Changes in Older Adult Loneliness

Results From a Seven-Year Longitudinal Study

PEARL A. DYKSTRA
Netherlands Interdisciplinary Demographic Institute, The Hague

JENNY DE JONG GIERVELD
Netherlands Interdisciplinary Demographic Institute, The Hague

This study examines loneliness and its correlates—health, residential care, partner status, and network size—over a seven-year period among adults born between 1908 and 1937. The four waves of data are from the Dutch "Living Arrangements and Social Networks of Older Adults" and the "Longitudinal Aging Study of Amsterdam" programs. Data from at least two waves are available for 2,925 respondents. Results show that older adults generally become lonelier as time passes. The increase is greater for the oldest, the partnered, and those with a better functional capacity at baseline. Older adults who lose their partner by death show the greatest increase in loneliness. Not all older adults become more lonely: Improvement in functional capacity and network expansion lead to less loneliness. Entry into residential care does not affect loneliness. The longitudinal design provides new insights into factors that protect against loneliness compared to cross-sectional studies.

Keywords: *loneliness; longitudinal; protective factors; aging*

The image of the elderly in the general public is that of an overwhelmingly lonely group (Revenson 1986; Victor et al. 2002). In a U.S. survey, for example, 38% of those younger than 65 named loneliness as a

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very serious problem for older adults (National Council on the Aging 2000). Becoming old is often equated with becoming lonely. How much evidence is there for this belief? Do people become lonelier as they get older? Results from cross-sectional studies suggest that loneliness is common only among the very old (de Jong Gierveld 1998; Perlman 1984; Pinquart and Sörensen 2001). Between 20% and 30% (depending on the survey) of middle-aged and young-old respondents report moderate or serious loneliness. However, at advanced ages, the prevalence of loneliness increases. Of those aged 80 and older, 40% to 50% characterize their situation as one of moderate or serious loneliness.

Loneliness is the unpleasant experience that occurs when a person's network of relationships is deficient in some important way (de Jong Gierveld 1987; Peplau and Perlman 1982). An often-used definition of loneliness is that it involves an unwanted discrepancy between the relationships one has and the ones one would like to have (Perlman and Peplau 1981). Loneliness is more strongly associated with qualitative than with quantitative characteristics of relationships (de Jong Gierveld 1998; Hughes et al. 2004).

Whether aging actually leads to an increase in loneliness cannot be determined on the basis of a single measurement in time. Longitudinal data are required. Unfortunately, few longitudinal studies of loneliness have been carried out. Those that have been conducted involve small samples (Samuelsson, Andersson, and Hagberg 1998; Wenger and Burholt 2004) and focus on specific groups within the population such as college students (Cutrona 1982; Jones and Moore 1989; Shaver, Furman, and Buhrmester 1985), AIDS patients (Nokes and Kendrew 1990), alcoholics (Akerlind and Hornquist 1989), widows and widowers (Lund, Caserta, and Dimond 1993; van Baarsen et al. 1999), and older men (Tijhuis et al. 1999). Jylhä's (2004) population-based prospective longitudinal study of loneliness is an exception, but her study included no information on corresponding changes in respondents' life circumstances.

This study uses loneliness data from a large nationally representative sample of the Dutch older adult population, collected at four points in time over a seven-year period. A previous analysis of data from the same group of respondents for two measurement points showed a *decrease* in loneliness over a one-year period (de Jong Gierveld and Dykstra 1996). Now we can find out what happens over a period of seven years. The following questions are addressed: What

is the general trend across time in loneliness among older adults? If changes in loneliness occur, how can they be explained? Finally, do the changes over time differ for different categories of older adults?

Why Might Loneliness Change Over Time?

The definition of loneliness as an unwanted discrepancy between the relationships one has and the ones one would like served as the backdrop for identifying ways in which aging might affect loneliness. This definition has two central components: existing relationships and desired relationships. These two components have structured our ideas about changes in loneliness as people age.

