

Social Isolation and Loneliness in Old Age: Review and Model Refinement

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ABSTRACT

This paper reviews the empirical literature on social isolation and loneliness and identifies a wide range of published correlates. Using data from a study conducted in North Wales, which included many of the same correlated variables, a statistical modelling technique is used to refine models of isolation and loneliness by controlling for co-variance. The resulting models indicate that the critical factors for isolation are: marital status, network type and social class; and, for loneliness: network type, household composition and health.

KEY WORDS – Isolation, loneliness, model, networks.

Background

Social isolation and loneliness have long been identified as problems associated with old age (Sheldon 1948; Halmos 1952). Although not always made explicit in the literature, social isolation refers to the objective state of having minimal contact with other people; while loneliness refers to the subjective state of negative feelings associated with perceived social isolation, a lower level of contact than that desired or the absence of a specific desired companion. As populations age these problems are increasingly viewed as a major concern (Bennett

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1980; Mullins *et al.* 1988; Christ and Muller 1991) and absence of loneliness and isolation is seen as important for a good quality of life (Sinclair *et al.* 1990). In the context of social policy and service provision for elderly people the fact that biological reactions to stress may increase physical susceptibility to disease and mental illness (Dean and Lin 1977) indicates that amelioration of these stressful conditions can improve health as well as quality of life.

The importance of social isolation in social policy terms is implicit in the emphasis placed on social integration and support networks in the Griffiths Report (1988) and the Government White Paper (DoH 1989), with the associated guidance (DoH 1990*a* and *b*) and in its correlation with institutional admissions (Rodstein *et al.* 1976; Ross and Kedward 1976) and poor rehabilitation (Hyman 1972).

Loneliness has been described as the main problem associated with old age (Wilkes 1978). It has been identified as a common presenting problem in referrals to social services (Stevenage Development Corporation 1973; Hazan 1980; Grant 1981; Sinclair *et al.* 1990; Jerrome 1991) and a significant correlate with entry to residential care (Townsend 1965; Wenger 1984*a*; Sinclair *et al.* 1990).

Social isolation and loneliness have been identified as susceptible to therapeutic interventions (Bennet 1980; Freeman 1988; Grant 1988; Mullins *et al.* 1988; Knipscheer 1988; Jerrome 1991, 1992) and thus as important targets for preventive strategies (Goldberg 1979; Hadley *et al.* 1975; Mulligan and Bennett 1977/8; Grant 1988; Jerrome 1991). The reduction of isolation and loneliness is seen as a main aim by most personnel in the charitable groups which organise clubs for older people and by similar statutory day care providers (Jerrome 1991). Changes in levels of isolation and loneliness have been used as outcome measures in the evaluation of various interventions (Challis 1982).

The first part of this paper reviews the literature on social isolation and loneliness. The relationship between isolation and loneliness is discussed and the reported correlates of isolation and loneliness identified. Subsequently, a statistical modelling technique is employed in an effort to refine earlier analyses, based on longitudinal data from a study conducted with elderly people living in the community in North Wales.

While social isolation and loneliness are seen as common problems of old age, the prevalence of these problems is likely to have been over-estimated. It has been suggested that social isolation is not widespread except among the *very* old (Peters and Kaiser 1985; Freeman 1988). However, advancing age predisposes people to those experiences which can lead to isolation: bereavement, relocation (moving) and retirement

(Hovaguimian *et al.* 1988), although different patterns of isolation have been identified which include both those who become isolated in old age and those who are life-long isolates (Bennett 1980, Wenger 1992 *a*).

The largest survey on loneliness, conducted in the United States by Harris and Associates (1974), found that for elderly people it was less important than fear of crime, poor health and inadequate income. The survey was repeated in 1981 with similar findings (Harris *et al.* 1981). A European study found that the prevalence of loneliness shows no significant difference between age groups (Tornstam 1981).

The correlates of isolation and loneliness

Despite the absence of a direct link between isolation and loneliness (Wenger 1983, 1984 *b*), many of the same factors are associated with both. Different writers have looked at different variables, some concentrating on demographic and others on behavioural correlates. Interpretations are not always consistent so that no unified model of isolation or loneliness exists.

Both isolation and loneliness have been shown to be more common for women than for men (Qureshi and Walker 1989), but this is largely due to the fact that women are more likely to be widowed and living alone, both factors being important correlates for men and women. However, a study in the US (Mullins and Mushel 1992) found that men were more lonely than women. The association with advanced age (Wenger 1983) can also be explained in terms of the greater likelihood of being widowed and living alone, although some of the isolation associated with longevity results from outliving one's contemporaries (Hadley and Webb 1974). However, Bury and Holme (1990) found that even in a study of people over 90, 61 per cent said they were never lonely. Table 1 summarises the prevalence of loneliness from a range of studies.

In some studies living alone has been equated with social isolation and in all studies of isolation living alone appears to be a *sine qua non* of the definition, for while not all those living alone are isolated, nearly all those who are isolated live alone. Loneliness is not directly associated with living alone. Many who live alone live fully integrated socially active lives (Larsen *et al.* 1985), however, loneliness is more common amongst those living alone (Havinghurst 1978; Hunt 1978; Wenger 1983). The evidence indicates that intimate relationships outside the family may be more important than family relationships (Abrams 1974; Bengtson and Kuypers 1985).

