Social relations, language and cognition in the 'oldest old'

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ABSTRACT

This paper reports a study of the associations between social relations, language and cognition among people aged 85 or more years (hereafter the 'oldest old'). Although the links between cognition and both social relations and language ability are well-established, less is known about the relationship between social relations and language skills, especially among the oldest old. With a sample of 20 adults aged 85–93 years living independently in two retirement communities (a seniors' apartment complex and independent apartments in a continuum-of-care setting), we used the approach of the *Rochester Interaction Record* to assess the frequency, purpose and quality of their social interactions over one week. It was hypothesised that aspects of social relations, as well as the type of residential setting, would associate with both cognitive skills (measured using the *Composite Cognistat*) and language skills (measured using the *Boston Naming Test*). It was found that participants who had a low proportion of interactions with family members, or a high proportion with friends, as well as those with diverse relationships, performed better on the cognitive and language tasks. Furthermore, those from the setting with more programmed activities performed better on the language task. The conclusion critically examines the findings about the influence of family relationships and the importance of residential setting.

KEY WORDS – social relations, social contact, ageing, oldest old, language, cognition, diary study.

Social relations and language abilities

Although the 'oldest old' are the fastest growing age group of the population, the factors that lead to successful ageing and, more particularly, to the prevention of cognitive decline, are unclear. One largely ignored aspect of successful ageing in advanced old age is language skills. The neurocognitive declines associated with ageing, such as problems with memory, attention,

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inhibition and processing speed, have typically been blamed for decrements in language ability among older people (Au *et al.* 1995; Kemper *et al.* 1989; Kemper 2001), but another important influence may be social contacts. Social engagement has been found to be protective of cognitive decline (Seeman *et al.* 2001; Zunzunegui *et al.* 2003). This study examines the associations among social relations and cognitive and linguistic skills, specifically vocabulary retrieval, in two age-segregated settings common to the age group in the United States. Because living arrangements can greatly influence both the quantity and quality of individuals' social relations, these associations are considered in the context of the type of residential setting.

Social relations

Social relations are important for physical health and psychological wellbeing (*cf.* Antonucci 1985, 1990, 2001; Berkman *et al.* 2000; Kahn and Antonucci 1980; Rook 1984; Russell and Cutrona 1991; Seeman 1996). Social relations vary in their structure (*e.g.* social network size and frequency of contact) and function (*e.g.* satisfaction with social relations), and function is generally more strongly associated with wellbeing than structure. According to Krause (2001), perceived support has the strongest, most consistent effects on health and wellbeing in late life. In the present study, to measure social engagement, both structural and functional aspects of social relations have been examined. The structural measures were the frequency with which individuals interact with others, the range of conversational partners, and the variety of activities in which individuals engage. The functional measure was the individual's satisfaction with their social interactions.

Social relations and cognitive functioning

Although very few studies have specifically addressed the association between social relations and language ability among older adults, an association between social relations and cognitive ability in this age group has been shown. A frequently proposed explanation is the 'use it or lose it' effect: more formally, that socially-active older adults engage their cognitive skills more frequently than those who are inactive, which benefits their cognitive performance (and presumably their language ability) (*e.g.* Seeman *et al.* 2001). There is empirical support for the 'use it or lose it' mechanism for both the structural and the functional aspects of social relations. The association between the structural aspects and decreased cognitive decline has been demonstrated in numerous longitudinal studies, *e.g.* a decreased risk of cognitive decline has been associated variously with greater

participation in social or leisure activities (Fabrigoule *et al.* 1995), more diverse social contacts (*e.g.* Bassuk, Glass and Berkman 1999), and a high frequency of both visual contacts with relatives and community activities (Zunzunegui *et al.* 2003). Other longitudinal studies have shown a connection between functional aspects of social relations and cognitive functioning among older adults, with less cognitive decline being associated with greater emotional support (Seeman *et al.* 2001), and higher satisfaction with support (Arbuckle *et al.* 1992).

Fratiglioni *et al.* (2000) distinguished the effects of the structural and functional measures of social support on cognitive functioning. In their study of Swedish adults aged 75 or more years, they found that, although living alone and not having friends or relatives led to an increased risk of dementia, having *infrequent* but *satisfying* contacts did not increase the risk. Thus, it may be that structural aspects of the network, such as total network size, are important up to a threshold, but beyond that point more contacts are not necessarily better, and the quality of a person's relationships is equally or more important for wellbeing than either the number of relationships or the frequency of contacts.

