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A 6-Item Scale for Overall, Emotional, and Social Loneliness

Confirmatory Tests on Survey Data

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Loneliness is an indicator of social well-being and pertains to the feeling of missing an intimate relationship (emotional loneliness) or missing a wider social network (social loneliness). The 11-item De Jong Gierveld Loneliness Scale has proved to be a valid and reliable measurement instrument for overall, emotional, and social loneliness, although its length has sometimes rendered it difficult to use in large surveys. In this study, the authors empirically tested a shortened version of the scale on data from two surveys ($N = 9,448$). Confirmatory factor analyses confirmed the specification of two latent factors. Congruent validity and the relationship with determinants (partner status, health) proved to be optimal. The 6-item De Jong Gierveld Loneliness Scale is a reliable and valid measurement instrument for overall, emotional, and social loneliness that is suitable for large surveys.

Keywords: *loneliness scale; emotional loneliness; social loneliness; objective social isolation; partner status*

Loneliness is one of the main indicators of social well-being. It reflects an individual's subjective evaluation of his or her social participation or isolation. Investigating social participation and isolation requires the identification of the objective characteristics of the functioning of communities and the sizes, compositions, and functioning of networks of personal relationships. In addition, instruments are needed to assess individuals' subjective evaluations of the situations they are in, in this case loneliness. In this study, a shortened version of the De Jong Gierveld Loneliness Scale for overall, emotional, and social loneliness was constructed and empirically tested on new data.

Perlman and Peplau (1981) formulated loneliness as “the unpleasant experience that occurs when a person’s network of social relationships is deficient in some important way, either quantitatively or qualitatively” (p. 31). A second definition explicitly takes into account the standards that are central in the evaluation process leading to loneliness: Loneliness is a situation that occurs from a lack of quality relationships. This includes “situations in which the number of existing relationships is smaller than is considered desirable or admissible, as well as situations where the intimacy one wishes for has not been realised” (De Jong Gierveld 1987:120). In both definitions, loneliness is considered to be an expression of negative feelings of missing relationships and occurs in individuals of all ages. The opposite of loneliness is embeddedness.

Social isolation, in contrast, has to do with the objective characteristics of a situation and refers to the absence of relationships with other people. The central question in this context is, To what extent is an individual alone? The continuum of objective social isolation puts social isolation at one extreme and social participation at the other.

Loneliness is one of the possible outcomes of the evaluation of a situation in which an individual has a small number of relationships. However, many determinants work together in explaining why some people with small numbers of social contacts consider themselves lonely whereas others feel good and sufficiently embedded. Among these determinants is the presence or absence of an intimate partner (Dannenbeck 1995; Dykstra and De Jong Gierveld 2004; Peters and Liefbroer 1997; Waite and Gallagher 2000; Wenger et al. 1996); the size and functioning of family relationships, particularly parent-child bonds (De Jong Gierveld and Peeters 2003; Kaufman and Uhlenberg 1998; Kitson and Morgan 1990; Pinquart 2003);

Authors’ Note: This study was based on data collected in the context of the Living Arrangements and Social Networks of Older Adults Survey. The research program was conducted at Vrije Universiteit in Amsterdam and at the Netherlands Interdisciplinary Demographic Institute in the Hague and supported by the Netherlands Program for Research on Aging and the Ministry of Health, Welfare, and Sports. Additionally, data came from the Netherlands Kinship Panel Study, funded by Grant 480-10-009 from the Major Investments Fund of the Netherlands Organization for Scientific Research, and by the Netherlands Interdisciplinary Demographic Institute, Utrecht University, the University of Amsterdam, and Tilburg University. The Regional Health Services data originated from the health survey of the islands of the province of Zuid-Holland. Correspondence concerning this article should be addressed to Jenny De Jong Gierveld, Netherlands Interdisciplinary Demographic Institute, P.B. 11650, 2502 AR The Hague, the Netherlands; e-mail: gierveld@nidi.nl.

nonkin relationships and participation in volunteer work, clubs, and the church (Pulusuk and Minkler 1980; Van Tilburg et al. 1998; Wagner, Schütze, and Lang 1999); personality traits (Jones and Carver 1991; Windle and Woods 2004); gender (Baltes, Freund, and Horgas 1999; Borys and Perlman 1985); and health (Havens and Hall 2001; Kramer et al. 2002; Mullins, Elston, and Gutkowski 1996; Penninx et al. 1999; Steverink et al. 2001).

