practical implications of this study, for policy makers, employers, and individuals, relates to the role of part-time and flexible work as a means of enabling volunteering (and caring) among older people. There is a wealth of evidence that part-time work and/or positive flexibility is popular among older people, and yet it is often not available (Lain & Vickerstaff, 2015). If individuals were able to reduce their hours of employment on a larger scale, for example, increased numbers might remain in work longer and also volunteer. Further research is, however, needed on this to increase our understanding of the relationship between working time and volunteering among older workers.

### Limitations and Avenues for Future Research

As with all research, there are limitations in this study that open up avenues for future research. Due to sample-size limitations we were constrained in the number of confounding variables that we could include; we focused on two factors that previous research indicates are of great importance: gender and long-standing illness. Future research will want to make use of other socioeconomic variables, including education, income, marital status, and partner's characteristics. It is, for example, possible that while activity substitution is not common in general it is more frequent among sub-groups, such as highly educated professionals. Consistent with this, Cook (2015) found that substitution appeared fairly common in her sample of disproportionately highly educated Canadian volunteers.

It should also be recognized that this analysis relates to a specific time and place, England in the 2000s/2010s, and the results might vary over-time and in different contexts. The United Kingdom/England has been described as modified male breadwinner society in which part-time employment rates among women are relatively high (O'Connor et al., 1999; see also ONS, 2013). This may differently influence female work, volunteering or caring patterns relative to countries such as the United States where part-time work is less common. Likewise, employment rates of older people are lower in the United Kingdom

**Table 13. Predicting Whether Someone Missed at Least One Wave of the Study**

	Estimate	<i>p</i>
Intercept	0.30	.018
Female	-0.00	.965
Has no long-standing illness (ref)		
Has long-standing illness	-0.06	.482
Illness limits activities	-0.07	.380
Age-group 50–53 (ref)		
Age-group 54–56	-0.07	.388
Age-group 57–60	-0.11	.151
Low educational level (ref)		
Middle educational level	-0.37	<.001
High educational level	-0.58	<.001
Married	0.25	.001
Income quartile 1 (ref)		
Income quartile 2	-0.15	.098
Income quartile 3	-0.25	.009
Income quartile 4	-0.25	.014
Not employed (ref)		
Employed small part-time	-0.39	.009
Employed large part-time	-0.15	.161
Employed full-time	-0.07	.418
Self-employed small part-time	-0.26	.335
Self-employed large part-time	-0.44	.058
Self-employed full-time	0.13	.315
Care provision	-0.01	.887
Never volunteering (ref)		
Sometimes volunteering	-0.26	.005
Often volunteering	-0.19	.048
Pseudo <i>R</i> <sup>2</sup> s		
Hosmer and Lemeshow <i>R</i> <sup>2</sup>	0.021	
Cox and Snell <i>R</i> <sup>2</sup>	0.029	
Nagelkerke <i>R</i> <sup>2</sup>	0.039	

Note. Results based on logistic regression.  
Source. ELSA Waves 1–6.

than in the United States (Lain, 2016), reducing the relative need for individuals in England to combine paid work with volunteering caring. This may change over time, with increasing employment of older people in England. Individuals with low incomes may be particularly affected by the need to combine caring and paid work.

An additional limitation is relevant to most survey-based research on volunteering, that under-reporting of volunteering can occur unless individuals are prompted in detail (Rooney, Steinberg, & Schervish, 2004). Relatedly, it is important to note that the different domains were asked in different time frames (work: usually in a week, volunteering: in a year, care: last week). This may have an impact on the results. Finally, missing data analyses indicated that missing data were not random. Because lower educated and lower income individuals were more likely to have missed at least one wave it may be that we have a better view on individuals who were comparatively well off. Note, however, that it is not clear yet what the best way is to deal with missing data in sequences.

We focused on three important activity domains, but these are certainly not all domains individuals can be active in. Researchers have

given warnings not to focus exclusively on physically active tasks, as the older-old and the dependent older adults may not be able to perform these tasks despite trying to age actively (Boudiny, 2013). Previous research has mentioned the danger of an individualized and active image of older individuals for individuals who are not able to fit this image. Individuals who cannot fit this image may feel they are a burden and that they lack a sense of purpose in life (Stephens et al., 2015). Future research may broaden the scope and look at more ways in which individuals can age actively. This might, for example, include relatively sedentary activities such as hobbies that are not physically demanding. More qualitative work investigating the complexity of factors that individuals face in later careers would also give us a more fine-grained picture of late careers.