It is important to note that the association between social relations and cognitive functioning appears to hold when age, gender, educational and socio-economic attributes are controlled. Almost all of the studies mentioned above controlled for age, gender, education and baseline cognitive level, and several also controlled for ethnicity, income and occupation. The only study to find a gender difference, by Zunzunegui *et al.* (2003), provided evidence that (among women only) engagement with friends was related to less cognitive decline over time. In general, however, the effects that have been shown change very little after controlling for age, gender and education.

Social relations and language ability

Social relations may influence language indirectly through their effect on cognition, and may have a direct influence through the maintenance of communication skills. Exemplifying the 'use it or lose it' mechanism, it is possible that linguistic competence is maintained by use, and that individuals with limited social engagement (*i.e.* few social interactions), may lose linguistic skills over time (Ryan 1995). For example, without the social and cognitive demands created by and through talk, access to one's vocabulary may deteriorate. Linguistic skills may also be compromised because individuals who are viewed as disabled or old are more likely than others to be addressed with patronising speech, which is unlikely to be beneficial (Giles *et al.* 1994; Ryan *et al.* 1986). In a series of studies with

people aged approximately 70 years, Kemper and Harden (1999) found that the talk-patterns known as 'elderspeak' made it more difficult for older adults to comprehend messages, and specifically that slow speech with high pitch and short sentences created comprehension difficulties. Several studies have shown that young people are more likely to use patronising language with older speakers than with same-age peers. Moreover, this negative over-accommodation may be bi-directional, so that older people over-simplify their *own* speech to those patronising them (Giles *et al.* 1994).

Living arrangements and social relations

The effects of the living arrangement, that is whether a person lives alone or with others, and the type of residence (*e.g.* home in the community, senior apartments, retirement community) on social relations, cognition and language have been largely overlooked in research on ageing and cognitive wellbeing. Different living arrangements are associated with different social networks, and these are likely to influence a person's cognition and language, *e.g.* someone living alone in the community may have a more restricted social network and fewer social contacts than someone living in a retirement community. Moreover, a residential setting that promotes involvement in activities is likely to offer opportunities for more numerous and diverse friendships and relationships than one which does not. Some research has suggested that there are cognitive benefits of living in specialised accommodation for older people (or a 'senior setting'). Weinstock and Bennett (1971) compared the social relations and cognition of three groups of adults aged roughly 80 years (those residing in the community who were on the waiting list for a home for the aged, newcomers to the home, and those who had resided in the home for more than a year). They found that, when matched for age, education, sex and religion, the newcomers and long-established residents had better cognitive functioning than those on the waiting list.

The primary research

Aims and hypotheses

The study reported here examined the associations among social relations, living arrangements, cognition, and language ability among people in advanced old age. Drawing on the theoretical and empirical evidence that has been reviewed, it was hypothesised that both the structural (frequency and purpose) and functional (quality) aspects of social relations associate with higher performance on language and cognitive tasks and, moreover,

that the *quality* of social interactions, a functional measure, has as much if not more influence on cognitive and language skills as their *frequency* or other structural measures. It was also predicted that those who spend less time with same-age peers (such as friends), and more time with those younger than themselves (such as children and grandchildren), may be linguistically disadvantaged when compared with those who spend more time with same-age peers. Finally, although no previous work has directly related language skills to the living arrangement, it was surmised that the social stimulation provided by an organised retirement community would positively associate with the maintenance of language and cognitive skills or, more specifically, that when a setting offers diverse organised activities, it provides occasions for social contact that foster cognitive and linguistic performance.

Design and sample

A cross-sectional study of 20 people aged 85 or more years living alone and independently in age-congregate settings was conducted. This age group, the 'oldest old', has 'high levels of disability, co-morbidity, and high social loss' (Smith and Baltes 1997: 459). Baltes and Smith (2003) made theoretical and empirical distinctions between those in the 'Third Age' and those in the 'Fourth Age', and suggested that the appropriate age for dividing the two is 85 years. The oldest-old may be a particularly important age group in which to examine social relations, language skills and type of residential setting, all of which may promote or diminish their unique vulnerabilities.