Two components of loneliness can be distinguished. Weiss (1973) differentiated between emotional loneliness, stemming from the absence of an intimate relationship or a close emotional attachment (e.g., a partner or a best friend), and social loneliness, stemming from the absence of a broader group of contacts or an engaging social network (e.g., friends, colleagues, and people in the neighborhood). Emotional loneliness arises, for example, when a partner relationship dissolves through widowhood or divorce and is characterized by intense feelings of emptiness, abandonment, and forlornness. Young people who have moved to places where they are newcomers frequently report social loneliness.

Two reliable and valid loneliness scales have been used in many research projects (Pinquart and Sörensen 2001). The first is the revised UCLA Loneliness Scale (Russell 1996; Russell, Peplau, and Cutrona 1980), consisting of 20 items, and its shorter version, the 3-item UCLA Loneliness Scale (Hughes et al. 2004). The second is the scale developed by De Jong Gierveld and colleagues (De Jong Gierveld and Kamphuis 1985; De Jong Gierveld and Van Tilburg 1999b), consisting of 11 items. The De Jong Gierveld Loneliness Scale was developed at the beginning of the 1980s. The conceptualization of the phenomenon of loneliness and its measurement, via triangulation and a stepwise procedure of qualitative research phases and survey explorations, was laid out by De Jong Gierveld and Kamphuis (1985) and De Jong Gierveld (1989). The De Jong Gierveld Loneliness Scale can be used as a unidimensional loneliness scale, but the items were developed with Weiss's (1973) distinction between social and emotional loneliness in mind. For that reason, depending on the research question of the study under consideration, researchers can choose to use either the total 11-item loneliness scale or the separate emotional (6 items) and social (5 items) subscales.¹ The loneliness subscales for emotional and social loneliness have proved to be valid and reliable measurement instruments for these phenomena (De Jong Gierveld and Van Tilburg 1999a; Dykstra and De Jong Gierveld 2004; Van Baarsen et al. 2001); the two scales are moderately correlated. Moreover, international comparative research by Van Tilburg, Havens, and De Jong Gierveld (2004) has shown that neither the content of the loneliness items nor the results of statistical analyses suggest that there is cultural

variation (differential item functioning) of these items, underlining the suitability of the scale for use in different locations and countries.

However, the large number of items (11) of the De Jong Gierveld Loneliness Scale has sometimes rendered it difficult to use the scale in large surveys. This study presents the construction and testing of a shorter version of the De Jong Gierveld scale. In shortening the 11-item loneliness scale, we explicitly guaranteed the continued threefold application of the original scale as an overall loneliness scale as well as emotional and social subscales.

Methods

One Construction Study and Two Test Studies

Study 1 was used to develop the short version of the original 11-item loneliness scale. Studies 2 and 3 were designed to test the qualities of the constructed shorter version of the scale.

Study 1: Respondents. The data came from the Dutch Living Arrangements and Social Networks of Older Adults Survey (NESTOR-LSN). In 1992, interviews were conducted with 4,494 men and women born between 1903 and 1937 (Knipscheer et al. 1995). The sample was stratified according to sex and year of birth. For reasons of efficiency and cost control, the selection of respondents was restricted to three regions of the Netherlands. These regions represented differences in religion and aging. A large city and two smaller communities were selected in each region. The overall response rate was 62%. The realized sample was fairly representative of the underlying population (Broese van Groenou et al. 1995).

Study 1: Measuring instruments. In study 1, the De Jong Gierveld Loneliness Scale was used (De Jong Gierveld and Kamphuis 1985; De Jong Gierveld and Van Tilburg 1999b). The 11 items of the scale are presented in Table 1. The loneliness scale ranges from 0 (*not lonely*) to 11 (*extremely lonely*) ($\alpha = .84$). The scale has proved to be a reliable and valid instrument (Pinquart and Sörensen 2001). As mentioned, researchers can use the scale as a one-dimensional measure or choose to use two subscales (one for emotional loneliness and one for social loneliness, with $\alpha = .88$ and $\alpha = .88$, respectively). In total, 3,987 respondents provided full information on the items of the loneliness scale.