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### APPENDIX A

PAM clustering has a random component to it. To check the stability of our cluster solutions, we repeated the analyses five times using different seeds. To check whether we ended up with the same clusters, we looked for each of the activity domains whether the medoids and the  $n$  per cluster were the same as the version presented in the article. This was indeed the case for each of our activity domains.

### APPENDIX B

In this appendix, we see whether it matters if we weight the data. Although preferable we would have used a longitudinal weight, we

cannot use the longitudinal weight provided by ELSA because we kept the people who died over the observation period in our analyses. Because all of the respondents included in this study participated in the first wave, we use the first wave weight instead. Although this is not the ideal weight it should provide us with some information about the impact of weighting on our analyses.

For each of the clusters, the medoids are the same, but the  $n$  per cluster is somewhat different. Some clusters seem more stable than others, but the same characteristics seem to make up the cluster. We then performed the loglinear analyses on the weighted clusters. We again excluded the respondents who ended up in at least one activity domain cluster as “died in observation period” (121 respondents).

For the basic model, we ended up with the same final model. While in the version presented in the main article, this model was marginally significant, on weighted data it is not significant. This provides further proof that this is indeed the right model.

We then continued with the full model, including gender and having a long-standing illness. As shown in Table B5, we ended up with the same model as presented in the main article, showing that the differences in clusters did not lead to a different final model. Hence, the main conclusions presented in our article stand. For this appendix, we used two additional R packages: `plyr` (Wickham, 2011) and `WeightedCluster` (Studer, 2013).

**Table B1. Work Pathway Clusters**

Medoids Unweighted Cluster	$n$ in Unweighted Cluster	Medoids Weighted Cluster	$n$ in Weighted Cluster
EFT,6	297	EFT,6	297
EFT,4 – N,2	121	EFT,4 – N,2	121
SLPT,2-SSPT,1-SLPT,1-SSPT,1-N,1	77	SLPT,2-SSPT,1-SLPT,1-SSPT,1-N,1	76
EFT,3-N,3	253	EFT,3-N,3	307
ELPT,3-N,3	235	ELPT,3-N,3	159
SFT,6	127	SFT,6	120
N,6	761	N,6	790
EFT,3-ELPT,2-N,1	118	EFT,3-ELPT,2-N,1	143
N,1-D,5	108	N,1-D,5	108
ELPT,5-N,1	114	ELPT,5-N,1	106
ESPT,4-N,2	120	ESPT,4-N,2	104

Source. ELSA Waves 1–6.

**Table B2. Volunteering Pathway Clusters**

Medoids Unweighted Cluster	$n$ in Unweighted Cluster	Medoids Weighted Cluster	$n$ in Weighted Cluster
N,6	1,367	N,6	1,524
T,1-N,1-T,4	447	T,1-N,1-T,4	403
O,1-N,1-O,2-N,1-O,1	378	O,1-N,1-O,2-N,1-O,1	288
N,2-D,4	139	N,2-D,4	116

Source. ELSA Waves 1–6.

**Table B3. Care Pathway Clusters**

Medoids Unweighted Cluster	<i>n</i> in Unweighted Cluster	Medoids Weighted Cluster	<i>n</i> in Weighted Cluster
N,6	1,686	N,6	1,845
C,1-N,2-C,1-N,1-C,1	505	C,1-N,2-C,1-N,1-C,1	369
N,2-D,4	140	N,2-D,4	117

Source. ELSA Waves 1–6.