Potential participants were screened to exclude those whose language skills were compromised by cognitive decline, using the *Cognistat*, formerly the *Neurobehavioral Cognitive Status Examination* (Kiernan *et al.* 1987). This measures seven different cognitive functions: confrontation naming, simple auditory attention, recent verbal memory, verbal judgment, verbal abstract reasoning, mental calculations, and constructional skill. In its customary use, screening items in each area of cognitive function are first administered; if an individual does not pass the screening item, additional items (the metric) in that performance category are administered. Several studies have reported, however, that some of the screening items produce many false-negative identifications of cognitive loss, and have argued that all subtest metric items should be administered (Drane and Osato 1997; Oehlert *et al.* 1997; Schrimsher *et al.* 2005). Drane *et al.* (2003) abandoned the screen and metric approach, and found that using the total number of correct metric items (the composite score) improved its reliability and standardisation. In addition, they provided preliminary education- and age-adjusted norms. Following this work, we used the composite score

(range 0–80) which includes all metric items, and set the ninth proportion as a cut-off for participation. Since we used the composite metric score, we hereafter refer to the measure as the *Composite Cognistat*. Four of the 27 individuals assessed for cognitive loss failed the screening; three others were unable to complete the study for other reasons.

Participants

The participants were 20 non-Hispanic white individuals aged 85–93 years who lived in two retirement communities within a Protestant-church-managed retirement complex; it was decided to study residents of senior residences rather than of community dwellings to ensure that the re-spondents had opportunities for regular social interaction through physi-cal proximity. The selection of two residential communities also allowed us to examine the effect of the type of setting. Five men and 15 women consented to participate: nine were high-school educated, and 11 had more than a high-school education (*e.g.* trade school, graduate degrees).[1] Seven lived in apartments designated as senior residences and *without pro-grammed activities* – although there was an occasional organised event, such as (approximately monthly) birthday parties, there was no planned roster of daily activities. Thirteen participants lived in free-standing independent apartments in a continuum-of-care community (independent living, assisted living, nursing home and dementia care facilities on the same campus) *with programmed activities*, *i.e.* a daily schedule of residential community events. All the participants lived alone and independently in their own apart-ments, not in assisted-living settings.

Background and social contact variables

The setting without programmed activities was coded '0' and the one with such activities was coded '1'. The number of months' residence at the current setting was recorded. Education was a dichotomous variable, with high-school education '0' and more than high school '1'. Each partici-pant's hearing was assessed by a certified speech and language therapist.[2] All subjects who had hearing aids wore them to the interviews. None of the participants had difficulty hearing the examiners during either interview session.

To obtain information about social contacts, we adapted the approach of the *Rochester Interaction Record* (Wheeler and Nezlek 1977; Reis and Wheeler 1991), a daily-diary event recording system. Nezlek *et al.* (2002) have used this instrument successfully with older adults, and they reported missing only 10 per cent of their interactions over two weeks. As Bolger, Davis and Rafaeli (2003) pointed out from a review of diary methods, these

records of events reduce errors caused by retrospection, resulting in a more reliable and accurate picture of everyday life. Because we were interested in the relationship between sustained social interaction and communication skills, the diary record was limited to 'talk episodes' in social situations (face-to-face or telephone) that lasted at least five minutes. The diary was maintained by participants for only one week since it was believed longer would be taxing. We refer to these dairies as *conversation logs* (see Figure 1). The participants were provided with notebooks and recording forms, and they collected information on both the objective or *structural* aspects of their social relations (with whom they interacted, their relationship with the person, and the activity engaged in during the interaction), and the functional or *subjective* aspects (satisfaction with the interaction).[3]

We used the records to create the following social relations variables: number of conversation logs, number of different types of relationships, proportion of interactions with family members, proportion of interactions with friends, proportion of multi-party interactions, number of different activities in which they engaged, and satisfaction with the interactions. To supplement these quantitative variables, the participants were asked to describe their 'typical day'; this qualitative information was used to identify and illuminate the patterns in the conversation logs.