Table 1
Items of the 11-Item (original) and 6-Item (short)
De Jong Gierveld Loneliness Scales

Statement	Original Emotional Subscale	Original Social Subscale	Short Emotional Subscale	Short Social Subscale
1. There is always someone I can talk to about my day-to-day problems ^a		X		
2. I miss having a really close friend	X			
3. I experience a general sense of emptiness	X		X	
4. There are plenty of people I can rely on when I have problems ^a		X		X
5. I miss the pleasure of the company of others	X			
6. I find my circle of friends and acquaintances too limited	X			
7. There are many people I can trust completely ^a		X		X
8. There are enough people I feel close to ^a		X		X
9. I miss having people around	X		X	
10. I often feel rejected	X		X	
11. I can call on my friends whenever I need them ^a		X		

Note: The introduction read, "Please indicate for each of the statements, the extent to which they apply to your situation, the way you feel now. Please circle the appropriate answer." Answer categories ("yes!" "yes," "more or less," "no," and "no!" or "yes," "more or less," and "no") differed for face-to-face interviews, telephone interviews, and mail questionnaires. In self-administered questionnaires, an example may be added between the introduction and the items.

a. Item should be reversed before scoring.

In investigating the validity of the 11-item scale and the 6-item shortened scale, we used some variables that are considered important determinants of loneliness. Of the many determinants, we selected one in the field of personal social relationships, namely, the presence or absence of a marital or nonmarital partner, for the validity investigation. Of the background characteristics, we selected subjective health as a well-known determinant

of loneliness. Subjective health was measured using the question "How is your health in general?" (*poor, not so good, fair, good, very good*).

Study 2: Respondents. To test the shortened scales, we first selected the Netherlands Kinship Panel Study (NKPS; Dykstra et al. 2004). Face-to-face interviews were conducted from October 2002 to January 2004 with 8,154 men and women aged at least 18 years and at most 79 years. A random sample of the addresses of private residences from throughout the Netherlands was used. The overall response rate of the NKPS was 45%. One must keep in mind that in general, response rates in the Netherlands are low compared with, for example, the United States. Moreover, this is especially so for a survey that combines a research theme (family relationships) that is less attractive than, for example, health, and a country-overarching sample, which motivates the respondents less into participating than local initiatives. The overall response rate for the NKPS was lowest in the most urbanized regions, mostly attributable to both a lower contact rate and a lower likelihood of cooperating given contact. In general, men, particularly men in the youngest age categories living with their parents, and women living alone were underrepresented in the main sample. Several weight factors were constructed to correct for the design of the study and for sample distribution characteristics. In this methodologically oriented investigation, we refrained from correcting for nonrepresentativeness.

Study 2: Measurement instruments. At the end of the interview, each respondent received a self-completion questionnaire, which was collected by the interviewer at a later date. The self-completion questionnaire pertained mostly to subjective issues (attitudes, well-being), including the 11-item loneliness scale. Because of partial nonresponse, data were available for 7,244 respondents. The NKPS encompasses the presence or absence of a marital or nonmarital partner and a subjective health variable to test the validity of the new loneliness scales.

Study 3: Respondents. In 2000, the Regional Health Services (RHS) in the Netherlands conducted a mail survey among 4,659 men and women in the southwestern region of the province of Zuid-Holland (Bisscheroux, Lops, and Wolleswinkel 2001). The respondents' ages ranged from 21 to 99 years. The sample was derived from the municipal registers. The response rate was 72%.

Study 3: Measurement instrument. The self-administered questionnaires included mainly questions on health and health behavior, including a

subjective health indicator. The presence or absence of a marital or non-marital partner was also included, as was the 11-item loneliness scale. Because of partial nonresponse, data were available for 3,260 respondents.

Procedure

We first describe the selection process leading to the shortened loneliness scales. We then examine the postulated existence of two dimensions by means of confirmatory factor analysis incorporated in the LISREL program (Jöreskog and Sörbom 1993). We assumed equal variances of error terms and unrelated error terms and therefore applied the maximum likelihood estimation procedure. We adopted the procedure and evaluation criteria for model fit recommended by Hu and Bentler (1998, 1999). More specifically, we applied the combinational rules of standardized root mean square residual $\leq .08$ (an absolute index of the fit between obtained and implied covariance matrices) and comparative fit index $\geq .95$ (a noncentrality-based index computed as a function of chi-square, degrees of freedom, and sample size).

