Introduction

Numerous studies have shown the substantial contributions made by older people to providing services for family members and demonstrated that in a wide range of populations studied, the net balance of such time transfers tends to be from older to younger generations, at least until the age of 75 or 80 (Attias- Donfut, Ogg and Wolff 2005) Grundy 2005; Kunemand and Motel 2000, Kronebusch, K. and Schlesinger, M. 1994, Soldo and Hill). Older people are also active in volunteer and community groups. Formal volunteering is most usual among mid-life adults, but older volunteers tend to commit more hours (Van Willigen 2000). Additionally from choice or necessity, many older people continue to engage in paid work. Recognition of the value of these activities, lead to the development of the concept of 'productive ageing', in part as a counterpoint to dominant depictions of older people as dependent and 'inactive' and the narrow view of work as paid labour (Butler and Gleason 1985; Schulz 2001). Productive ageing, in a commonly used definition, refers to "any activity by an older individual that produces goods or services, or the capacity to produce them, whether they are paid for them or not" (Caro, Bass and Chen 1993, p 6).

Studies explicitly focussed on productive ageing have produced rather disparate results. A 1991 Commonwealth Fund Survey conducted in the USA, for example, collected data on four forms of activity; employment; volunteering for organisations; help to children and grandchildren; and caregiving for sick and disabled friends, relatives and neighbours (Taylor, Bass and Bennett, 1992). Results showed that nearly two thirds of 55-64 year olds and one third of 65-74 year olds spent 20 or more hours per week in these forms of activity (Bass and Caro 1996). Wahrendorf et al's analysis of SHARE data, however, found much lower (although variable) levels of participation in three forms of social productivity among Europeans aged 50 and over with between 5 and 17% undertaking voluntary work, providing care for a disabled relative or friend, or providing help to relatives friends or neighbours.

Apart from benefits to society as a whole, it has been argued that the sense of usefulness and competence that older people may derive from productive activity has benefits for their emotional well-being and physical and mental health (Havighurst and House 1991). From a research perspective, untangling the direction of causation between productive activity and health status is difficult, even using longitudinal data, especially as the association may be bi-directional. Nevertheless, the available evidence from studies focussed on specific forms of activity and those considering overall number and range of activities and roles generally indicates benefits for mental and physical health. Adelman (1994a and b) for example, found positive associations between multiple roles and the physical and mental health of older Americans and other studies, also predominantly from North America, have shown positive associations between overall levels of productive activity and indicators of well-being and health, including depression, life satisfaction, functional and cognitive status and mortality (Glass et al 1999; Mennec 2003; Morrow-Hintell et al 2003). Less is know about possible benefits or otherwise of providing help to relatives. The literature generally suggests negative effects of intensive caregiving, although this may partly reflect the adverse effects of having a close relative

who needs care. Looking after grandchildren, however, has been associated in several studies with better health at follow up. Research has shown a strong reciprocal element in intergenerational family exchanges, either concurrent or over the lifecourse (Antonucci et al; Kunemand and Rein 1999; Grundy 2005) which suggests that older people may also derive future benefits from helping family members if this increases their chances of receiving help themselves should they need it.

Most of the studies referred to above have been based on high-income North American and European populations. In low and middle income countries the lesser availability of retirement pensions and other social security systems mean that labour force participation rates are higher in older age groups, at least among men. Additionally the generally greater extent of kin interaction, including co-residence, and lesser extent of state alternatives would suggest that providing help to family would occupy more people for more of the time than in, for example, Northern Europe. The different context of productive activity in older age groups may also mean that implications for health and well-being are different. Understanding more about patterns of productive activity among older people in mid and low income countries, and their implications for health and well-being, is an important topic for research.

In this paper we address use data from a 2005 sample of 2,000 66-68 year old residents of Santiago de Chile to investigate patterns of productive activity and factors associated with these, including health status. We also analyse associations between productive activity and indicators of well-being. The activity patterns and health status of the older population is especially important in Chile, and many other Latin American countries, because a process of rapid demographic transition in the second half of the twentieth century is now resulting in large, and rapid, growth in the absolute and relative size of the older population (Palloni et al 2006). Research on the activities of older people, particularly those in early old age, are also of particular relevance to Chile because of ongoing debates about the funding of pensions.
The aims of this paper are firstly to investigate the extent of productive activity among Chileans aged 66-68 old Chileans resident in low or middle income areas of Santiago; secondly to analyse socio-demographic and socio-economic differentials in participation in four types of productive activity and thirdly to analyze of associations between productive activity and indicators of mental health and well-being.