AGING AND EXISTING RELATIONSHIPS

Demographic reality tells us that the older people become, the more likely they are to experience the *loss* of age peers. Widowhood comes with old age, an event that of course is more likely to occur to women than men. The loss of the spouse has been found to be a major risk factor for loneliness in late life (de Jong Gierveld and van Tilburg 1987; Pinquart 2003; Stroebe and Stroebe 1987; Victor et al. 2005). At advanced ages, people are also increasingly likely to outlive friends and siblings, situations that have been found to contribute to loneliness (Gold 1987; Mullins and Mushel 1992).

Old age may not only bring a loss of ties but also a *reduction in social activity.* Incapacity of network members, but also of older adults themselves, imposes difficulties on maintaining contact. Not surprisingly, studies tend to show a negative association between health and loneliness (de Jong Gierveld and van Tilburg 1995; Jones, Victor, and Vetter 1985; Jylhä 2004).

One should be cautious not to equate aging with social losses. There are also relationship *gains* in late life, and they may lead to a decline in loneliness. New partnerships after widowhood or divorce are one example. Older adults' social networks may expand in other ways: Retirement enables people to engage in new commitments, and the birth of grandchildren may bring increased interactions with children. Research indicates that older adults continue to make new acquaintances or to renew long-existing slumbering ties, even at

advanced ages (Bowling, Grundy, and Farquhar 1995; Lang 2000; van Tilburg 1998). Although poor health might reduce possibilities for maintaining relationships, increased demands may mobilize helpers and increase the support received (Miller and McFall 1991; Stoller and Pugliesi 1988).

AGING AND DESIRED RELATIONSHIPS

One source of insight into the question of how aging might affect older adults' relationship desires comes from *disengagement* theory (Cumming and Henry 1961). A withdrawal from social involvements is considered to be an integral part of aging. To become old is to become increasingly self-focused. Presumably, such a process of withdrawal means that older adults start attaching less importance to social ties and find increasing gains in solitude.

Perlman (1988) has two explanations for why older adults are not as lonely a group as stereotypes suggest. The first is that the desired levels of contact might drop as rapidly as the actual level of contact. The second is that older adults might have higher ratings of the quality of their relationships. In line with these explanations, we would like to point to the possible role of *social comparison* processes (Festinger 1954) in late life loneliness. Older adults might be less lonely because they feel their social circumstances compare favorably in terms of earlier expectations or relative to peers.

The next perspective centers on changing *needs* for support. At advanced ages, people's functional capacities tend to decline, bringing reduced means of managing independently. Help cannot always be mobilized successfully. Unmet needs, linked with an unwanted dependency and feelings of disappointment, may give rise to feelings of loneliness.

AGING AND LONELINESS

The previous considerations are not equivocal regarding the relationship of aging and loneliness. The "loss," "reduction in social activity," and "increased needs" perspectives suggest an increase in loneliness over time, whereas the "gains," "disengagement," and "positive social comparison" perspectives suggest a decrease over time. In what follows, we describe that way in which insights from the

various perspectives were incorporated in the present study. We selected variables (from a data set that was not developed specifically for research on changes in loneliness) that approximate the previously described theoretical concepts as closely as possible. Unfortunately, we had no measures for disengagement or positive social comparison.

Design of the Study

RESPONDENTS

The Time 1 (T_1) data are from 3,805 face-to-face interviews conducted in 1992 with respondents born between 1908 and 1937 who participated in the "Living Arrangements and Social Networks of Older Adults' (NESTOR-LSN) research program (Knipscheer et al. 1995). The oldest individuals, and in particular the oldest men, were overrepresented in the stratified random sample. The response rate was 62%. The Time 2 (T_2; 1992-1993), Time 3 (T_3; 1995-1996), and Time 4 (T_4; 1998-1999) data are from follow-up interviews[1] conducted in the context of the Longitudinal Aging Study Amsterdam (LASA; Deeg and Westendorp-de Serière 1994).

The interval between T_1 and T_2 averaged .86 years (*SD* = .18); between T_2 and T_3, 3.06 years (*SD* = .16); between T_3 and T_4, 2.99 years (*SD* = .21); and between T_1 and T_4, 6.91 years (*SD* = .24). Complete loneliness data from four waves were available for 1,701 respondents, from at least three waves for 2,251 respondents (not necessarily the first three; respondents might have missed an interview in between), and from at least two waves for 2,925 respondents.