Cognition and language assessments

Because of the breadth of information that the *Composite Cognistat* elicits, it was used as the measure of a participant's cognition. As the study was a pilot to assess the profitability of further work on social relations and language, the well-studied linguistic skill, vocabulary retrieval, was adopted as the language ability variable (Au *et al.* 1995). It was measured by the full 60-item version of the *Boston Naming Test* (BNT), a 'confrontation naming task' (Borod, Goodglass, and Kaplan 1980). In this test, individuals are shown line drawings of objects, one at a time, which they are asked to name. Performance on the BNT is sensitive to the level of education and has been shown to decline with age (Connor *et al.* 2004; Hawkins and Bender 2002). Because the literature suggested that older people's speech is sometimes both verbose and off-topic (Arbuckle and Gold 1993; Pushkar, Gold and Arbuckle 1995; James *et al.* 1998), we evaluated the presence of off-target speech by collecting speech samples on three topics: solving a past problem, describing a typical day, and explaining the decision to move to the current residential setting. Any segments of speech that were irrelevant to the nominated topic were identified and counted.

CONVERSATION LOG

Initials of person and sex:		**Amount of time you talked (MINUTES):**	

Initials of person and sex:

_____   Male   Female

Amount of time you talked (MINUTES):

5-15   15-30   30-60   60+

Day of the week: _____

Time of day: A.M.
(please circle one)   P.M.

If you talked with other(s) at the same time, their initials and sex:

_____   Male   Female

Was this a phone call? Yes   No

_____   Male   Female

Type of Activity: Meal   Hobby/Games   Religious
(circle all that apply)

Task/Business   Just to talk   Health care visit

Exercise   Volunteering/   Other _____
     Community Service

Relationship: Family member/   Neighbor   Romantic
(circle best   Relative   partner
description)

Friend   Worker   Acquaintance

Stranger   Other _____

Please circle:

I felt close to...	*not at all*	*very little*	*somewhat*	*a good deal*	*a great deal*
I shared my thoughts & feelings...	*not at all*	*very little*	*somewhat*	*a good deal*	*a great deal*
Other shared their thoughts & feelings...	*not at all*	*very little*	*somewhat*	*a good deal*	*a great deal*
I enjoyed talking to...	*not at all*	*very little*	*somewhat*	*a good deal*	*a great deal*
Other got on my nerves...	*not at all*	*very little*	*somewhat*	*a good deal*	*a great deal*
I felt disappointed...	*not at all*	*very little*	*somewhat*	*a good deal*	*a great deal*

Figure 1. The conversation log or recording form.

Analysis strategy

The social relations variables that had been found to associate significantly with the BNT and *Composite Cognistat* scores were entered into hierarchical multiple regressions with controls for education. Because of the small

sample size, there were insufficient degrees of freedom to control for more than one variable, and because of the strong effects of education and the weak effects of age on the other variables in the models (see Table 2), it was decided to control only for education. Those aged 85 or more years are more homogeneous than a wider age span (Baltes and Smith 2003), and it was believed reasonable to treat them as a single 'age group'; therefore, age in years was not used as an independent variable.

Two sets of regression analyses were conducted, one to predict language ability using the BNT, and the other to predict cognitive ability using the *Composite Cognistat*. Separate models for each social relations variable were run, and the strengths of the effects in the models were compared. With the small sample of 20, statistical power was limited, so we set the probability of Type 1 errors at 10 per cent, and the probability of Type 2 errors at 20 per cent, which allowed us to test for effects that accounted for at least 15 per cent of the variance in the BNT or *Composite Cognistat*, on the assumption that at least 40 per cent of the variance was explained by the control variable education.

Results

Diary completion

No participant said that the conversation log was difficult to complete. All but two estimated that they recorded 75 to 100 per cent of their conversations over five minutes, and the other two estimated 50–60 per cent. No one reported modifying the frequency of their interactions as a result of completing the log.