**Table B4. Goodness-of-Fit Tests for Loglinear Models—Weighted Clusters**

Loglinear Model	Deviance	$\chi^2$	<i>df</i>	<i>p</i> (deviance)	AIC
Only main effects	108.4	107.4	42	<.001	132.4
<b>All two-way interactions</b>	<b>16.5</b>	<b>17.5</b>	<b>16</b>	<b>.420</b>	<b>92.5</b>
Also three-way interaction	0	0	0	—	108.0
<b>Two-way interactions, excluding volunteer–care</b>	<b>22.0</b>	<b>23.4</b>	<b>18</b>	<b>.232</b>	<b>94.0</b>
Two-way interactions, excluding work–care	57.7	55.4	24	<.001	117.7
Two-way interactions, excluding work–volunteer	60.3	63.6	32	.002	104.3
Two-way interactions, excluding volunteer–care and work–care	63.9	61.8	26	<.001	119.9
Two-way interactions, excluding volunteer–care and work–volunteer	66.5	69.6	34	<.001	106.5

Note. AIC = Akaike information criterion.

Source. ELSA Waves 1–6.

**Table B5. Goodness-of-Fit Tests for Loglinear Models—Including Gender and Having a Long-standing Illness—Weighted Clusters**

Loglinear Model	Deviance	$\chi^2$	df	p (deviance)	AIC
Only main effects + female × long-standing illness	901.4	885.6	201	<.001	931.4
<b>All two-way interactions</b>	<b>164.8</b>	<b>164.7</b>	<b>153</b>	<b>.242</b>	<b>290.8</b>
All three-way interactions	62.6	—	75	.845	344.6
All four-way interactions	9.6	—	24	.996	393.6
Also five-way interaction	0	—	0	—	432.0
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Two-way interactions, excluding work-care	180.0	174.2	161	.146	290.0
Two-way interactions, excluding work-volunteer	212.0	221.4	169	.014	306.0
Two-way interactions, excluding work-female	574.7	541.3	161	<.001	684.7
Two-way interactions, excluding work-long-standing illness	337.8	324.9	161	<.001	447.8
Two-way interactions, excluding care-volunteer	170.8	172.5	155	.182	292.8
Two-way interactions, excluding care-female	193.8	191.2	154	.016	317.8
Two-way interactions, excluding care-long-standing illness	165.7	168.5	154	.245	289.7
<b>Two-way interactions, excluding volunteer-female</b>	<b>166.1</b>	<b>164.8</b>	<b>155</b>	<b>.256</b>	<b>288.1</b>
Two-way interactions, excluding volunteer-long-standing illness	175.1	172.2	155	.129	297.1
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Two-way interactions, excluding volunteer-female and work-care	181.4	173.8	163	.154	287.4
Two-way interactions, excluding volunteer-female and work-volunteer	212.0	221.2	171	.018	302.0
Two-way interactions, excluding volunteer-female and work-female	574.8	541.2	163	<.001	680.8
Two-way interactions, excluding volunteer-female and work-long-standing illness	339.0	325.2	163	<.001	445.0
Two-way interactions, excluding volunteer-female and care-volunteer	171.9	172.6	157	.197	289.9
Two-way interactions, excluding volunteer-female and care-female	194.8	191.8	156	.019	314.8
<b>Two-way interactions, excluding volunteer-female and care-long-standing illness</b>	<b>167.0</b>	<b>168.4</b>	<b>156</b>	<b>.259</b>	<b>287.0</b>
Two-way interactions, excluding volunteer-female and volunteer-long-standing illness	176.2	172.0	157	.140	294.2
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<b>Two-way interactions, excluding volunteer-female, care-long-standing illness, and work-care</b>	<b>183.7</b>	<b>178.4</b>	<b>164</b>	<b>.139</b>	<b>287.7</b>
Two-way interactions, excluding volunteer-female, care-long-standing illness, and work-volunteer	212.9	225.1	172	.019	300.9
Two-way interactions, excluding volunteer-female, care-long-standing illness, and work-female	575.1	546.1	164	<.001	679.1
Two-way interactions, excluding volunteer-female, care-long-standing illness, and work-long-standing illness	341.3	328.3	164	<.001	445.3
Two-way interactions, excluding volunteer-female, care-long-standing illness, and care-volunteer	172.5	175.8	158	.203	288.5
Two-way interactions, excluding volunteer-female, care-long-standing illness, and care-female	195.4	194.3	157	.020	313.4
Two-way interactions, excluding volunteer-female, care-long-standing illness, and volunteer-long-standing illness	176.8	175.1	158	.145	292.8
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Two-way interactions, excluding volunteer-female, care-long-standing illness, work-care, and work-volunteer	229.9	231.8	180	.007	301.9
Two-way interactions, excluding volunteer-female, care-long-standing illness, work-care, and work-female	615.9	568.2	172	<.001	703.9
Two-way interactions, excluding volunteer-female, care-long-standing illness, work-care, and work-long-standing illness	357.9	339.6	172	<.001	445.9
<b>Two-way interactions, excluding volunteer-female, care-long-standing illness, work-care, and care-volunteer</b>	<b>189.4</b>	<b>184.6</b>	<b>166</b>	<b>.103</b>	<b>289.4</b>
Two-way interactions, excluding volunteer-female, care-long-standing illness, work-care, and care-female	236.6	223.3	165	<.001	338.6
Two-way interactions, excluding volunteer-female, care-long-standing illness, work-care, and volunteer-long-standing illness	193.5	185.3	166	.071	293.5