Using multivariate logistic regression, we examined differences with regard to gender, age, functional capacity, educational level, income, and household composition, all measured at T_1, between respondents for whom we had longitudinal data (from two, three, or four waves) and (1) those who had died or could not participate in the study because of severe physical and/or mental problems, and (2) those who refused to participate in the follow-up. Compared with respondents who had died or who had severe physical and/or mental problems, respondents for whom we had longitudinal data were more likely to be female, young, living independently, and well educated and to have a good functional capacity. Compared to refusers, respon-

dents for whom we had longitudinal data had a higher income. In other words, the study sample is a survivor sample. Furthermore, the sample is characterized by a relatively high socioeconomic status. Nevertheless, the stratified sampling frame and the sample size guaranteed the inclusion of sufficient men, respondents of advanced age, respondents with physical problems and chronic ailments, and respondents with a low socioeconomic status.

MEASUREMENTS

Loneliness. The same 11-item Loneliness Scale was used at the four points in time. The scale meets the criteria of a Rasch model and consists of five positive and six negative items (de Jong Gierveld and Kamphuis 1985). To meet the goodness-of-fit tests of a Rasch model, item difficulties must be invariant if a respondent sample is divided on the basis of characteristics such as age, race, gender, or test-score profiles. The positive items assess feelings of belongingness (e.g., "I can rely on my friends whenever I need them"). The negative items apply to aspects of missing relationships (e.g., "I experience a sense of emptiness around me"). Response categories were no, more or less, and yes. Responses to the positive items were reversed. To improve scale homogeneity, the answers were dichotomized, assigning the middle category to the value indicating loneliness. The rationale for using the "more or less" answer as an indicator of loneliness is that respondents are reluctant to admit to items describing social network deficits (or to agree with items describing gratifying relationships), given the stigma associated with loneliness. Scale scores range from 0 (*not lonely*) to 11 (*extremely lonely*). The scale has been used in several Dutch surveys and has proven to be a reliable and valid instrument that is robust to different data collection modalities (van Tilburg and de Leeuw 1991). The homogeneity (Loevingers's $H \geq .33$) and reliability ($\rho \geq .81$) of the scale were sufficient for each of the observations.

Health. Both the "reduction in social activity" and the "increased needs" perspectives are based on deteriorations in health with age. For that reason, two health measures were included in the analyses. The first is a measure of functional capacity: a sum score of six items assessing difficulties in self-care, mobility, and carrying out household activities (e.g., dressing and undressing, walking up and down

stairs, and doing the laundry and regularly cleaning the house). The five possible answers were not at all, only with help, with a great deal of difficulty, with some difficulty, and without difficulty. Scale scores range from 6 (*no functional capacity*) to 30 (*full functional capacity*). The six items constituted hierarchically homogeneous scales at the four observations (Loevinger's $H \geq .59$), which were reliably measured ($\rho \geq .83$). The second health measure is a subjective rating, namely, the response to the question, "How is your health in general?" Self-rated health is widely recognized as a comprehensive indicator of health (Deeg and Bath 2003). Answer categories range from 1 (*poor*) to 5 (*very good*). A deterioration in health should lead to greater loneliness, whereas an improvement should lead to less loneliness. If health conditions remain the same, there should be no change in loneliness.

Residential care. The "increased needs" perspective requires information on the extent to which needs for support are actually fulfilled. Although there is no direct measure of need fulfillment, we do have information on residential care. For the four moments in time, we know whether the older adult is still living independently or has entered an institution. A comparison of two groups of older adults matched on gender, age, partner status, and health, one living independently the other institutionalized, revealed lower levels of loneliness among those who had been admitted to residential care (de Jong Gierveld and Kamphuis 1986). The authors concluded that the entry into residential care brought an end to the older adults' anxieties about coping on their own and subsequently made them feel less lonely. Russell et al. (1997) have also suggested that for extremely lonely older adults, nursing home admission might be a strategy to gain social contact with others. In this study, we expect a decrease in loneliness among those who enter residential care and no change among those who remain in their own homes.