Preliminary analyses

Table 1 presents the descriptive statistics, beginning with the dependent measures, the *Boston Naming Test* and the *Composite Cognistat*. To determine which variables to use in our central analyses, the analysis began by correlating the background and social relations variables and the BNT and *Composite Cognistat* scores. Both parametric (Pearson) and nonparametric (Spearman *rho*) correlation coefficients were estimated. Because in all cases the two coefficients were very similar (mean difference = 0.04) and produced no conflicting evidence of significance, only the Pearson coefficients are presented in Table 2. Off-topic speech was so infrequent that it was not included in the analysis. Hearing loss was not associated with the BNT or any of the social variables (except multi-party interactions), so it was also excluded. The bivariate correlations revealed that neither satisfaction with

T A B L E 1. *Psychometric and social contact attributes of the sample*

| Variable | Range | Level of education | | | | Activities at setting | | | | All | |
| | | High school only | | More than high school | | Unprogrammed | | Programmed | | | |
		Mean	s.d.	Mean	s.d.	Mean	s.d.	Mean	s.d.	Mean	s.d.
Boston Naming Test (BNT)[1]	43–59	46.2	2.6	54.0	3.3	45.7	4.0	52.6	4.1	50.5	4.9
Composite Cognistat[2]	64–80	69.4	5.3	75.8	3.1	70.0	5.9	74.5	4.2	73.0	5.2
Number of conversation logs	9–58	19.8	7.7	30.6	11.9	18.6	5.9	29.5	12.0	25.7	11.4
Different types of relationships[3]	1–6	3.7	1.6	4.9	0.3	3.4	1.5	4.9	0.7	4.4	1.2
Interactions with family ratio[4]	0.04–1	0.4	0.3	0.2	0.1	0.5	0.3	0.2	0.1	0.3	0.2
Interactions with friends ratio[5]	0–0.75	0.2	0.2	0.5	0.2	0.2	0.1	0.4	0.2	0.4	0.2
Number of different activities	0–20	5.6	2.0	6.0	1.8	4.9	1.8	6.3	1.8	5.8	1.9
Sample size		9		11		7		13		20	

Notes: 1. Possible range, 0–60. 2. Possible range, 0–80. 3. Number of different types of relationships indicated across the conversation logs. 4. Number of interactions with family/total number of interactions. 5. Number of interactions with friends/total number of interactions.

TABLE 2. *Bivariate correlations for all variables*

Variable	Variable											
	1	2	3	4	5	6	7	8	9	10	11	12
1. *Boston Naming Test* score	1.0											
2. *Composite Cognistat* score	0.6**	1.0										
3. Age (years)	0.2	0.3	1.0									
4. Education (1 = more than high school)	0.8***	0.6**	0.4*	1.0								
5. Months in setting	0.6**	0.2	0.0	0.3	1.0							
6. Number of conversation logs	0.5*	0.6**	0.3	0.5*	0.2	1.0						
7. Setting (1 = with programming)	0.6**	0.4$^+$	0.2	0.4$^+$	0.6**	0.5*	1.0					
8. Number of different relationships	0.7**	0.5*	0.3	0.5*	0.3	0.6**	0.6**	1.0				
9. Multi-party interactions ratio	−0.3	−0.5*	−0.3	−0.3	−0.1	−0.4$^+$	−0.3	−0.4	1.0			
10. Interactions with family ratio	−0.5*	−0.6**	−0.1	−0.3	−0.5*	−0.5*	−0.8***	−0.8***	0.3	1.0		
11. Interactions with friends ratio	0.5*	0.6**	0.3	0.6**	0.2	0.5*	0.5*	0.5*	−0.2	−0.5*	1.0	
12. Number of different activities	0.4	0.2	0.3	0.1	0.4$^+$	0.5*	0.4	0.7**	−0.3	−0.6**	0.2	1.0

Note: The sample size is 20 participants.
Significance levels: $^+$ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

T A B L E 3. *Hierarchical multiple regressions predicting the Boston Naming Test score*

Variable	B	SEB	β	ΔR^2
Control variable				
Education (1 = more than high school)	7.78	1.35	0.81***	
Social interaction variables				
Months in setting	0.06	0.01	0.45***	0.19***
Setting (1 = with programming)	3.40	1.34	0.34*	0.10*
Number of different relationships	1.32	0.59	0.33*	0.08*
Interactions with family ratio	−6.57	2.94	−0.30*	0.08*

Notes: The sample size is 20 participants. The table summarises the results of four separate multiple regressions, each controlling for education and examining the effect of one of the independent (social interaction) variables. *SEB* is the standard error of *B*. ΔR^2 is the change in variance accounted for by the social interaction variable, relative to the variance explained by the control variable alone. *Significance levels*: * $p < 0.05$; *** $p < 0.001$.

interactions nor type of activity associated with either the language or cognitive score, so they were also eliminated from subsequent analyses. The BNT scores correlated with the number of months of residence in a setting, the number of conversation logs completed, the type of residential setting, the number of activities during the week, the number of types of reported relationships, and the proportion of the reported interactions that were with family members and with friends. The *Composite Cognistat* correlated with all the same variables except the number of months of residence in the setting.