Table B5. Continued

Loglinear Model	Deviance	$\chi^2$	df	p (deviance)	AIC
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and work–volunteer	236.2	237.6	182	.004	304.2
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and work–female	622.2	577.4	174	<.001	706.2
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and work–long-standing illness	363.7	347.4	174	<.001	447.7
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and care–female	242.8	232.2	167	<.001	340.8
<b>Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, and volunteer–long-standing illness</b>	<b>199.2</b>	<b>190.9</b>	<b>168</b>	<b>.050</b>	<b>295.2</b>
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, volunteer–long-standing illness, and work–volunteer	243.7	241.5	184	.002	307.7
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, volunteer–long-standing illness, and work–female	632.0	584.4	176	<.001	712.0
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, volunteer–long-standing illness, and work–long-standing illness	371.3	357.6	176	<.001	451.3
Two-way interactions, excluding volunteer–female, care–long-standing illness, work–care, care–volunteer, volunteer–long-standing illness, and care–female	252.7	240.0	169	<.001	346.7

Notz. AIC = Akaike information criterion.  
Source: ELSA Waves 1–6.

## APPENDIX C

In this appendix, we investigate what the models look like if we only include gender, rather than both gender and having a long-standing illness. When including both gender and having a long-standing illness about 11% of the margins is below 5, this is only about 1% when only including gender and still less than 4% if we include gender and only look at individuals without a activity limiting illness. Agresti (2013) suggests that when the fitted values are small “but the sufficient marginal totals for  $M_i$  are mostly in at least the range 5–10, the chi-squared approximation is usually adequate for model comparison statistics” (pp. 400–401). Even for the model presented in the article, about 89% of the margins are at least 5. Because there are far less margins below 5 in the model with only gender and to gain further insight in the relationships presented in the article, we looked at what happened when we only controlled for gender and for gender on the subsample of individuals without an activity limiting illness.

Taking the final model presented in the article as starting point, it is shown that when we are only controlling for gender, more relationships between the pathways exist. Where in the presented model the volunteering cluster was only related to the work cluster, when we only control for gender it is related to care as well. This relationship is marginally significant [ $\Delta(2) = 6.50, p = .039$ ]. Also, there is a remaining

marginally significant relationship between the work cluster and the care cluster [ $\Delta(8) = 16.56, p = .035$ ]. The extra pathways found in this model are, thus, not very strong. The relationships presented in the article appear to be more pronounced: between the work and volunteering pathway [ $\Delta(16) = 49.71, p < .001$ ], between gender and the work pathway [ $\Delta(8) = 396.19, p < .001$ ], and between gender and the care pathway [ $\Delta(1) = 39.90, p < .001$ ].

If we look instead at individuals who do not have an activity limiting illness, the relationship between the work cluster and the care cluster disappears again. Thus, evidence seems to suggest that at least most of this relationship is due to differences between gender and if there is a remaining direct relationship between the work and care clusters this relationship is only marginally significant. The relationship between care and volunteering remained but is still not very pronounced [ $\Delta(2) = 7.61, p = .022$ ]. The relationship between volunteering and work disappeared and should thus be interpreted with caution in the model presented in the main article. The relationships between gender and work [ $\Delta(8) = 358.2, p < .001$ ] and gender and care [ $\Delta(1) = 62.2, p < .001$ ] remain.