Partner status. The "loss" and "gains" perspectives assume information on network members. The presence or absence of a partner in the household was assessed at the four points in time. In more than 95% of the cases, the partner was a spouse; consensual unions were relatively infrequent. A change in partner status between measurements pertains either to having lost a partner or to having become

involved in a new partner relationship. The expectation is that the loss of a partner leads to an increase, whereas a new partnership is accompanied by a decrease in loneliness. If there is no change in partner status, there should be no change in loneliness.

Network size. The same network delineation procedure (see van Tilburg 1995 for details) was used for the four observations. Seven relationship domains were specified: household members, children and their partners, other kin, neighbors, colleagues, organizational contacts, and others. For each domain, respondents were requested to specify the names of those with whom they were in touch regularly and who were important to them. The definitions of these concepts were left to the respondents. The size of the social networks ranged from 0 to 77. For reasons of parsimony, the analysis does not look at the loss or gain of specific types of relationships but rather at the total size of the network. We expect a decrease in network size to lead to greater loneliness, whereas an increase in network size should lead to a reduction in loneliness. The loneliness scores of respondents whose networks do not change in size should remain unchanged.

PROCEDURE

The usual strategy for analyzing changes over time if one has more than two measurement points is to apply MANOVA for repeated measurements. A drawback of MANOVA, however, is that it is restricted to cases with data from all four waves and that it assumes equal observation intervals for all respondents. As described earlier, our study has different conditions. We have data from only two or three observations for a considerable portion of our respondents, and there is a relatively large variation in the individual observation intervals (the T_1-T_4 time interval ranges between 5.89 and 7.75 years). Multilevel analysis can deal with these limitations (Snijders 1996). It does not require data for a fixed number of observations for all respondents. Moreover, the time between measurement points can be modeled explicitly; there is no need to assume equal follow-up intervals.

Preliminary analyses indicated that the variation in the sample was retained by not restricting the study of change to respondents for whom data from four observations were available. Respondents with data from two or three observations were a less select group than those

with four observations. They were less select in the sense that they were less often female (47% vs. 55%), were older at T_1 (73.1 vs. 67.0 years), had lower levels of education (8.4 vs. 9.1 years), were less likely to be living with a partner (64% vs. 73%), and had a poorer functional capacity (28.6 vs. 27.2).

The models in our analysis had two levels: the level of the respondent and the level of the observations. Data from the observations were nested within respondents. The models were analyzed using *MlwiN* (Rashbash et al. 2000), a computer program for multilevel analysis. We applied the forward modeling approach, starting with an empty model (containing only a constant) and adding explanatory variables as *fixed* effects at subsequent steps. The parameter estimates of the fixed effects and their standard errors can be read in the same way as unstandardized coefficients in linear regression models. A method for evaluating the compatibility of a model is to look at the reduction of deviance (measured as the –2*log-likelihood). The deviance is the lack of correspondence between the model and the data. The difference in deviance of successive models has a chi-square distribution with the number of added explanatory variables as degrees of freedom.

The multilevel analysis followed a stepwise procedure. The first aim was to determine the *trend* over time in feelings of loneliness: Is there an increase in loneliness, a decrease, or is there no change? Time is the number of years since the first point of measurement. Second, we wanted to find out whether *initial conditions* (T_1 characteristics) predicted differences in loneliness. They were age, gender, living in residential care, functional capacity, self-reported health, partner status, and network size. Given the large body of research suggesting that the benefits of marriage differ between men and women (e.g., Antonucci 1994; Dykstra and de Jong Gierveld 2004; Umberson 1992), we also included an interaction between gender and partner status. The variables for time, age, network size, functional capacity, and self-reported health were centered on the mean to avoid multicollinearity, following Cronbach's (1987) recommendation. Third, we examined whether the changes in loneliness differed for different categories of older adults. We did so by testing *interactions* between T_1 characteristics and time. Finally, we examined the impact on loneliness of *changes* in the initial characteristics, taking into account baseline levels. Change was computed as the difference in relation to the T_1 score.