The hierarchical multiple regression analyses

Hierarchical multiple regressions were used to examine the factors that predicted performance on the *Boston Naming Test*. The significant models controlling for education included each of the following predictor variables: setting, number of months resident in the setting, the number of different relationships, and the proportion of interactions involving family (see Table 3). The model with education and number of months at setting accounted for the greatest variance in scores on the BNT ($R^2 = 0.84$). Participants who had lived in a particular setting for the greatest number of months had higher BNT scores. In addition, participants who had more diverse relationships and a lower proportion of interactions with family members performed better on the BNT than those with few relationships and a high proportion of their interactions with family members. The association between the BNT and the setting shows that participants living in the programmed setting had higher scores on the BNT.

Turning to the *Composite Cognistat* score, a second set of hierarchical multiple regressions indicated that they could be predicted by models that

TABLE 4. *Hierarchical multiple regressions predicting the Composite Cognistat score*

	B	SEB	β	ΔR^2
Control variable				
Education (1 = more than high school)	6.37	1.88	0.63**	
Social interaction variables				
Number of conversation logs	0.16	0.09	0.35+	0.09+
Interactions with multi-parties ratio	−8.79	4.98	−0.32+	0.09+
Interactions with family members ratio	−8.87	4.13	−0.38*	0.13*
Interactions with friends ratio	9.49	4.74	0.42+	0.12+

Notes: The sample size is 20 participants. The table summarises the results of four separate multiple regressions, each controlling for education and examining the effect of one of the independent (social interaction) variables. *SEB* is the standard error of *B*. ΔR^2 is the change in variance accounted for by the social interaction variable, relative to the variance explained by the control variable alone. *Significance levels*: + $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

included education plus each of the following: the number of conversation logs, the proportion of multi-party interactions, the proportion of interactions involving family, and the proportion of interactions involving friends (see Table 4). The model, including education and the proportion of interactions involving family, accounted for the greatest percentage of the variance ($R^2 = 0.52$). Participants who interacted less often with family members and more often with friends had a higher *Composite Cognistat* score than those who interacted more with family members. The *Composite Cognistat* score also associated inversely with the number of multi-party interactions ($p < 0.10$).

Interview data

The 'Typical day' speech sample provided snapshots of how the participants spent their time, and suggested ways in which social contacts support language skills. There were striking differences when comparing the sub-samples of (a) those with high family contacts and low BNT and *Composite Cognistat* scores, and (b) those with low family contacts and high BNT and *Composite Cognistat* scores. The differing circumstances are illustrated in the following two vignettes:

John (aged 86 years) recorded nine conversation logs, all with family and while just talking. When he described his typical day, he observed that his primary activities were cleaning his apartment, watching TV, and driving around. He said that he did not like talking to 'all those women [at his setting] because they complain a lot'. When consulting with his family about whether to participate in our research, both his daughters told him not to waste his time on the study, but his son told him that the study was 'a good idea and that he might learn something'.

Jane (aged 88 years) produced 43 conversation logs, but said that they in-accurately represented the frequency of her conversations because she had many that were less than five minutes. Most of her conversations took place around noon, at the communal meal. Roughly one-half were with friends/neighbours and accompanied various activities, including an anniversary celebration, a trip to a ball-game, church services, and a computer class. In addition, Jane visited people who were in the nursing home in the complex, and she attended activity programmes offered by her residential setting. She also enjoyed gardening and working on the computer.

These vignettes exemplify the general pattern that those with a richer interactional life had better language and cognitive scores. The ad-vantages were explicitly described by a 90-year-old resident:

A retirement center such as this is a most desirable place for people aged 65 to 100-plus to live. When I was still in my own home, there were days in the winter when I didn't see anyone: here I have so many friends to talk with whose interests and experiences are much the same as mine. Most people do not realise what a positive experience this can be. … For communication, this is as good as it gets.