TABLE 1. *Prevalence of loneliness in adults aged 65+ (%)*

	Very/often lonely	Sometimes lonely	Never/rarely lonely	Sample Characteristics
U.K. Studies:				
Sheldon (1948)	10	7	84	Urban
Tunstall (1966)	9	—	—	
Goldberg (1970)	13	36	50	Social Service Clients
Townsend and Tunstall (1973)	11	33	56	Living alone
Hunt (1978)	13 ¹	—	—	
Wenger (1984)				
Self-assessed	5	19	76	Rural Population
Aggregate measure	9	29	63	
Jones <i>et al.</i> (1985)	5	19	76	Urban
	2	14	84	Rural
Quereshi and Walker (1989)	12 ²	—	—	
Other countries:				
Shanas <i>et al.</i> (1968)	7	21	72	Denmark, UK & USA
Harris <i>et al.</i> (1974)	12 ¹	—	—	USA
Kivett (1979) ³	16	42	43	USA – rural
Harris <i>et al.</i> (1981)	13	—	—	USA
Power (1980)	14	25	61	Republic of Ireland – Living alone
Clifford (1990)	15	20	65	Republic of Ireland
Huijsman and de Klerk (1993)	10	17	73	The Netherlands

¹ Loneliness experienced as serious problem.

² Aged 75+.

³ Based on discriminant analysis.

Isolation has also been identified as more common amongst those who are widowed (Berardo 1967; Carey 1977; Qureshi and Walker 1989) and while the majority of widowed people are women, it has been suggested that isolation can be more extreme for widowed men (Dibner 1981). However, the relationship between widowhood and loneliness is reported in nearly all studies, some of which have noted that it is most intense *in early* widowhood (Sheldon 1948; Berardo 1967; Shanas *et al.* 1968; Townsend and Tunstall 1973; Whittington 1977; Hunt 1978; Kivett 1979; Power 1980; Wenger 1983), when the loss of an intimate companion is most painful.

It has been claimed that loneliness amongst widows may be ameliorated by visits from children. However, it has been found that such visits make little impact on loneliness (Hadley *et al.* 1975; Arling 1980), and very old widows living *with* children are frequently amongst the most lonely (Townsend and Tunstall 1973; Wenger 1983). Absence

of children has been identified as being associated with both isolation (Palmore 1976) and loneliness (Shanas *et al.* 1968; Townsend and Tunstall 1973), but Weeks and Cuellar (1981) found that while elderly people may turn to the family for instrumental help, they are least likely to do so in times of loneliness. In contrast, a study in Sweden found that loneliness is related inversely to frequency of contact with children and friends but not neighbours (Berg *et al.* 1981). Mullins and Mushel (1992) found that loneliness was unrelated to the availability of spouse or children but that the existence of friends was significant. The importance of friends has also been identified by other authors (Wenger 1983; Jerrome 1991). It has been shown that most of the objective measures of social isolation are unrelated to the subjective measures of well-being, although companionship and the availability of confidant relationships *are* significant (Chappell and Badger 1989). Other research has shown that those without a confiding relationship are more subject than others to depression (Murphy 1982).

Singleness has also been associated with both isolation (Shanas *et al.* 1968; Lowenthal and Robinson 1976; Palmore 1976) and loneliness (Shanas *et al.* 1968; Hadley and Webb 1974; Kivett 1979; Wenger 1984*b*), although Townsend and Tunstall (1973) claim that single people are less lonely. Part of the reason for such disagreement is likely to stem from bivariate analyses without any control variables. In addition to marital status, loneliness has been associated with loss of *any* close relationship (Townsend and Tunstall 1973; Hadley and Webb 1974; Mullins *et al.* 1988); changes in social contacts (Kivett 1979); reliance on a *single* close relationship (Hadley and Webb 1974); and, on loss in general (Shanas *et al.* 1968; Power 1980).

Other authors (Shanas *et al.* 1968; Abrams 1974) emphasise that loneliness is more closely associated with loss than with isolation. Thus loneliness is found to be more common among recent isolates than life-long isolates (Townsend and Tunstall 1973; Bennett 1980) and associated with the experience of loss or death of members of the close social network (Townsend 1968; Hadley and Webb 1974; Mullins *et al.* 1988). Both isolation and loneliness have been identified as being associated with retirement migration and thus disruption of the social network (Whittington 1977; Wenger 1984*b*; Fitzgerald 1986). This latter point is in contrast with long-standing isolation which is more often associated with a failure to develop a social network in earlier life (Hadley and Webb 1974).

Social class status has been found to be associated with isolation but not loneliness. Working class older people appear to be more likely than others to become isolated (Blum 1964; Lowenthal and Robinson 1976).

Working class elders are also more likely to become depressed (Murphy 1982).