Next, we investigated the psychometric characteristics of the 6-item loneliness scale and of the 3-item emotional scale and the 3-item social loneliness scale: (a) reliability, (b) validity, and (c) the correlation of loneliness with the two selected determinants of loneliness (the presence or absence of an intimate partner and health). In examining the psychometric characteristics of the new scales, we used the total age groups as used in studies 2 and 3, encompassing respondents aged 18 to 79 years and 21 to 99 years, respectively. Additionally, we repeated the tests for three age subgroups: 18 or 21 to 44 years, 45 to 64 years, and 65 years and older.

Results

Construction of the Shortened Scale: Selection of Items

As mentioned, we sought to shorten the 11-item loneliness scale while guaranteeing that the emotional and social subscales could be represented in the shorter scale as well. Additionally, we opted for balanced subscales with more than 1 item per subscale to guarantee a certain level of reliability and not too many items to realize a shorter measuring instrument. Of the choices of 2, 2 or 3, and 3 items, we decided to select 3 emotional loneliness and 3 social loneliness items. The following criteria were used to

select the items: (a) an optimal close correlation between either emotional or social loneliness indicators, (b) optimal coverage of the broad range of item difficulties, and (c) optimal phrasing and wording of the set of items.

A principal component factor analysis with varimax-rotated factors resulted in two factors encompassing the 6 emotional items and 5 social loneliness items, respectively. The 3 items with the highest loadings on the first factor (emotional loneliness) were "I miss having people around me," "I miss the pleasure of the company of others," and "I experience a general sense of emptiness." After dichotomizing, the item difficulties ranged from 22% to 25% agreement. To cover a broader range of item difficulties, we included the item "I often feel rejected," with 12% agreement. Because we wanted to end up with 3 items, we rejected the item "I miss the pleasure of the company of others" because of its length. The 3 items with the highest loadings on the second factor were selected for the short social loneliness scale. Although the item difficulties of the items of the social loneliness scale (after converting and dichotomizing) covered only a relatively small range (18% to 28%), the 3 selected social items happened to cover this range, with item difficulties of 18%, 23%, and 28%, respectively. The 3 items were "There are plenty of people I can lean on when I have problems," "There are enough people I feel close to," and "There are many people I can trust completely." Table 1 presents the items of the 11-item scale and the selected items of the short loneliness scale.

Testing the 6-Item Loneliness Scale

The two-factor structure. Information about the tests on the two-factor structure in the two test data sets is shown in Table 2. For reasons of comparison, information concerning the construction data set was included in the final columns. Each of the 6 items was categorized into the subscales as postulated; the factor loadings were high. Moreover, the correlation between the two latent factors proved to be modest in each of the two test data sets, as expected. The results of confirmatory factor analysis for each of the test data sets showed model fit, indicating that the emotional and social subscales were two dimensions of the overarching loneliness concept.

Reliability. Table 3 shows Cronbach's α coefficients for the NKPS and the RHS test data sets. Information based on the NESTOR-LSN data set is provided in the final column.

Table 2
Results of Confirmatory Factor Analysis on the 6-Item De Jong
Gierveld Loneliness Scale for Emotional and Social Loneliness

Item	NKPS (<i>n</i> = 7,244)		RHS (<i>n</i> = 3,260)		NESTOR-LSN (<i>n</i> = 3,987)	
	Emotional	Social	Emotional	Social	Emotional	Social
3. I experience a general sense of emptiness	.74	—	.72	—	.69	—
9. I miss having people around	.71	—	.67	—	.75	—
10. I often feel rejected	.64	—	.54	—	.49	—
4. There are plenty of people I can rely on when I have problems	—	.64	—	.72	—	.60
7. There are many people I can trust completely	—	.68	—	.60	—	.67
8. There are enough people I feel close to	—	.74	—	.67	—	.67
Correlation between latent factors	.53		.42		.43	
Comparative fit index	.99		.99		.99	
Standardized root mean square residual	.02		.04		.04	

Note: NKPS = Netherlands Kinship Panel Study; RHS = Regional Health Services; NESTOR-LSN = Dutch Living Arrangements and Social Networks of Older Adults Survey.