To conclude, at least part of the relationship between the care and work clusters appears to be due to gender. Remaining relationships seem to be weaker and are not found in all specifications of the model.

Table C1. Loglinear Models—Including Gender

Loglinear Model	Deviance	df	p	AIC
Only main effects	640.7	95	<.001	666.7
<b>All two-way interactions</b>	<b>80.9</b>	<b>58</b>	<b>.025</b>	<b>180.9</b>
All three-way interactions	19.1	16	.265	203.1
Also four-way interaction	0	0	—	216.0
All two-way interactions, excluding work–care	97.4	66	.007	181.4
All two-way interactions, excluding work–volunteering	130.7	74	<.001	198.7
All two-way interactions, excluding work–female	477.1	66	<.001	561.1
All two-way interactions, excluding care–volunteering	87.3	60	.012	183.3
All two-way interactions, excluding care–female	120.7	59	<.001	218.7
<b>All two-way interactions, excluding volunteering–female</b>	<b>81.5</b>	<b>60</b>	<b>.034</b>	<b>177.5</b>
All two-way interactions, excluding volunteer–female and work–care	98.0	68	.010	178.0
All two-way interactions, excluding volunteer–female and work–volunteering	131.2	76	<.001	195.2
All two-way interactions, excluding volunteer–female and work–female	477.7	68	<.001	557.7
All two-way interactions, excluding volunteer–female and care–volunteering	88.0	62	.017	180.0
All two-way interactions, excluding volunteer–female and care–female	121.4	61	<.001	215.4

Note. AIC = Akaike information criterion.

Source. ELSA Waves 1–6.

Table C2. Loglinear Models—Including Gender if Respondent Does Not Have Long-Standing Illness

Loglinear Model	Deviance	df	p	AIC
Only main effects	552.3	95	<.001	578.3
<b>All two-way interactions</b>	<b>80.4</b>	<b>58</b>	<b>.028</b>	<b>180.4</b>
All three-way interactions	19.2	16	.259	203.2
Also four-way interaction	0	0	—	216.0
All two-way interactions, excluding work–care	95.4	66	.010	179.4
<b>All two-way interactions, excluding work–volunteering</b>	<b>109.3</b>	<b>74</b>	<b>.005</b>	<b>177.3</b>
All two-way interactions, excluding work–female	414.4	66	<.001	498.4
All two-way interactions, excluding care–volunteering	87.6	60	.012	183.6
All two-way interactions, excluding care–female	116.6	59	<.001	214.6
All two-way interactions, excluding volunteering–female	82.0	60	.031	178.0
All two-way interactions, excluding work–volunteering and work–care	124.1	82	.002	176.1
All two-way interactions, excluding work–volunteering and work–female	441.9	82	<.001	493.9
All two-way interactions, excluding work–volunteering and care–volunteering	116.3	76	.002	180.3
All two-way interactions, excluding work–volunteering and care–female	145.6	75	<.001	211.6
<b>All two-way interactions, excluding work–volunteering and volunteering–female</b>	<b>109.5</b>	<b>76</b>	<b>.007</b>	<b>173.5</b>
<b>All two-way interactions, excluding work–volunteering, volunteering–female, and work–care</b>	<b>124.2</b>	<b>84</b>	<b>.003</b>	<b>172.2</b>
All two-way interactions, excluding work–volunteering, volunteering–female, and work–female	442.1	84	<.001	490.1
All two-way interactions, excluding work–volunteering, volunteering–female, and care–volunteering	117.1	78	.003	177.1
All two-way interactions, excluding work–volunteering, volunteering–female, and care–female	146.1	77	<.001	208.1
All two-way interactions, excluding work–volunteering, volunteering–female, work–care, and work–female	482.4	92	<.001	514.4
All two-way interactions, excluding work–volunteering, volunteering–female, work–care, and care–volunteering	131.8	86	.001	175.8
All two-way interactions, excluding work–volunteering, volunteering–female, work–care, and care–female	186.5	85	<.001	232.5

Note. AIC = Akaike information criterion.

Source. ELISA Waves 1–6.