Both isolation and loneliness are associated with poor health and/or loss of mobility. Evidence presented elsewhere suggests that social stress may trigger poor health (Dean and Lin 1977; Murphy 1987; Grant 1988), although loneliness may *result* from restricted contacts with others *due* to ill health (Jerrome 1991). Loneliness is associated with the amount of contact with health professionals, and use of medicines (Asiel 1987). It has also been shown to be connected with general disability (Jones *et al.* 1985). The causal relationship is not clear cut. Isolation and loneliness may lead to ill health, the causal link may be in the other direction or the connections may be circular. Correlations have been found between poor health and isolation (Lowenthal 1964; Hadley and Webb 1974; Lowenthal and Robinson 1976; Lynch 1977) and between poor health and loneliness (Townsend and Tunstall 1973; Kivett 1979; Power 1980; Wenger 1984*b*; Jones *et al.* 1985; Asiel 1987; Mullins *et al.* 1988). Mullins *et al.* (1988) go so far as to say that health is the best predictor of loneliness. Mortality has been associated with both isolation (Berkman and Syme 1979; Abrams 1983) and loneliness (Abrams 1983).

The main link between loneliness and mental illness appears to be the likelihood of lonely people becoming depressed (Thompson 1973). The relationship between depression and loneliness is further emphasised by findings that link childhood loss or an unsafe childhood with later depression (Brown and Harris 1978) and loneliness in adulthood (Seabrook 1973; Tornstam 1989). However, at least one author, taking a psychoanalytic approach finds that both neglect and too much attention in the context of a secluded childhood can lead to loneliness in old age (Andersson 1990). Severe life events in the preceding year have also been linked to the onset of depression (Murphy 1982, 1983).

Isolation and loneliness have also been shown to be associated with admissions to residential care (Townsend and Tunstall 1973; Ross and Kedward 1976; Wenger 1984*a*; Koedoot and Hommel 1993), while those who are isolated demonstrate poor stroke rehabilitation levels (Hyman 1972). Jerrome (1982) and Elias (1986) have noted that dying is both a lonely and for many an isolated experience.

Both isolation (Brocklehurst 1978) and loneliness (Wenger 1984*b*, 1992*b*) have been associated with low morale, although Wenger (1984*b*) found that those who were isolated had better health and higher morale than those who were lonely. While poor physical health is related to both social isolation and loneliness, only isolation appears to be highly correlated with mental disorder (Lowenthal 1964; Hadley

TABLE 2. Summary of reported correlates¹ of isolation and loneliness

	Isolation	Loneliness
Age²	×	×
Male sex	×	×
Widowhood	×	×
Singleness	×	×
Living alone	×	×
Childlessness	×	×
Retirement migration	×	×
Poor health	×	×
Restricted mobility	×	×
Mortality	×	×
Admission to institutional care	×	×
Low morale	×	×
Working class status	×	
Poor rehabilitation	×	
Mental illness	×	
Absence of friends		×
Loss		×
Depression		×

¹ As specified in the table, all associations are positive.

² Bold type indicates variables also available in North Wales study discussed below.

and Webb 1974; Gottlieb and Schroter 1978; Salloway 1983; Wilkin *et al.* 1985; Freeman 1988 and Hovaguimian *et al.* 1988) and Lowenthal (1964) notes that this is more marked when isolation develops late in life. This suggests a causal relationship, *i.e.* (late developing) isolation may lead to mental disorder rather than the other way round. There is an indication here that loss is associated with mental health problems. However, only prospective studies can fruitfully examine these links.

The identified correlates of isolation and loneliness are summarised in Table 2. In the remainder of this paper we present statistical models of isolation and loneliness which control for interrelationships between variables.

Findings from North Wales study

The findings presented in the remainder of this paper come from the first phase of a four phase longitudinal study of ageing conducted in North Wales 1978–1991. The sample was selected from the total community of elderly people living at home in a range of representative settlement types in rural North Wales, and the achieved sample was

representative of the numbers living in different community types for that rural region. The project was based on a 1979 survey of 534 elderly people 65+ living in the community. Survivors have been re-interviewed in 1983, 1987, 1991 and 1995.

We present here the results of cross-sectional multivariate analyses of the baseline 1979 data. The objective is to arrive at refined models of isolation and loneliness which identify and include the main explanatory variables from our list of possible correlates.

Building statistical models of isolation and loneliness

Models are established for (1) social isolation, (2) loneliness based on an aggregate measure and (3) self-assessed loneliness.

Isolation was measured on an aggregate scale based upon eight objective items: lives alone; has no close relatives; never visits relatives or friends; has no contact with neighbours; has no telephone; is alone for more than 9 hours a day; lives more than 50 years from nearest neighbour; and is housebound. One isolation point was scored for each item, giving a maximum isolation measure (IM) score of 8 and a minimum of 0.

An aggregate scale was also designed to measure *loneliness* but, in this case, the contributing items had a subjective emphasis. Only one of the questions actually mentioned loneliness (although another item allowed loneliness as an element in the response), thus seeking to overcome the stigma of loneliness and resistance to admitting that one was lonely (see Wenger, 1983). The eight items were: feels lonely much of the time; does not see enough of friends and relatives; does not meet enough people; has no one to confide in; wishes for more friends; has no one to ask favours of; has no real friends in the area; and spent the previous Christmas alone and lonely. The last item was coded from the response to an open question in which 'alone by choice' was another category. This loneliness measure is referred to subsequently as LM.