In summary, our analysis unraveled (a) effects of the initial conditions, (b) differential effects of the initial conditions over time, and (c) effects of changes in the initial conditions over time.

Results

DESCRIPTIVE ANALYSIS

Table 1 shows the means for the four points in time for loneliness, age, the proportion in residential care, functional capacity, self-reported health, the presence of a partner in the household, and network size. Note that the means in Table 1 are based on respondents who participated in all four waves of the study. Thus, they reflect the circumstances of survivors and, specifically, those within that group who are relatively fit. Another limitation is that the table shows aggregate change only. Variability within the sample is glossed over.

The mean loneliness scores show a decrease in loneliness between T_1 and T_2 and a subsequent increase between T_2 and T_3 and between T_3 and T_4. Across time, a consistent decrease in functional capacity can be observed. There is also a steady decrease in the subjective health ratings. The percentage living in residential care shows an increase across time, whereas the percentage with a partner shows a decrease over time. Between T_1 and T_2, there is a decrease in mean network size, an increase between T_2 and T_3, and a decrease between T_3 and T_4.

Table 2 provides additional information on changes in loneliness scores between T_1 and T_2, T_2 and T_3, and T_3 and T_4. Here the analyses were not restricted to respondents who participated in all four waves. The Edwards-Nunnally method (Speer 1992), which takes into account measurement errors and regression toward the mean, was applied to determine whether individual change was significant. This method is applied in mental health research to determine the practical importance of statistical effects found in clinical trials. It is a means of preventing change rates from being artificially inflated by regression toward the mean (Jacobson et al. 1999). From one measure to the next, the loneliness scores of more than 70% of the respondents remained unchanged, whereas a decrease in loneliness was observed for between 10% and 13%, and an increase in loneliness was observed for between 11% and 18% of the respondents.

TABLE 1

Descriptive Data for Respondents Who Participated in All Four Waves (N = 1,701)

	Time 1		*Time 2*		*Time 3*		*Time 4*	
	M	SD	M	SD	M	SD	M	SD
Loneliness	1.9	2.5	1.8	2.4	2.0	2.5	2.3	2.7
Gender (% male)	45.4							
Age (55+)	66.9	8.1	67.8	8.1	70.9	8.1	73.8	8.1
Residential care (% yes)	0.9		1.3		3.6		5.2	
Functional capacity (6-30)	28.0	2.6	28.2	3.6	27.7	4.1	26.6	5.1
Self-reported health (1-5)	3.8	0.8	3.7	0.9	3.7	0.9	3.6	0.9
Partner (% yes)	70.0		68.4		63.1		57.8	
Network size (0-77)	15.6	10.3	14.8	8.6	15.2	8.7	14.8	8.8

TABLE 2
Change in Loneliness Scores (Edwards-Nunnally method of significance of individual change)

	Time 1 → Time 2		*Time 2 → Time 3*		*Time 3 → Time 4*	
	n	%	n	%	n	%
Decrease $p < .001$	79	2.7	52	2.3	37	2.1
Decrease $p < .01$	93	3.2	39	1.7	35	2.0
Decrease $p < .05$	68	2.4	46	2.0	29	1.6
Decrease $p < .10$	147	5.1	92	4.1	80	4.5
No change	2,201	76.1	1,613	71.8	1,286	72.5
Increase $p < .10$	58	2.0	88	3.9	55	3.1
Increase $p < .05$	86	3.0	95	4.2	85	4.8
Increase $p < .01$	64	2.2	63	2.8	58	3.3
Increase $p < .001$	95	3.3	160	7.1	108	6.1
Total	2,891	100	2,248	100	1,773	100

MULTILEVEL ANALYSIS[2]

Table 3 shows the results of the multilevel analysis. Model 1 is a so-called empty model, specifying only a constant. Its parameter estimate is the mean loneliness score of 2.21 for the sample of 2,925 respondents who participated in at least two waves. The variance at the respondent level (4.406) is more than twice as large as that at the level of individual observations (2.325), indicating that the variation in loneliness scores between respondents is considerably larger than the variation across time for individual respondents. It is also an indication of a relatively high degree of stability in loneliness across time.