The α coefficients for the 6-item loneliness scale varied between .70 and .76 for the total adult population, indicating a quite reliable scale. As expected, the reliability coefficients for the 3-item emotional loneliness scale were lower, varying between .67 and .74. We still consider the reliability to be quite good. The level of the α values for the 3-item social loneliness scale were found to vary between .70 and .73 for the adult population. Overall, the reliability measures of the three scales were higher in the NKPS data set compared with the RHS data; an explanation of these differences is not yet available. We also investigated the item-rest correlations of each of the scale items. The results (not shown) indicate that all correlations were above .30. The reliability of the scales did not increase by deleting one of the scale items. We conclude that the 6-item loneliness scale, as well as the 3-item emotional and social loneliness scales, proved to

Table 3
Reliability Tests (Cronbach's α coefficients) of the
6-Item Loneliness Scale and the 3-Item
Emotional and Social Loneliness Subscales

Scale	NKPS (<i>n</i> = 7,244)	RHS (<i>n</i> = 3,260)	NESTOR-LSN (<i>n</i> = 2,945)
6-item loneliness scale	.76	.70	.71
3-item emotional loneliness scale	.74	.67	.68
3-item social loneliness scale	.73	.70	.69

Note: NKPS = Netherlands Kinship Panel Study; RHS = Regional Health Services; NESTOR-LSN = Dutch Living Arrangements and Social Networks of Older Adults Survey.

be reliable. Moreover, the reliability coefficients did not differentiate according to age groups (those under 45 years of age, those aged 45 to 64 years, and those aged 65 and over).²

Congruent validity. In this section, we compare the correlations between the shortened 6-item loneliness scale and the 3-item subscales with the parallel original loneliness scale and subscales from different points of view. The correlation between the 6-item and 11-item loneliness scale was very high in each of the surveys, varying between .93 and .95 (Table 4). The same can be said about the correlation between the 3-item emotional loneliness scale and the original 6-item emotional loneliness scale: Correlations were above .88. The parallel outcomes for the social loneliness scale were even better, with correlation coefficients of .93. The associations between the 3-item subscales and the overarching 6-item loneliness scale, taking into account the dual structure of the overarching loneliness concept, were quite good as well (with correlation coefficients varying between .77 and .87). Moreover, the correlation coefficients for congruent validity did not differentiate according to the age groups investigated (those under 45 years of age, those aged 45 to 64 years, and those aged 65 and over).³

Correlation with determinants. Table 5 shows the correlation of the shortened and the original scales with some of the well-known determinants. We first examined the association between the absence or presence of a partner, one of the most important determinants of (emotional) loneliness. In this respect, the 6-item loneliness scale ran remarkably parallel to the 11-item scale. Comparing the 3-item emotional loneliness scale with

Table 4
Congruent Validity Tests: Correlation Coefficients

Scale	NKPS (<i>n</i> = 7,244)	RHS (<i>n</i> = 3,260)	NESTOR-LSN (<i>n</i> = 2,945)
6-item short loneliness scale vs. 11-item original loneliness scale	.95	.93	.94
3-item short emotional loneliness scale vs. 6-item original emotional loneliness scale	.91	.88	.92
3-item short social loneliness scale vs. 5-item original social loneliness scale	.93	.93	.92
3-item short emotional loneliness scale vs. 6-item short loneliness scale	.79	.77	.79
3-item short social loneliness scale vs. 6-item short loneliness scale	.87	.85	.82

Note: NKPS = Netherlands Kinship Panel Study; RHS = Regional Health Services; NESTOR-LSN = Dutch Living Arrangements and Social Networks of Older Adults Survey.

the original 6-item scale showed the same pattern: Correlation coefficients were strongly parallel. The same was found for the social loneliness scales. Health is one of the factors that are strongly associated with the degree of loneliness, at the level of both emotional and social loneliness; the 11-item loneliness scale and its two subscales have repeatedly indicated this significant relationship. Table 5 compares the 6-item loneliness scale and the 11-item scale. The working of the 6-item loneliness scale and the 11-item loneliness scale, and the two subscales, proved to be strongly parallel. The different scales for the three age groups investigated proved to be remarkably parallel as well.⁴

Discussion

This study provides ample evidence that the quality of the 11-item De Jong Gierveld Loneliness Scale is mirrored in the shortened 6-item scale. In developing a shortened version of the scale, we explicitly took into account the threefold use of the original 11-item loneliness scale: to measure overall loneliness and to measure emotional and social loneliness, in contrast to the (shortened) unidimensional UCLA Loneliness Scale (Hughes et al. 2004;

Table 5
Correlation Between the Original and Short De Jong Gierveld Loneliness Scales and Determinants of Loneliness