The third measure is a *self-assessment of loneliness* (SAL) for each respondent, with five response categories. This item was reduced to a two-category variable with 'never' and 'rarely' lonely combined into a 'not lonely' category, and 'sometimes', 'often' and 'most of the time' combined into a 'lonely' category.

The software package GLIM (Francis *et al.* 1993) was used for the analyses. A conventional linear regression model was appropriate for the continuous response variable IM and a logistic regression model for the binary response variable SAL. The response variable LM was more

problematic. It is positively skewed with around 60 per cent of the responses on the lowest end of the scale. It was decided to recode this continuous variable into three categories: 'not lonely' (a score of 0), 'medium' (a score of 1 or 2) and 'high' (a score of 3 or higher) on the basis of earlier work (see Wenger 1984*b*). A multinomial logistic model was then fitted to these data.

Eleven explanatory variables supported by previous work (see Table 2 – marital status constituted one variable, subsuming widowhood and singleness) were available for inclusion in the models. The list was augmented by seven more measures: number of years widowed, income, network type (Wenger 1989, see appendix), ethnicity (Welsh/non-Welsh); wish for more friends, having a confidant, and the time they have known their confidant. Seven variables dependent on the respondent's subjective assessment or response, or feelings, are classified as subjective (self-assessed health; activities limited by health; morale; presence of local friends; desire for more friends; presence of a confidant and length of time known confidant). The number of years respondent has known a confidant is included because the perception of having a confidant may be subjective. The analyses seek to establish models on the basis of the objective variables and then to test for the effect of subjective variables over and above the objective variables. With this pragmatic approach, it is possible to obtain some indication as to whether the role of subjective variables is an additional and distinct direct effect, an intervening effect, or the result of complex interaction with the objective variables.

A forward substitution method was used to guide the selection of a preferred model for each response variable. Explanatory variables were entered in the model one at a time and their effect was tested for statistical significance. The most significant variable was then added to the model and the process repeated until none of the remaining variables was significant. In the case of two or more variables of similar significance at any iteration, two or more models were developed and goodness-of-fit criteria were used to choose between the final results. At each iteration, variables not significant at 5 per cent were dropped from the analysis (see Appendix B).

Isolation model

Since household composition and the existence of close relatives contributed towards the definition of the isolation measure (IM), these variables (household composition and childlessness) were excluded from the analysis of IM. All the other variables except age of arrival in

present community, ethnicity and the two health variables are significant at a 5 per cent level when included on their own in the model. Marital status is the most significant of the objective variables and enters the model first. After controlling for this variable, age, sex and income cease to be significant. Subsequently, the variables number of years widowed, social class, and network type enter the model in that order.

In stage 2, with the parameter estimates of the objective model held fixed, the variable 'length of time they have known a confidant' is highly significant and enters the model. All but morale then cease to be significant. Thus, at this stage, the model includes two subjective variables in addition to the objective variables from stage 1.

When model fitting is repeated without distinguishing between objective and subjective variables, exactly the same set of explanatory variables appear in the final model; the results are encouragingly robust.

The resulting *Model of Isolation* includes: marital status; number of years widowed; social class; support network type; morale; and length of time respondent has known their present confidant.

Self-assessed Loneliness (SAL) model

For the analysis of self-assessed loneliness the objective variables age, parenthood, arrival age, social class and ethnicity are all non-significant at the 5 per cent level when included on their own in the model. Marital status again enters the model first. Controlling for this variable, sex, number of years widowed and income cease to be significant. The two remaining objective variables, network type and household composition, are both included in the final model for stage 1.

Because of the nature of the logistic distribution (having fixed variance) the parameters of the objective model cannot be fixed when testing for the subjective variables. Having arrived at a preferred model for the objective variables, subjective variables are introduced into this model. SAL was a defining variable for morale, so morale was not considered for inclusion. All the other subjective variables, except the presence of local friends, are significant when included on their own, and the wish for more friends, self-assessed health and length of time respondent has known their confidant enter the model in that order. The objective variables remain significant after inclusion of subjective variables in the model; again, the models are encouragingly robust.

The resulting *Model of Self-Assessed Loneliness* includes: marital status; household composition; support network type; self-assessed health;

desire for more friends and length of time respondent has known their confidant.

Loneliness (aggregate measure) LM model

For the analysis of the LM, network type enters the model first. Controlling for this variable, age and number of years widowed cease to be significant. At this round, household composition and ethnicity were both significant. Each of these variables remains significant when controlling for the other; both variables are included in the stage 1 model.

Once again, the parameters of the objective model cannot be fixed because of the nature of the logistic distribution. All the subjective measures, apart from the two health measures, are defining variables for LM. They are, therefore, ignored in the analysis. Self-assessed health enters first in stage 2. This does not affect the objective model, but health limited activities ceases to be significant.