Discussion

This study has found that individuals who engaged in interactions with a wider variety of social partners and who interacted relatively little with family members had better language skills than those with less diverse social networks and who interacted frequently with family members. Likewise, those who interacted less frequently with family members or who had more frequent interactions with many people had better cogni-tive function than those who interacted more frequently with family or less frequently with others. It was also found that individuals who had lived in their residential setting for a long period, or who lived in a setting with a roster of daily activities, had better language performance than those who had lived in their setting for only a short period or who lived in a setting with fewer opportunities for social engagement.

Unexpectedly, satisfaction with relationships did not predict perform-ance on the *Composite Cognistat* or the BNT, even though a relationship between satisfaction with interactions and wellbeing had been reported (*e.g.* Antonucci 2001). Carstensen (1992) reported an increase in satisfaction with social relations with age, and Rook (2003) found a decline in negative social exchanges or a low frequency of negative exchanges with age. This is consistent with the absence of variation in the reported satisfaction: the participants were generally quite satisfied with their interactions. The respondents seem to have restricted their interactions to those that they

enjoyed. This lack of variation may help to explain why satisfaction did not predict success in the language and cognitive tasks, even though the importance of functional aspects of social relations for cognitive ability has been demonstrated (*e.g.* Arbuckle *et al.* 1992).

Limiting talk to one's family turned out to be particularly disadvantageous: the higher the proportion of interactions with the family, the poorer was cognitive and language performance. Perhaps interactions with family are routine, cover similar conversational territory at each contact, and provide low stimulation. It might be that these frequent contacts are restricted to 'monitoring topics', as family members check up on their older relatives. Another possibility is that the extent of shared experience and understanding with family members is so great that the older person does not need to work very hard to communicate. Finally, if the majority of an older person's interactions are with younger family members, and if they use impoverished input (reduced syntactic complexity and lexical diversity), this could diminish the quality of the older person's responses.

Those who had many and various conversation partners were advantaged in terms of their language and cognitive skills. In understanding the differential impact of family compared to other relationships on cognitive and language functioning, it is important to note the vigorous debate in the field of social relations on their differential effects on the wellbeing of older people. Research has shown that friendships may be more important for morale and wellbeing than family relations (Adams and Blieszner 1995; Cavanaugh 1998; Johnson and Troll 1994; Larson, Mannell and Zuzanek 1986). Whereas family relationships are generally obligatory, friendships are optional (Antonucci and Akiyama 1995; Crohan and Antonucci 1989). Thus, family relationships may negatively affect wellbeing if they are *absent*, but when they are present, their *obligatory* nature means that they are less likely than friendships to make a positive contribution to wellbeing. It may be that conversations with friends, as compared to those with family, are more self-motivated, which may engender more complex and diverse dialogue.

The role of family might only be part of the interactional picture, for the nature of one's living environment may also play a role. It was found, for example, that the participants living in the 'unprogrammed' setting spoke more often to family than those in the setting with activities. Setting was also important in that the longer the duration of residence, the higher the BNT scores. These findings suggest that there may be important benefits to living independently in an age-congregate environment. Moving to such a setting while one is independent may help maintain one's communication skills. Some of the study participants said that they were glad

they had moved before they experienced decline. The potential of such settings for promoting successful ageing needs further consideration.

Limitations of the study and future research

This study has suggested that spending time in conversation with family members rather than with a wider range of social contacts associated with relatively low linguistic and cognitive performance. Furthermore, living in a residential setting with programmed activities was associated with better linguistic performance. Much remains to be learnt about which characteristics of age-congregate residential settings promote successful ageing, and about how these characteristics vary among types of people. Although 'a sense of community' does not necessarily promote verbal interactions (McMillan and Chavis 1986), talk is an important medium through which senses of belonging, integration and emotional fulfilment are realised. Settings that foster a sense of community may stimulate interaction among residents, just as residents who are highly interactive may contribute to a sense of community. At the same time, there is much that we do not know about the associations between type of residential setting and particular personality traits among the oldest old. For example, the more introverted may select settings that make minimal interactional demands, *e.g.* those without organised activities or with a low sense of community. Carp and Carp (1980) found that a more extroverted person develops more relationships in a setting with greater sociability than an introverted person; we expect that this is also the case for extroverted individuals in all but the most socially-impoverished settings.