Scale	NKPS (<i>n</i> = 7,244)	RHS (<i>n</i> = 3,260)	NESTOR-LSN (<i>n</i> = 2,945)
Partner status			
6-item short loneliness scale	.19*	.20*	.26*
11-item original loneliness scale	.20*	.21*	.28*
3-item short emotional loneliness scale	.30*	.32*	.34*
6-item original emotional loneliness scale	.29*	.31*	.34*
3-item short social loneliness scale	.06*	.03	.09*
5-item original social loneliness scale	.06*	.05	.12*
Subjective health			
6-item short loneliness scale	.22*	.23*	.24*
11-item original loneliness scale	.22*	.22*	.24*
3-item short emotional loneliness scale	.24*	.24*	.23*
6-item original emotional loneliness scale	.23*	.22*	.23*
3-item short social loneliness scale	.15*	.14*	.16*
5-item original social loneliness scale	.15*	.15*	.17*

**p* < .001.

Russell 1996). The exercise proved to be successful in that confirmatory factor analysis indicated the 3-item emotional loneliness and the 3-item social loneliness subscales to be two dimensions of the overarching loneliness concept. The correlation between the two factors proved to be small. The congruent validity of the three scales was optimal. Moreover, for the overall 6-item loneliness scale and for the two subscales, the reliability coefficients indicate that the scales are quite good in terms of reliability, given the number of items. Finally, we compared the validity of the three shorter scales with that of the three original scales, with the aid of the association with two determinants of loneliness: an indicator of objective social isolation (the absence or presence of an intimate partner) and an indicator of health. The validity of the shortened scales is remarkably parallel to that of the original scales in this respect. As shown in previous research, respondents without intimate partners score significantly higher on loneliness than respondents with intimate partners. The correlations are much higher for emotional loneliness than for social loneliness. About the same patterns of correlation coefficients are observed when investigating the relationship between loneliness and subjective health. So, the working of the 6-item

loneliness scale and the 11-item loneliness scale, and the two subscales, convinces us that the shortened 6-item De Jong Gierveld Loneliness Scale is a good scale, representing the same central features of loneliness as those captured by the 11-item scale and meeting the requirements of reliability and validity. The shorter version of the De Jong Gierveld scale is attractive for reasons of cost-effectiveness and in terms of validity and reliability for all researchers who wish to use a multidimensional loneliness measuring instrument in large-scale surveys.

However, some methodological questions concerning the scale remain unanswered. In the NKPS and RHS testing data sets, the shortened loneliness scale used was part of the 11-item original loneliness scales. It is unknown whether the functioning of the shortened 6-item loneliness scale, without the other 5 items, differs from the functioning of the 6-item scale when it forms part of the 11-item loneliness scale. Does the broader context of the scale, application in the field of demography or health, make a difference for the functioning of the shortened scale? The test data sets in this study used mail questionnaires to investigate loneliness; the use of the shortened version of the loneliness scale in telephone modes needs to be further explored. Furthermore, the suitability of the shortened scale for use in different countries and regions needs further elaboration.

Whether to use the 11-item version or the shortened 6-item version of the loneliness scale is not a neutral decision. Whereas studies detailing the prevalence of loneliness, or in-depth studies of loneliness among certain individuals, as well as research into the changing nature and impact of loneliness after specific life events may benefit from using the 11-item scale, the use of the shortened 6-item loneliness scale may be sufficient in other studies. In both cases, however, researchers have a reliable and valid measuring instrument at hand, which can be used as a unidimensional overall loneliness measure as well as provide information about the emotional and/or social loneliness situation of respondents. This study has also shown that the 6-item loneliness scale and the 3-item emotional and social subscales of loneliness are good measuring instruments for the broad age range of adults (18 to 99 years), as well as for the three age subgroups investigated: those aged under 45 years, those aged 45 to 64 years, and those aged 65 years and over.

Notes

1. Possible answers are "yes!" "yes," "more or less," "no," and "no!" When face-to-face interviews or telephone interviews are conducted, it may be sufficient to offer the respondents only the answers "yes," "more or less," and "no." The model is based on the so-called cognitive

theoretical approach to loneliness. A characteristic of this approach to loneliness is its emphasis on the discrepancy between what one wants in terms of interpersonal affection and intimacy and what one has; the greater the discrepancy, the greater the loneliness. In developing the scale, item response models such as Rasch and Mokken (using MSP software) were applied to evaluate the homogeneity of the scale. Scale scores are based on dichotomous item scores; the answer "more or less" always indicates loneliness. A score of 0 refers to complete social embeddedness and the absence of loneliness. A score of 11 refers to complete loneliness.