The resulting *Model of the Loneliness Measure*, includes household composition; support network type; ethnicity and self-assessed health.

Discussion of the models

Using a multivariate modelling technique, it has been possible to refine the models of isolation and loneliness, reducing the number of significant correlates and identifying those which remain important when allowing for the associations between variables.

Isolation

In refining the *model of isolation*, the number of correlates was reduced from the 12 which are significant on their own to just 6 variables. The parameter estimates for the stage 1 model and for the final model including both objective and subjective variables are given in Table 3. (The parameter estimates for the subjective variables at stage 2, when the objective parameters were fixed at their Stage 1 values, were close to those of the final model.). The coefficients for the objective variables change little when the subjective variables are added, indicating that the model gives a robust picture of the effect of the objective variables.

The results suggest that the variable marital status is significantly related to social isolation: married respondents appear to be less likely to be isolated than those who have never married, or have been widowed. Moreover, for the widowed, isolation tends to increase with

TABLE 3. *Isolation measure: Model fitting results using cross-sectional method (0 = not isolated; 8 = very isolated)*

	Stage I		Final Model	
	p.e.	s.e.	p.e.	s.e.
Constant	1.17	0.24	1.89	0.55
	Objective Variables			
Marital status				
single	0.00		0.00	
married	-1.19	0.18	-1.15	0.17
widowed	0.03	0.16	0.03	0.16
Social Class				
I/II	0.00		0.00	
III/IV	0.41	0.12	0.43	0.12
V	0.49	0.16	0.49	0.15
military/no class	0.27	0.29	0.28	0.27
Years widowed	0.20	0.04	0.15	0.04
Network type				
local family dependent	0.00		0.00	
locally integrated	-0.09	0.15	0.07	0.15
locally self-contained	0.41	0.17	0.48	0.17
wider community focused	-0.02	0.20	0.05	0.19
private	0.53	0.23	0.51	0.22
	Subjective Variables			
Morale				
low			0.00	
medium			-0.66	0.39
high			-0.93	0.38
Time known confidant				
< 1 year			0.00	
1-3 years			-0.07	0.34
4-5 years			0.25	0.33
6-10 years			-0.03	0.32
11-20 years			-0.06	0.32
21-30 years			0.90	0.36
31+ years			1.40	0.42
R ²	0.32		0.39	

duration of widowhood. Older working class people are more likely to be socially isolated in addition to the effect of marital status. This may reflect lower levels of income and access to transport as well as life-style. Support network type remains significant even when marital status and social class are controlled for. Those with privatised or household-focused life-styles are more likely to be isolated. The locally integrated network type, which includes higher numbers of friends and involvement in community groups, is associated with the lowest isolation scores.

TABLE 4. *Cross-sectional analysis of self-assessed loneliness – model fitting results (N = 498) (1 = lonely; 0 = not lonely)*

	Stage 1		Final Model	
	p.e.	s.e.	p.e.	s.e.
Constant	0.57	0.41	0.20	0.93
	Objective variables			
Marital status				
single	0.00		0.00	
married	0.28	0.67	0.61	0.77
widowed	1.34	0.34	1.71	0.40
Network type				
local family dependent	0.00		0.00	
locally integrated	-1.28	0.34	-0.9	0.37
local self-contained	-0.40	0.36	-0.21	0.41
wider community focused	-1.64	0.47	-1.40	0.53
private restricted	0.18	0.44	0.14	0.49
Household composition				
alone	0.00		0.00	
with spouse	-1.06	0.67	-1.57	0.76
with younger	-1.46	0.36	-1.55	0.40
with older	-1.71	0.66	-2.02	0.79
	Subjective variables			
Wish for more friends				
yes			0.00	
no			-1.84	0.37
State of health				
good/excellent			0.00	
all right for age			0.68	0.30
fair/poor			1.56	0.35
Time known confidant				
< 1 year			0.00	
1-3 years			0.65	0.78
4-5 years			-0.52	0.80
6-10 years			-0.50	0.74
11-20 years			-0.51	0.73
21-30 years			0.69	0.82
31+ years			0.73	0.95
Log likelihood	-235.0		-198.0	
Degrees of freedom	487		478	

The significantly higher levels of isolation for those who have known their confidant for more than 20 years is difficult to explain. The association with low morale is likely to reflect the lowered morale of those who become socially isolated but may equally well indicate withdrawal on the part of those whose morale is low.

What seems clear from this analysis is that social isolation appears to arise from factors which are largely beyond the control of the individual

and which are, therefore, not obviously susceptible to amelioration. Practitioners should be aware of the predisposing factors and maintain closer monitoring and surveillance of those recognised to be at risk of social isolation.

Loneliness

We have produced two separate *loneliness models*, one based on self-assessment and another based on an aggregate measure, which it has been suggested is more objective and overcomes feelings of stigma which may influence responses (Wenger 1983).

For *self-assessed loneliness* the number of significant correlates was again halved from 12 to 6 in the multivariate analysis. Only 7 explanatory variables were significant on their own for the *aggregate loneliness* measure and these were reduced to 4 by the multivariate analysis. The parameter estimates for the loneliness models are given in Tables 4 and 5 respectively.