It is also important to note the possible impact of the religious affiliation of the settings on the residents' social interactions. The social support that religious activity offers has been shown to underlie the positive association between religion and wellbeing (*e.g.* Idler and George 1998). This study, however, has examined two settings with the same religious affiliation, and, furthermore, no differences were found between the settings in religious attendance, which implies that the variation in social contact in the two settings was not attributable to differences in religious activity.

Because the data were collected over a short period, we cannot rule out the possibility of reverse causal effects. It is likely that the revealed associations were bi-directional. As individuals decline cognitively, they may become more dependent on family members. The fact that the number of conversation logs (*i.e.* the total number of interactions over five minutes during one week), a measure of social activity, negatively correlated with the proportion of interactions with family, suggests that the family may fill a gap for those with some cognitive decline. Longitudinal data would be

necessary to determine whether cognitive decline produced a change in interactional partners.

The generalisability of the results from this pilot study is limited by several factors. First, the sample was small, the statistical power was limited, and the need to test multiple models increased the risk of erroneously identifying relationships as statistically significant; clearly, the analysis must be replicated with a larger sample. Furthermore, the sample was limited in that it reflected the experiences of working- and middle-class non-Hispanic whites. Although the association between social relations and cognitive functioning appears relatively robust, a much larger and more educationally- and ethnically-diverse sample would be needed to evaluate the generalisability of the relationship between family interaction and the maintenance of language skills. Because interactional style is known to differ among ethnic groups (Eckert and Rickford 2001; Tannen 1981), it is possible that the observed pattern is specific to the sample. Finally, the small sample size meant that it was not possible to investigate interactions, as between gender and family contacts.

Given the centrality of the conversation log to the study, further comments on diary keeping are in order. A self-report diary obtains a great deal of information about an individual's social relations while minimising interference from delayed recall. The findings reported here are consistent with those of Nezlek and colleagues (2002), who observed that older adults generally have no difficulty regularly recording their interactions. However, much of the work that has used the approach of the *Rochester Interaction Record*, including the present study, has relied on individuals with at least a high-school education. The self-report diary requires some level of engagement with record-keeping and print, as encountered through schooling. Whether this literacy-oriented task is as appropriate for those with much less education remains to be seen.

Another aspect of the conversation log that warrants further consideration for the oldest old is the subjective rating scale. Some participants reported that certain items were not relevant to an interaction, such as 'feeling close to', because they had no expectation of closeness. Others indicated that they wanted to communicate more detail than the Likert scale permitted. Although they were free to annotate the form, and many did, its layout did not encourage such annotations. These reactions to the subjective section may have contributed to the absence of association between the reported subjective and objective social contact data. The subjective rating categories as they relate to older people's talk during interactions need further development.

This descriptive study has provided preliminary evidence of the relationships among social relations, language skills and cognition among

the oldest old. It has shown important effects of the living arrangement and their associated patterns of socialisation on the maintenance of cognitive and linguistic skills. In addition, it has pointed to the need for further investigation of which aspects of language production are most influenced by social relations. Finally, it has shown that daily diaries are a promising approach to studying social relations among people at the oldest ages in the present cohort.

Acknowledgements

NOTES

1 Administrators in the residential settings assisted with the recruitment by distributing letters of invitation to participate to approximately 80 residents in their communities who were aged 85 or more years and who were living alone and independently. The receipt of a reply indicating a willingness to participate was followed up by telephone calls during which both the one-on-one data collection sessions were scheduled. Informed consent was obtained.

2 The assessment was at 25 decibels (dB) for the octave frequencies of 1000 and 2000 HZ following the guidelines of the *American Speech-Language-Hearing Association* (1996) for adults aged 65 or more years. Performance ranged from 25–80 dB; raw scores on the hearing test were converted to ASHA qualitative ratings (1–5) for each ear with '1' (16–25 dB) indicating slight/minimal hearing loss and '5' (71–90 dB) severe loss.

3 The participants were given the recording forms at the end of the first interview and asked to begin recording the next day. They were shown a sample completed record as a model, and then, with the interviewer, practised completing a record for a conversation that they had had earlier in the day. The participants were also phoned three times during the record-keeping phase as reminders and to answer their questions.

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