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Original Article

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Received April 3, 2014; Accepted May 13, 2015

Decision Editor: Deborah Carr, PhD

Abstract

Objectives: We validate a translated version of the De Jong Gierveld Loneliness Scale (DJGLS) for use among older migrants from Turkish and Moroccan descent and validate the original Dutch version of the same scale for Surinamese migrants in the Netherlands.

Method: The data were derived from a population-based cross-sectional study among community-dwelling individuals aged 55 and older. In addition to translating the DJGLS for these ethnic groups, several statistical analyses were performed to assess the scale's reliability and validity.

Results: The DJGLS proved to be internally consistent and to have adequate convergent validity among all ethnic groups. Latent structure analysis confirmed the two latent factors (emotional and social subscales) in all groups, but also showed that fit was not optimal in most groups. Known groups validity was observed using functional limitations and subjective health as grouping variables.

Conclusions: The results provide sufficient support for use of the translated version of the 11-item DJGLS among Turkish and Moroccan older migrants and use of the Dutch version for Surinamese older migrants as a reliable and valid measure of loneliness. Fit of latent structural models varied between good and poor. Further research is needed to investigate ethnic differences in levels and determinants of loneliness.

Keywords: Cross-cultural—Loneliness—Older migrants—Prevalence—Psychometric properties

The number of older migrants in Europe has grown and will keep increasing in the coming decades (Lanzieri, 2011). Older migrants represent a large variety of migration histories and countries of origin. In the Netherlands, as in other northwestern European countries, older adults of Turkish and Moroccan descent form the largest groups of

migrants, together with those of Surinamese descent. The first Turkish and Moroccan migrants came as “guest workers” in the 1960s and early 1970s, whereas immigration flows from Suriname derive from colonial relations (1975). Currently, 137,000 individuals in the Netherlands aged 55 and older are of Turkish, Moroccan, or Surinamese origin,

representing 38.6% of the non-Western older population and 2.7% of the total Dutch older population (CBS, 2014).

Older migrants' situation has increasingly caught the interest of health care professionals and policymakers. Their latent vulnerability is frequently referred to hereby: being old and having a migrant background means a double risk of being vulnerable in terms of socioeconomic conditions and health, as supported by a number of empirical studies (Beirens & Fontaine, 2010; Fokkema & Naderi, 2013; Hack-Polay, 2008). In the Netherlands, this holds particularly for older Turkish and Moroccan migrants, less for those from Suriname. Turkish and Moroccan older migrants are often Muslim and low-educated persons who have difficulties speaking and writing Dutch and bridging the great cultural distance between their home country and Dutch society. By contrast, Surinamese older migrants are better educated, often speak Dutch, and are more familiar with the norms and values of Dutch society owing to their colonial relations, which have strengthened their labor market position and socioeconomic status (Vermeulen & Pennix, 2000). Compared with the native-born older population, rates of general health problems are higher among older migrants (Poort, Spijker, Dijkshoorn, & Verhoeff, 2001). They seem not only to experience poorer general health but also to report higher frequencies of chronic diseases at a younger age than their native Dutch counterparts (Schellingerhout, 2004).

Given all this, one may expect them to be vulnerable socially speaking too. Lack of financial resources and poor health limit people's mobility, access to social activities, and family and friends togetherness, thereby narrowing social relations and potentially increasing the likelihood of loneliness (Fokkema, de Jong Gierveld, & Dykstra, 2012; Luanaigh & Lawlor, 2008; Savikko, Routasalo, Tilvis, Strandberg, & Pitkala, 2005). Additionally, because of their migration history, they often miss family and friends in their homeland (Hacihanoglu, Yildirim, & Karakurt, 2012; van Staden & Coetzee, 2010). Despite the rapid growth in the number of older migrants in Europe, research on loneliness among this group is still rare and in an explorative stage. So far, there are a few qualitative and quantitative small-scale studies reporting high levels of loneliness (Fokkema & Naderi, 2013; Victor, Burholt, & Martin, 2012). More research is needed, given the wide range of negative effects of loneliness on both physical and mental health (Aanes, Mittelmarmark, & Hetland, 2010; Cacioppo, Hawkey, & Thisted, 2010), in order to develop effective loneliness prevention strategies and interventions for aging migrants.

The lack of a reliable and valid instrument to measure loneliness among migrant populations hinders cross-cultural studies. The De Jong Gierveld loneliness scale (DJGLS) is frequently used. It was developed in the mid-1980s in the Netherlands (de Jong Gierveld & Kamphuis, 1985; de Jong Gierveld & van Tilburg, 1999a) and has been translated and validated in several other European countries, China,

and Japan (de Jong Gierveld & van Tilburg, 2010; Grygiel, Humenny, Rebisz, Świtaj, & Sikorska, 2013; Leung, de Jong Gierveld, & Lam, 2008; van Tilburg, Havens, & de Jong Gierveld, 2004), but only for use by natives. Whether this DJGLS, developed from a Western perspective, is suitable for migrant populations in Europe, is still questionable.