Data and methods

We use data collected in 2005 from 2,000 people aged 66-68 resident in low or middle income areas of Santiago, Chile. The sample comprised participants in a cluster randomised controlled trial primarily designed to investigate the cost effectiveness of a nutrition supplement and exercise programme on pneumonia incidence, walking capacity and body mass index. Full details of the study methodology have been reported elsewhere (Dangour et al 2007).
Participants were interviewed at baseline in their local community centre or at home if unable to visit the community centre. Together with information on socio-economic and demographic characteristics, including numbers of living parents and parents in law, children and children in law and grandchildren, detailed information on health related

behaviours and health status was collected. Information was also collected on participation in various paid and unpaid activities, including provision of help to family members and participation in community and voluntary work. Follow up interviews and assessments were undertaken at 12 and 24 months. Analyses completed to date are from the baseline assessment, but the final paper will include analyses of follow up data (final data available early 2009).

Measures

Outcome variables

The indicators of productive ageing used relate to paid and voluntary work, time spent helping family members and membership of community organisations. Paid work (employed) was defined as being employed or working for pay in a family business. Paid work (self-employed) included making products for sale; selling products, or undertaking domestic work, childcare, repair work or anything similar for pay. In the analysis we grouped these two forms of paid work together. Unpaid work included work without pay in a family business or voluntary work for a community, charitable, educational or similar organisation. We initially combined voluntary work for an organisation and unpaid work in a family business but found that characteristics of the groups participating in these activities was rather different, results are therefore shown just for participation in a voluntary group. Questions about all these activities related to the past week.

The questions about help to family asked whether respondents 'regularly helped' and in addition about approximate hours per week spent helping (less than 2; 2-4 or 4 or more). These were asked separately for three categories of living relative; parents or parents in law; children or children in law, and grandchildren. Types of help provided were distinguished with separate questions about provision of money; gifts of food, clothing or similar; provision of services such as looking after someone, domestic tasks or transport and, in the case of parent and parents in law, provision of personal care. In this analysis we are concerned with provision of help, rather than of money or gifts, so only the provision of services is included in our outcome measure. We derived two main indicators of help to children and grandchildren identifying those who provided at least four hours per week of help to either (2-4 hours to both children and grandchildren; four or more to either children or grandchildren or four or more to both children and grandchildren) and those providing 8 or more hours of help (four or more to both children and grandchildren). As less than a quarter of the sample had living parents or parents in law, we did not include help to parents among the types of productive activity analysed, although we present some descriptive statistics on this activity. Finally we also included participation in a community group, club or organisation.

In the second part of the analysis we examined associations between productive activities, as defined above, and indicators of psychosocial health and well-being. These were a dichotomised indicator of depressive symptoms based on score on the Geriatric Depression Scale and an indicator of well-being based on responses to four items from Neugarten's life satisfaction scale. Analysis completed has investigated these associations cross sectionally using baseline data; analysis in progress will include examination of associations with these outcomes at 12 and 24 months post baseline.

Co-variates

Co-variates included socio-economic status, health status, and perceived support.

Socio-demographic measures constituted gender, household type and a combined count of number of living children and grandchildren. Indicators of socio-economic status and resources included years of education (grouped 0-5, 6-8, 9+); personal income and a household durable score. We also derived a measure of combined income of household members other than the respondent (equivalised by household size) which we used in analyses of differentials in participation in paid work (as clearly personal income and working for pay are endogenous). We derived two measures of health and functioning, the first based on a five category question in which respondents were asked whether they considered their health to be excellent, very good, good, pair or bad. This was dichotomised into excellent/very good/good versus fair/bad. The second was based on responses to 15 questions about limitations in specific areas of function or mobility including reaching, lifting, stair climbing, walking and running (see appendix for full description).

Finally in analyses of participation in voluntary work, community organisations and provision of help to family we included an indicator of social support, because of the theoretical and empirically demonstrated relevance of reciprocity in influencing participation in these forms of activity. This was based on a question asking 'if you need any material help, company or advice, do you have someone to whom you can turn?

Results

Table 1 shows the proportion of sample members engaged in the productive activities of interest. Half the men and a quarter of women in the sample were engaged in some form of paid work and about 15% in unpaid work As expected, women were more likely than men to provide 8 or more hours per week of help to children or grandchildren. Overall three-quarters of sample members were engaged in at least one of the four types of productive activity investigated and a third were engaged in more than one.

Participation in paid and unpaid work

Results from fully adjusted logistic regression models showed that men living alone or just with a spouse were more likely to be in paid work than those living in households including other relatives. Highly educated men were less likely to be working than those in the low education group. Among women those with the best functional health status were most likely to be in paid work and among both men and women paid work was negatively associated with the combined equivalised income of other household members.