Again, the general pattern of the parameter estimate for the objective variables in the Stage 1 models is maintained in the final models when the subjective variables are added.

In the SAL model, the parameter estimates for marital status and household composition increase with the inclusion of the subjective variables, while those for network type generally decrease. In a logistic model, this is consistent with the effect of the subjective variables being independent of marital status and household composition, but interacting with network type to reduce its effect. Network type is based upon both demographic criteria, such as availability of local kin, and social activity. It may be that the subjective variables are acting to substitute for part of the social component.

The inclusion of state of health in the model for LM has very little effect on the model, although there is some limited evidence for an interaction with network type as for SAL. This is not surprising since shifts in support network type are associated with the deterioration of health and/or growing frailty. Shifts are not inevitable but where they do occur, they are modally from more to less independent network types (Wenger and Scott 1994).

Three variables are significant in both of the loneliness models: network type, household composition and self-assessed health. Unsurprisingly, those with support networks which provide high levels of social contact and interaction – locally-integrated and wider community-focused networks – are less likely to be lonely. In the LM model, the effect increases steadily across the three categories: ‘not

TABLE 5. *Cross-sectional analysis of loneliness measure – model fitting results (N = 498) (modelling probability of loneliness categories)*

	Stage 1		Final Model	
	p.e.	s.e.	p.e.	s.e.
Constant				
Group (2)	0.14	0.30	-0.30	0.35
Group (3)	-0.43	0.39	-0.82	0.46
	Objective Variables			
Network Type*				
Group 2.LFD	0.00		0.00	
Group 2.LI	-1.17	0.32	-1.04	0.33
Group 2.LSC	-0.25	0.35	-0.15	0.35
Group 2.WCF	-1.25	0.42	-1.08	0.43
Group 2.PR	0.34	0.45	0.42	0.46
Group 3.LFD	0.00		0.00	
Group 3.LI	-2.65	0.54	-2.48	0.54
Group 3.LSC	-0.99	0.47	-0.82	0.48
Group 3.WCF	-2.20	0.62	-2.00	0.63
Group 3.PR	0.07	0.55	-0.22	0.55
Household Composition				
Group 2. alone	0.00		0.00	
Group 2. with spouse	-0.82	0.27	-0.86	0.27
Group 2. with younger	-0.97	0.33	-0.90	0.33
Group 2. with older	-1.15	0.48	-1.15	0.48
Group 3. alone	0.00		0.00	
Group 3. with spouse	-0.50	0.38	-0.58	0.39
Group 3. with younger	-0.95	0.47	-0.87	0.47
Group 3. with older	-2.11	1.03	-2.13	1.03
Ethnicity				
Group 2. Welsh	0.00		0.00	
Group 2. non-Welsh	0.75	0.26	0.77	0.26
Group 3. Welsh	0.00		0.00	
Group 3. non-Welsh	0.93	0.36	0.93	0.36
	Subjective Variables			
Health				
Group 2. good			0.00	
Group 2. all right			0.44	0.25
Group 2. fair/poor			0.85	0.30
Group 3. good			0.00	
Group 3. all right			0.14	0.38
Group 3. fair/poor			0.96	0.41
Log likelihood	-403.63		-397.74	
Degrees of freedom	978		974	

lonely', 'medium' and 'high'. Living with others and maintaining good health may, however, mitigate the effects of poor network support. These two factors and ethnicity discriminate mainly between the 'not lonely' and 'medium/high loneliness' groups.

An earlier analysis (Wenger 1983), comparing self-assessed with LM loneliness found that widows appeared to be more willing to admit to loneliness and suggested that self-assessment may under-measure loneliness for other groups. The presence of marital status only in the SAL model is consistent with this conclusion. The wish for more friends was used as an item in the LM and so was omitted from the modelling exercise for this reason. The presence of ethnicity in the LM model is also significant and it was suggested earlier (Wenger 1983) that those who had moved into Wales, many on retirement, may also be unwilling to admit to loneliness, explaining why ethnicity is not significant for the SAL model. There are parallels here with a recent US study (Mullen and Mushel 1992) which found loneliness to be related to gender, health status, economic condition, need for affection and the desire to be part of a social network.

The variable 'time known confidant' entered the model for self-assessed loneliness last of the six variables. Although the overall effect was just significant ($P = 0.04$), the individual parameter estimates are all smaller than their standard errors and do not show a consistent trend. Since having a confidant was not significant when other variables were controlled for, it is likely that this apparent effect is an artefact of the data.

The differences between the SAL and the LM models alert practitioners to remain aware of the stigma of loneliness, which may not be admitted by those who have no socially acceptable reason to be lonely, such as being widowed. Again, two of the major contributory factors to loneliness – network type and household composition – are not susceptible to amelioration. Curative or palliative treatment may, however, reduce the impact of poor health. Here too practitioners need to be aware of the predisposing factors.