This study therefore focuses on Turkish, Moroccan, and Surinamese older adults living in the Netherlands and aims to (a) translate the DJGLS into their home-country language and (b) evaluate psychometric properties of the DJGLS to assess its cross-cultural validity.

Method

Design and Participants

Our study is part of a population-based cross-sectional study called the SYMBOL (Systematic Memory testing Beholding Other Languages) study designed to investigate a newly developed nonverbal dementia screening test and to examine health status of older migrants in five domains: cognition, depressive symptoms, physical functioning, quality of life, and loneliness (Parlevliet et al., 2014). To this end, 2,550 community-dwelling older migrants of Turkish, Moroccan, and Surinamese descent (nearly all first-generation migrants), together with Dutch natives aged 55 and older, were approached from GP practices in low socioeconomic status suburbs in the four largest Dutch cities (Amsterdam, Rotterdam, The Hague, and Utrecht) between May 2010 and April 2013, of which 1,140 agreed to participate. The Surinamese participants were divided into Creole and Hindustani, as the two groups differ racially and culturally: Surinamese Creole are of African heritage, whereas Surinamese Hindustani are of Asian heritage. This distinction was based on self-report. The SYMBOL study was approved by the local ethical committee of the Academic Medical Center.

All participants were invited to take part in our study via a bilingual letter, followed by a personal invitation by phone by one of the bilingual research assistants. The invitation was accepted by 1,140 participants: 218 Turks, 173 Moroccans (29 of them were Berber speaking), 181 Surinamese Creole, 71 Surinamese Hindustani, and 497 natives. Irrespective of their proficiency level in Dutch, the migrants were able to express themselves in one of the languages of the country of origin—Turkish, Moroccan Arabic (the main spoken language of Morocco) or Tarifit (a Berber language used in Northern Morocco's Rif Mountains, where the majority of the Dutch Moroccans are from), or Sranantongo or Sarnámi (the most spoken Surinam languages by Creoles and Hindustani, respectively).

Interviewers were matched to participants on the basis of ethnic origin. All participants completed a structured questionnaire. Besides the DJGLS, information was collected on health and sociodemographic characteristics such as age, gender, education, and living situation. Interviews

were conducted either in health and community centers or at the participant's home. The duration of the complete interview was 60–90 min; the DJGLS took about 10 min.

Translation and Cultural Adaptation of the DJGLS

The DJGLS is composed of eleven items (Supplementary Appendix), six negatively formulated (i.e., “I miss having people around me”) and five positively formulated (i.e., “There are enough people I feel close to”), with the following three response categories: “no,” “more or less,” and “yes” (de Jong Gierveld & Kamphuis, 1985; de Jong Gierveld & van Tilburg, 1999a). Scores for the five positively formulated items were reversed. Each item is considered as a dichotomous variable with “more or less” being merged with “no” for the positive items and with “yes” for the negative ones. The total scale score is the sum of the item scores, ranging from 0 (*not lonely*) to 11 (*extremely lonely*). A score of 3 or higher is an indication of loneliness (van Tilburg & de Jong Gierveld, 1999). If two or more out of the 11 items of the DJGLS were missing ($n = 39$), the total scale score was not computed (de Jong Gierveld & van Tilburg, 1999a).

The DJGLS is used not only as a general loneliness scale but also as a measure to study emotional loneliness (represented by the six negatively formulated items) and social loneliness (represented by the five positively formulated items) separately (de Jong Gierveld & van Tilburg, 2010; Dykstra & Fokkema, 2007; van Tilburg & de Leeuw, 1991). Emotional loneliness is the lack of a specific, intimate relationship, and social loneliness is a lack of social integration and embeddedness (Weiss, 1973). If one or more out of the items from the emotional and social subscale, respectively, were missing ($n = 53$ and $n = 26$, respectively), the total subscale score was not computed (de Jong Gierveld & van Tilburg, 1999a).

For the forward–backward translation of the Dutch version of the DJGLS into Turkish, the two Moroccan languages, and the two Surinamese languages, we followed the guidelines of the European Organization for Research and Treatment of Cancer (Koller et al., 2007) for cross-cultural adaptation of questionnaires. All items were translated by two independent forward translators who were native speakers of the target language. We generated the Moroccan Arabic version in phonetic Arabic script and the Tarifit version in commonly used Latin script to make it more appropriate for interviewer administration purposes.