Time is introduced in Model 2. Its parameter estimate indicates an increase of 0.06 points on the Loneliness Scale with each year that passes. The introduction of time does not lead to a reduction of the variance in loneliness at the respondent level, as expected, but does result in a reduction of the variance at the level of observations. The latter finding indicates that there is significant variation between observations attributable to linear changes over time.

Model 3 tests whether T_1 characteristics are associated with differences in loneliness. The results show a positive association between age and loneliness: The older tend to be lonelier than the younger. Dif-

(text continues on p. 740)

TABLE 3

Multilevel Analysis of Changes in Loneliness (2,925 respondents, 9,858 observations)

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
Constant	2.212***	2.079***	2.918***	3.029***	3.000***
	(.042)	(.044)	(.291)	(.304)	(.290)
Time		0.060***	0.065***	0.022	0.009
		(.006)	(.006)	(.066)	(.011)
Time 1 characteristics					
Gender (1 = male)			0.611***	0.603***	0.622***
			(.146)	(.145)	(.145)
Age (55-84)			0.027***	0.012*	0.011*
			(.005)	(.005)	(.005)
Residential care (1 = yes)			–0.196	–0.205	–0.188
			(.286)	(.300)	(.284)
ADL-capacity (6-30)			–0.024	–0.033*	–0.034*
			(.013)	(.014)*	(.014)
Self-reported health (1-5)			–0.527***	–0.539***	–0.558***
			(.049)	(.052)	(.050)
Partner (1 = yes)			–0.935***	–1.142***	–1.180***
			(.111)	(.115)	(.115)
Gender × Partner			–0.793***	–0.776***	–0.741***
			(.175)	(.174)	(.173)
Network size (0-70)			–0.002*	–0.005*	–0.003**
			(.001)	(.002)	(.001)
Time 1 Characteristics × Time					
Age × Time				0.007***	0.005***
				(.001)	(.001)

(continued)

TABLE 3 (continued)

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*
Residential Care × Time				–0.001	
				(.067)	
Functional Capacity × Time				0.005*	0.005*
				(.002)	(.002)
Self-Reported Health × Time				0.004	
				(.008)	
Partner × Time				0.095***	0.082***
				(.014)	(.014)
Network Size × Time				0.001	
				(.001)	
Changes at Time 2, Time 3, or Time 4					
Change residential care					0.095
					(.167)
Loss partner					1.130***
					(.104)
New partner					–0.611
					(.352)
Change functional capacity (–23-14)					–0.019**
					(.007)
Change subjective health (–4-4)					–0.125***
					(.028)
Change network size (–65-60)					–0.016***
					(.003)

Variance					
Level respondents	4.406***	4.439***	3.545***	3.535***	3.500***
	(.135)	(.135)	(.112)	(.112)	(.110)
Level observations	2.325***	2.291***	2.294***	2.266***	2.221***
	(.035)	(.039)	(.038)	(.038)	(.038)
Model fit					
–2*log likelihood	42,067.91	41,975.51	41,432.64	41,334.39	41,160.82

*$p < .05$. **$p < .001$. ***$p < .001$ (two-tailed tests).

ferences in loneliness between those living in residential care and those living in their own homes are not observed.[3] Self-reported health at T_1 is inversely associated with loneliness, but differences in functional capacity do not account for significant differences in loneliness. The gender and partner main effects and their interaction should be interpreted as follows. Older adults with a partner tend to be least lonely, and the difference between partnered men and women is negligible. In comparison, the loneliness estimate is about 1.0 points higher for unpartnered women and about 1.6 points higher for unpartnered men. Finally, the Model 3 results show that network size is inversely related to loneliness. The consideration of T_1 characteristics results in a decrease in the variation in loneliness at the level of the respondent but leaves the variation at the level of observations unchanged.