Discussion of the results

The results of the model fitting are summarised in Table 6 and 7. Table 6 shows which of the variables in the North Wales Study had previously been identified as associated with isolation and/or loneliness (Table 2). Four variables, age, gender, childlessness and retirement migration cease to be significant for any of the measures when controlling for the other variables in a multivariate analysis (although ethnicity probably acts as a proxy for retirement migration in the aggregate loneliness measure).

TABLE 6. *Reconsideration of reported correlates of isolation and loneliness*

	Isolation		Loneliness		
	Literature	Cross-sectional Modelling	Cross-sectional Modelling		
			Literature	(Self-assessed)	(Aggregate Measure)
Age	x		x		
Gender	x		x		
Marital status	x	x	x	x	
Household composition	x	D	x	x	x
Childlessness	x	D	x		
Retirement migration	x		x		
Self-assessed health	x		x	x	x
Restricted mobility	x	D	x		
Morale	x	x	x	(D)	(D)
Social class	x	x			
Local friends			x	x	
Years widowed		x			
Network type		x		x	x
Ethnicity					x
Time known confidant		x		x	

D = defining variable.

TABLE 7. *Comparison of computer multi-variate models*

Isolation (Table 3)	Self-assessed Loneliness (Table 4)	Aggregate Loneliness Measure (Table 5)
Objective measures:		
Singleness or widowhood	Widowhood	
Length of widowhood		
Working class status		
Local self-contained or private restricted network	Family dependent, local self-contained or private restricted network	Family dependent, local self-contained or private restricted network
(Living alone was defining factor for isolation)	Living alone	Living alone
		Being non-Welsh
Subjective measures:		
Low morale	(Loneliness component is included in PGC morale scale)	
Length of time known confidant		
(Houseboundness was a defining factor for isolation)	Self-assessed health as only fair/poor	Self-assessed health as only fair/poor
	Desire for more friends	

Three variables are present in all three models: household composition, morale and support network type. However, only network type is not included in the operational definitions of the variables of interest. Household composition (i.e. living alone) was a defining item for isolation, and the Philadelphia Geriatric Center morale measure used includes a loneliness component. Two further variables are associated with isolation and self-assessed loneliness but not with the aggregate loneliness measure: marital status and the length of time respondents have known a confidant. *Singleness* and *widowhood* are associated with social isolation, but only widowhood with self-assessed loneliness (Table 7). Of these five variables three had been previously identified as associated with both isolation and loneliness. However, two new shared correlates have been identified: support network type and length of confidant relationship.

Two additional variables were identified as significant correlates of isolation but not loneliness: social class and number of years widowed. Restricted mobility (houseboundness) was a defining item for isolation. The association with social class (working class status) has previously been identified but the number of years widowed is a new correlate suggesting that the social isolation of widows increases over time.

Three variables are identified as correlates of loneliness but not isolation: self-assessed health, ethnicity and the desire for more friends. Health and friends have previously been identified but ethnicity is a new correlate which warrants further exploration. It is possible that Welsh ethnic identification also reflects class status since incomers are less likely to be blue collar working class (Table 7).

Looking more closely at Table 7, which identifies the variable values associated with isolation and loneliness, some of the overlaps and discontinuities can be explored further. The table distinguishes between objective and subjective variables. Some variables are more difficult than others to categorise because self-assessments can be affected by the emotional state of the respondent. Self-assessed health is clearly one of these. However, we have also classified the length of time respondents had known their confidant as subjective since the perception of *having* a confidant is likely to be subjective.

The outcome suggests that while the distinction between social isolation as an objective state and loneliness as a subjective state generally holds, the refined model indicates that it may not be so clearcut. As we might have previously suggested (Wenger 1983) self-assessed loneliness results from more subjective factors than loneliness based on the aggregate measure. Whilst it is not possible to prove the

direction of causality, particular objective aspects of social isolation appear to predispose older people to loneliness: widowhood, living alone and support network type. Also, some of the subjective variable correlates of loneliness may exacerbate social isolation: self-assessed poor health (leading to restricted mobility) and low morale.

Finally, it is emphasised that some potentially significant correlates were not available in the North Wales data set. These may be characterised as possible outcome variables *resulting* from isolation and/or loneliness. Mortality and admission to residential care have been found to be correlated with both isolation and loneliness. Isolation has further been linked with poor rehabilitation and mental illness; and loneliness with depression. Both are associated with low morale. The importance of network type for both isolation and loneliness suggests that interventions at the network level which increase contact and interaction are likely to have preventative outcomes in terms of loss of independence and health maintenance as well as improving quality of life. Further work using longitudinal data and looking prospectively at change and the correlates of changes will make it possible to explore further the inter-relationships between isolation, loneliness and other variables.

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Appendix A – Support network typology

The support network typology referred to in this paper is based on earlier work from the longitudinal research on ageing on which this paper is based (Wenger 1989). Five support network types were identified on the basis of the following factors:

- (1) the availability of local close kin
- (2) the level of involvement of family, friends and neighbours and
- (3) the level of interaction with the community and voluntary groups.

The networks are named on the basis of the nature of the old person's relationship to the support network. The first three types are based on the presence of local kin, the other two types reflect the absence of local kin:

- (1) Local family dependent
- (2) Locally integrated
- (3) Local self-contained
- (4) Wider community focused
- (5) Private restricted.