Processing the scale data entails counting the neutral and positive answers ("more or less," "yes," and "yes!") on items 2, 3, 5, 6, 9, and 10. This is the emotional loneliness score. The emotional loneliness score is valid only if the missing emotional loneliness score (i.e., no answer) equals zero. The neutral and negative ("no!" "no," and "more or less") answers on items 1, 4, 7, 8, and 11 are counted. This is the social loneliness score, which is valid only if the missing social loneliness score equals zero. The total loneliness score is computed by taking the sum of the emotional loneliness score and the social loneliness score. The total loneliness score is valid only if the sum of the missing emotional loneliness score and the missing social loneliness score equals zero or one. Further details and updates are available at <http://www.scw.vu.nl/~tilburg/>.

2. In addition, we investigated Cronbach's α coefficients for three subcategories by age: those aged 18 or 21 to 44 years, 45 to 64 years, and 65 years and over. For the 6-item loneliness scale, the coefficients for the NKPS and the RHS survey were .81 and .73, respectively, for the youngest group of adults; .79 and .75, respectively, for the group aged 45 to 64 years; and .73 and .61, respectively, for those aged 65 years and over. For the 3-item emotional loneliness scale, the reliability coefficients were .77 and .68, respectively, for those aged less than 45 years; .76 and .69, respectively, for those aged 45 to 64 years; and .71 and .65, respectively, for those aged 65 years and over. The reliability coefficients for the 3-item social loneliness group were .76 and .69, respectively, for those aged less than 45 years; .78 and .73, respectively, for those aged 45 to 64 years; and .76 and .68, respectively, for those aged 65 years and over. We consider the scales to be reliable for each of the subgroups according to age.

3. We investigated the congruent validity coefficients for the three subcategories by age. The correlation between the 6-item and 11-item loneliness scales was very high in the NKPS and in RHS surveys for each of the age groups investigated: .94 and .92, respectively, for those aged under 45 years; .95 and .94, respectively, for those aged 45 to 64 years; and .94 and .92, respectively, for those aged 65 years and over. Correlations between the 3-item emotional loneliness scale and the original 6-item emotional loneliness scale were also very high for each of the age groups: .91 and .85, respectively, for the youngest age group; .91 and .89, respectively, for those aged 45 to 64 years; and .91 and .90, respectively, for those aged 65 years and over. The same can be said for the correlation between the 3-item social loneliness scale and the original 5-item social loneliness scale: .93 and .93, respectively, for those aged under 45 years; .94 and .94, respectively, for those aged 45 to 64 years; and .91 and .92, respectively, for those aged 65 years and over. The correlation between the 3-item emotional subscale and the 6-item loneliness scale was quite good as well when comparing the age groups investigated: .81 and .79, respectively, for the youngest group; .79 and .78, respectively, for those aged 45 to 64 years; and .75 and .73, respectively, for those aged 65 years and over. The correlations between the 3-item social loneliness scale and the 6-item loneliness scale were comparable: .88 and .87, respectively, for the youngest age group; .87 and .89, respectively, for those aged 45 to 64 years; and .83 and .76, respectively, for the oldest age group.

4. The association between partner status and the 6-item versus the 11-item loneliness scales for the NKPS and the RHS surveys was .16 versus .17 and .18 versus .18, respectively, for those aged 45 years and under; .24 versus .25 and .17 versus .16, respectively, for those

aged 45 to 64 years; and .14 versus .15 and .16 versus .18, respectively, for those aged 65 years and over. The correlation of partner status with the emotional loneliness scales was .24 versus .23 and .22 versus .24, respectively, for the youngest group; .34 versus .34 and .23 versus .21, respectively, for those aged 45 to 64 years; and .31 versus .30 and .32 versus .33, respectively, for those aged 65 years and over. The correlation between partner status and the social loneliness scales was .06 versus .06 and .08 versus .07, respectively, for the youngest group; .10 versus .11 and .06 versus .07, respectively, for those aged 45 to 64 years; and .06 versus .06 and .09 versus .06, respectively, for the oldest age group. We found the same levels of associations for the correlations with subjective health.

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