Model 4 introduces interactions between the T_1 characteristics and time. The results show that the increase in loneliness is greater for older than for younger respondents, for those with a better functional capacity than for those with poorer functional status, and for older adults with a partner compared to those who are single. The interactions of time with residential care status, self-reported health, and network size at T_1 do not reach levels of significance. For reasons of parsimony, these interactions were dropped in the subsequent and final model. The consideration of the interactions with time is not associated with a drop in the variance in loneliness at the level of respondents, but there is a significant reduction in variance in loneliness at the level of observations.

In Model 5, the effects on loneliness of changes after T_1 in residential care status, functional capacity, self-reported health, partner status, and network size are taken into account. As the last column of Table 3 shows, changes in residential care status are not linked with changes in loneliness. The estimates for changes in functional capacity should be considered jointly with those for functional capacity at T_1 and the interaction with time. Respondents who report declines in functional capacity show an increase in loneliness, and this is particularly so for those with a relatively high functional capacity at T_1. Respondents who report better functional capacity over time tend to become less lonely, but the effect on loneliness of improvements in functional capacity are not as marked as that for declines in functional capacity. For example, the level of loneliness of older adults with a functional score of 30 at T_1 and a score of 6 at T_4 increases 1.5 points,

whereas respondents with a functional score of 6 at T_1 and a score of 30 at T_4 show a decrease of 0.2 points. The pattern of results for changes in self-reported health parallels that for changes in functional capacity. Model 5 also shows that the loss of a partner leads to higher levels of loneliness, but a new partnership is not accompanied by a significant decrease in loneliness. The joint consideration of the estimates for partner status at T_1, the interaction of T_1 partner status with time, and the change in partner status shows that the loneliness score of older adults who were partnered at T_1 but single at a later observation increases by 1.9 points, whereas that for respondents who were single at T_1 but partnered at a later observation decreases by 0.5 points. Finally, there is a significant effect of changes in network size. An expansion of network size results in less loneliness, whereas a reduction in the number of network members leads to greater loneliness. The introduction of the change variables leads to a reduction in variance in loneliness scores both at the respondent level and at the level of individual observations.

Conclusion

In this study, we looked at loneliness and its correlates over a seven-year period. Our first aim was to find the general trend in loneliness over time. The results provide a clear picture: as time passes, older adults become lonelier. These findings contradict earlier results (de Jong Gierveld and Dykstra 1996) showing a decrease in loneliness over time. The earlier study, although based on the same sample of respondents, used only two measurements separated by the relatively short time span of one year. In the 1996 article, the authors suggested that the decrease in loneliness might be a methodological artifact. Presumably, participation in the survey had occasioned the respondents to carefully consider their social ties, leading to more positive evaluations. The more complex patterns emerging from the analysis presented in this article demonstrate the danger of projecting patterns of change from just two data points.

The present study also shows, however, that the increase in loneliness is not the same for all categories of older adults. First, the increase in loneliness is highest for the oldest respondents. Earlier studies using cross-sectional loneliness data suggested such a pattern: little

change in loneliness for the "younger" old and a strong increase for the "older" old. The longitudinal data provide an important empirical confirmation of a pattern of findings that so far has only been based on an examination of age differences in loneliness using data collected at one point in time.

Second, the increase over time in loneliness varies according to the partner status at T_1. Notwithstanding the generally lower levels of loneliness among those with a partner than among those who are single, over time, those living with a partner show a stronger increase in loneliness than do those who remain single. This finding suggests that the partner relationship might not offer the same kind of protection against loneliness at advanced ages as it does earlier in the life course. For example, the relationship undergoes substantial changes as one or both of the partners are confronted with increasing frailty (Nieboer 1997). The person who previously was a major source of support may have become the target of intensive caregiving. Anxiety over the partner's health, the loss of partner support, together with the demands of caregiving may contribute to significant increases in loneliness. Note, however, that those who lose their partner by death show the greatest increase in loneliness. Qualitative changes in partner relationships at advanced ages have received little attention in the literature. In our view, they form an interesting line of research for the future.