The five networks identified can be summarised as follows:

- (1) The local family dependent support network has primary focus on close local family ties with few peripheral friends and neighbours. It is often based on a shared household with, or near to, an adult child, usually a daughter. Community involvement is generally low. All support needs are met by relatives. These networks tend to be small and the elderly people are more likely to be widowed, older and in less good health than those with other types of networks.
- (2) The locally integrated support network includes close relationships with local family, friends and neighbours. Many neighbours are also friends. Usually based on long-term residence and active *community involvement in church and voluntary organisations in the present or recent past*. These networks tend to be larger on average than others.
- (3) The local self-contained support network typically has arms-length relationships or infrequent contact with at least one relative living in the same or adjacent community or neighbourhood, often a sibling, niece or nephew. Childlessness is common. Reliance is focused on neighbours but elderly people with this type of network tend to adopt a household-focused life-style and community involvement, if any, tends to be low key. Networks tend to be smaller than average.
- (4) The wider community focused support network is associated with active relationships with distant relatives, usually children and high salience of friends and neighbours. Absence of local kin is typical. The distinction between friends and neighbours is maintained. The old people are generally involved in community and/or voluntary organisations. This type of network is frequently associated with retirement migration and is commonly middle class or skilled working class adaptation. Networks are larger than average.
- (5) The private restricted support network is typically associated with absence of local kin, other than in some cases a spouse, although a high proportion are married. Contact with neighbours is minimal. These old people have few nearby friends and a low level of community contacts or involvements. The network type subsumes two sub-types: independent married couples and dependent elderly persons who have withdrawn or become isolated from local

involvement. In many cases a low level of social contact represents a lifelong adaptation. Networks are smaller than average.

Appendix B – Statistical details of model building

Cross-sectional analysis of *isolation measure*, (N = 498) – cell values are *p*-values based on F-ratio test, ‘IN’ indicates a selected variable which remains in the model

Explanatory variables	Stage 1					Stage 2		
Age	*	0.11						
Sex	*	0.6						
Marital status	*	IN	IN	IN	IN	FIXED	FIXED	FIXED
Social class	0.01	0.001	*	IN	IN	FIXED	FIXED	FIXED
Ethnicity	0.68							
Arrival age	0.17							
Years widowed	*	*	IN	IN	IN	FIXED	FIXED	FIXED
Income	*	0.09						
Network type	*	*	*	0.002	IN	FIXED	FIXED	FIXED
Subjective variables								
Health	0.97							
Health limited activities	0.71							
Morale	*					*	0.01	IN
Presence of friends	0.03					0.03	0.10	
Wish for more	0.02					0.03	0.13	
Confidant	*					0.001	0.17	
Years known confidant	*					*	IN	IN
R ²					0.32			0.39

**p* < 0.0001.

Cross-sectional analysis of *self-assessed loneliness* (N = 498) cell values are *p*-values based on likelihood ratio test χ^2 , ‘IN’ indicates a selected variable which remains in the model.

Explanatory variables	Stage 1					Stage 2		
Constant	IN	IN	IN	IN	IN	IN	IN	IN
Objective Measures								
Sex	*	0.14	–	–	–	–	–	–
Age	0.07	–	–	–	–	–	–	–
Marital status	*	IN	IN	IN	IN	IN	IN	IN
Number of years widow	0.02	0.17	–	–	–	–	–	–
Household composition	*	*	*	IN	IN	IN	IN	IN
Network type	*	*	IN	IN	IN	IN	IN	IN
Income	*	0.29	–	–	–	–	–	–

Cross-sectional analysis of *self-assessed loneliness* (cont.)

Explanatory variables	Stage 1			Stage 2			
Social class	0.18	-	-	-	-	-	-
Ethnicity	0.22	-	-	-	-	-	-
Parenthood	0.31	-	-	-	-	-	-
Arrival age in community	0.07	-	-	-	-	-	-
Subjective Measures							
Presence of friends	0.01			0.25	-	-	-
Self-assessed health	*			*	*	IN	IN
Health limited activities	*			*	*	0.09	-
Confidant	*			0.04	0.05	0.08	-
Length known confidant	*			0.005	0.01	0.04	IN
Wish for more friends	*			*	IN	IN	IN

* $p < 0.0001$.

Cross-sectional analysis of *loneliness measure* (N = 498) – cell values are p -values based on likelihood ratio test χ^2 ; ‘IN’ indicates a selected variable which remains in the model

Objectives	Stage 1			Stage 2			
Age	0.03	0.33					
Sex	0.24						
Marital status	0.11						
Household composition	0.02	0.003	IN	IN	IN	IN	
Social class	0.16						
Ethnicity	*	0.007	0.003	IN	IN	IN	IN
Parenthood	0.11						
Arrival age	0.12						
Years widowed	0.04	0.10					
Income	0.23						
Network type	*	IN	IN	IN			
Subjective Variables							
State of health	*					0.02	IN
Health limited activities	*					0.06	

* $p < 0.0001$.