Modelling of differentials in participation in voluntary work showed that for women low education was associated with higher odds of participation (1.807, 1.212-2.692 $P<0.01$) as was feeling young or middle aged rather than old or very old (1.452, 1.108-1.902 $P<0.01$). No associations were found with household composition or either personal or other household members' income. Among men there were indications of similar associations, but no model provided an adequate fit to the data.

Help to children and grandchildren (8 hours per week or more)

For women this was strongly associated with household composition suggesting that much of this help takes place within a household context. Number of children and grandchildren was also associated with provision of help, as would be expected. Additionally those with the best level of functional health were most likely to provide assistance and there was a positive association between household durable score and

provision of help. Among men, only the association between household composition and provision of help was statistically significant.

Participation in community groups

Results for women showed positive associations between participation and low education and having some one to turn to and a negative association with personal income. Among men the only significant association was between better self- rated health and community group participation.

Associations between productive activities, depression and life satisfaction

We first examined associations between each type of productive activity and the indicators of depression and life satisfaction. Results showed no associations between any of the four forms of productive activity considered separately and the depression indicator for either men or women. However there was some indication that number of activities undertaken was negatively associated with depression. For both men and women undertaking voluntary work was positively associated with life satisfaction measure; for women there was also a positive association between community group participation and life satisfaction. Providing help to children and grandchildren or engaging in paid work were not, however, associated with this.

Further work

In the final analysis to be completed late 2008/early 2009 we will (1) examine these associations using data from the later follow-up data collections and (2) investigate whether change in levels of productive activity between baseline and the end of the trial at 24 months was associated with the intervention (physical exercise and or nutritional supplementation).

Discussion

Three quarters of the older Chileans in this study were engaged in one or more forms of productive activity, for men paid work predominated and for women help to family and community group participation. The results suggest an impetus from necessity as well as choice. Thus participation in paid work was among men highest for those with low levels of education (least likely to have an adequate pension) and for both men and women was negatively associated with the income of other household members. This is rather different from the pattern in many high income countries where in general the most educated are now (although not in the past) most likely to continue to work into their late sixties. The study, however, was of older people resident in low and middle income areas and so excludes the most advantaged section of the population. Help to family among women was strongly associated with living arrangements as well as with number of relatives, again suggesting a partially needs driven pathway to provision of help. There were some indications of positive associations between productive activity and indicators of well-being, but in this cross sectional analysis the direction of causation cannot be ascertained. Results from the follow up data will provide more insight into these associations. Participation in various forms of productive activity was positively associated with indicators of health suggesting the potential of health improvement as a means of increasing productive activity. Results from the randomised controlled trial will allow us to see whether the interventions being tested had positive effects on productive activity.

This study provides new information on correlates and consequences of productive activity among older people in a middle income country. The results also suggest a number of challenges for policy makers who need to find ways of ensuring that older people have adequate incomes without reducing incentives to productive activity (especially important if productive activity is conducive to well-being). The reforms of the Chilean pension system introduced in the 1980s received much acclaim from institutions such as the World Bank partly because in theory they would provide adequate incomes without providing disincentives to continued work. However, the rather limited coverage of the scheme may have made this ambition difficult to achieve. Additionally it is important that debates about work participation consider also the other contributions made by older people which, as seen here, are considerable.

Table 1. Distribution of the sample by gender and productive activity

		Men	Women	Total
Paid work in past week	None	48.2	72.7	64.8
	Employed	42.9	16.8	25.3
	Self-employed	8.9	10.4	9.9
Unpaid work in past week	None	83.4	84.3	84.0
	Voluntary work	10.2	13.6	12.5
	Unpaid work in family business*	5.1	2.1	3.1
Help to children and grandchildren#	None or < 4 hours per week	34.6	23.9	27.4
	4>8 hours per week	38.3	37.3	37.6
	8+ hrs per week	23.4	32.9	29.8
	NA (no children or grandchildren or missing data)	3.7	6.0	5.3
Help to parents and parents in law	None	21.0	10.3	13.6
	< 4 hrs	6.7	3.9	4.8
	4+ hours	3.6	5.1	4.6
	NA (no parents or parents-in-law)	69.2	81.0	77.2
Participates in community group	No	70.5	62.4	65.0
	Yes	29.5	37.6	35.0
Number of productive activities	0	24.0	26.2	25.5
	1	43.5	42.1	42.6
	2	21.7	23.8	23.1
	3	9.2	7.1	7.8
	4	1.5	0.8	1.1
	1 or more#	76.0	73.8	74.5
N		650	1350	2000

*including 5 men and 4 women who also reported other voluntary work.
taking account also of help to parents and parents in law, 25% of men and 35% of women helped family members for 8 hours per week or more.