Third, the increase over time in loneliness varies with respondents' health status at T_1. Those who start in good health and subsequently experience declines show the greatest increase in loneliness. However, substantial increases in loneliness are also observed among those with continuing good health. Although older adults with better health tend to be less lonely than those with poorer health, the difference between the two groups diminishes over time. Apparently, health becomes a weaker predictor of loneliness as time passes. It is not entirely clear how to account for this finding. In our view, the interpretation should be sought in processes of accommodation whereby older adults strive to achieve a match between their personal aspirations and the demands of their circumstances (Brandstädter and Renner 1992). In our view, a qualitative follow-up of a subsample focusing on accommodation processes is needed to shed light on the findings.

The finding that the protective effects on loneliness of having a partner and of being in good physical health decline over time is an

insight that could only be gained from using data from multiple waves. The longitudinal design has advanced our knowledge into factors that provide protection against loneliness compared to what has been reported on the basis of cross-sectional studies. Note that the decline in protective effect does not hold for all predictors: The protective effect of being involved in a network of relationships does not change across successive waves.

Contrary to our prediction that the entry into a residential care facility would be accompanied by a decrease in loneliness feelings, there were no changes in loneliness associated with this transition. The absence of an effect is possibly attributable to the small number of respondents entering residential care. The shift in the function of residential care facilities (van Solinge 1995), with a greater emphasis on care and a diminishing importance of the institution as a living arrangement, might also play a role.

Although the general trend over time is an increase in loneliness, the findings also indicate that certain categories of older adults become *less* rather than more lonely over time. For example, those who experience an improvement in health report lower levels of loneliness over time. Unfortunately, the dominant focus in research and policy is on older adults whose health declines. As our study shows, the rewards of a recovery from disease or an improvement in health are clear: Older adults experiencing such a change become less lonely. The social losses that tend to accompany old age also receive greater attention in research and policy than do social gains. Our longitudinal data show that older adults do not only lose ties; they also make new ones. Levels of loneliness drop among those with networks that increase in size over time. Nevertheless, our findings show that the declines in loneliness that come with improvements in health and a new partner are smaller than the increases in loneliness that are brought about by health deterioration and the loss of a partner.

NOTES

1. At Time 2, to reduce nonresponse, loneliness data were collected by means of a written questionnaire for 170 respondents with missing values on this variable. The data from these respondents are excluded from the present analysis because earlier methodological analyses have indicated that the mode of data collection (telephone interview, face-to-face interview,

written questionnaire) has an effect on reports of loneliness feelings (van Tilburg and de Leeuw 1991). When loneliness data are collected by means of a written questionnaire, loneliness levels tend to be higher than when collected by either a telephone or a face-to-face interview.

2. The distribution of loneliness scores was heavily skewed. For that reason, the multilevel analysis was also carried out using the natural logarithm of the scores. The pattern of results was highly similar for the two kinds of measures. For simplicity of interpretation, results based on the nontransformed scores are presented.

3. There is no effect for residential care because health differences have been taken into account. If functional capacity is excluded from the analysis, for example, we do find higher levels of loneliness among older adults in residential care than among those living at home.

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Pearl A. Dykstra is a senior researcher at the Netherlands Interdisciplinary Demographic Institute (NIDI), The Hague and has a chair in family demography at Utrecht University. Her publications focus on late life families, aging and the life course, social networks, and loneliness. At present, she also is the director of the Netherlands Kinship Panel Study (NKPS).

Theo G. van Tilburg is a professor of social gerontology at the Vrije Universiteit in Amsterdam. He is director of the research program "Social context of aging." His research interests include the effects of personal network characteristics and social support on well-being and life-course developments in personal networks, related to deteriorating health and role loss.

Jenny de Jong Gierveld is a professor emeritus in the Department of Sociology and Social Gerontology at the Vrije Universiteit in Amsterdam and Honorary Fellow at the Netherlands Interdisciplinary Demographic Institute (NIDI), The Hague. She has published in the areas of social research methodology, loneliness, and living arrangements and social networks of older adults.