Differences in translations were reconciled in a consensus meeting, and the resulting common forward translation was back-translated by another translator who was also proficient in Dutch. Any discrepancies were discussed and resolved by Moroccan Arabic and Surinamese research assistants and the Turkish research coordinator, resulting in a final translation for the described ethnic groups.

Five persons per ethnic group were then invited to perform the three-step test-interview (TSTI) (Hak, van der Veer,

& Jansen, 2004). The TSTI is an instrument for pretesting a self-completion questionnaire by observing actual instances of interaction between the instrument and respondents (the response process). Because this process consists mainly of cognitive processing (“thinking”) and is therefore hidden from the observer, the concurrent think-aloud protocol is used as a technique to make the thought process observable. This process led to some additional minor changes in grammar and wording. The final translations for the Turkish, Moroccan, and Surinamese groups are provided in the Supplementary Material.

Variables and Measures for the Validation

All participants completed a structured questionnaire. This questionnaire, The Older Persons and Informal Caregivers Survey Minimum DataSet (TOPICS-MDS; Lutomski et al., 2013), covers background information and items of existing (sub)scales. Besides the DJGLS, information was collected on sociodemographic characteristics such as age, gender, education, living situation, and marital status. Relevant to our study, two health indicators were also included: a subjective and an objective one. Self-rated health was obtained using the question “How is your health in general?” with five answer categories ranging from *excellent* (=1) to *poor* (=5), with lower scores representing better self-rated health (Hays & Morales, 2001). Functional limitations were assessed using the eight items from the modified Katz Index score of activities of daily living (ADL) (Weinberger et al., 1992). Participants were asked if assistance is required (0 = *no*, 1 = *yes*) for the following basic functions: bathing, dressing, eating, toileting, use of incontinence products, getting up from a chair, brushing hair/shaving, and walking. The total ADL score was not computed for those with one or more items missing. Two items from the modified Katz Index of instrumental activities of daily living (IADL) (Lawton & Brody, 1969; Weinberger et al., 1992)—“help in taking medicines” and “help in dealing with finances” (0 = *no*, 1 = *yes*)—were used to examine divergent validity. The questionnaire also provides information about participants’ quality of life (two items), emotional well being (subscale), and social functioning (one item). Quality of life was assessed firstly by the question “How is your quality of life in general?” with five answer categories ranging from “*excellent*” to “*poor*,” with lower scores representing better quality of life; this is formed phrasing similar to the self-perceived health question from the RAND-36, which is an internationally recognized health-related quality of life survey validated for use in the Netherlands (Hays & Morales, 2001; van der Zee & Sanderman, 2012). Secondly, a modified version of Cantril’s Self Anchoring Ladder was used: “What report mark would you give your life at this moment?” (Cantril, 1965). Although not all lonely people have mental well-being problems (or vice versa), it is known from the literature that loneliness is associated with negative feelings (Lim & Kua, 2011). Information about

participants' emotional well being was obtained by the mental well-being subscale of the RAND-36. The subscale is composed of five items asking participants how often in the past 4 weeks they have felt "nervous," "calm and tranquil," "despondent and sombre," "happy," or "so sombre that nothing could cheer [them] up," with six answer categories ranging from "always" to "never." Negative attributes (e.g., nervous) are scored from 0 to 100, whereas positive attributes (e.g., happy) are reverse scored. Individual item scores are averaged and rescaled to produce a summary score between 0 and 100 so that higher scores reflect a more positive emotional state (Hays & Morales, 2001; van der Zee & Sanderman, 2012). Summary scores were not computed for those with two or more items missing. Social functioning was assessed with the only item from the social functioning domain of the RAND-36 that was included in the questionnaire, "How often in the past four weeks have your physical health or emotional problems hampered your social activities (such as visits to friends or close family members)?," with answer categories ranging from "continuously" to "never" (Hays & Morales, 2001; van der Zee & Sanderman, 2012).

Statistical Analyses

All Turkish and Moroccan participants were interviewed in their own language. Although the Surinamese-translated versions of the DJGLS were available, the Surinamese participants appeared to have sufficient Dutch language proficiency and hence preferred to fill in the questionnaire as a self-administered questionnaire in the Dutch language, like the Dutch group did. For this reason, we assessed only the psychometric properties of the Dutch version of the DJGLS in the Surinamese study population.

The DJGLS has been tested for reliability and validity. Reliability of the scale was assessed by Cronbach's α for the different ethnic groups. A value of 0.70 or greater was considered satisfactory and adequate for purposes of group comparisons (Cronbach, 1951). For validity of the DJGLS, we examined its construct validity, referring to the extent to which the application of the construct measures the underlying theory; we did this by testing the postulated two-dimensional structure of the DJGLS—emotional and social loneliness—and assessing its structural validity and known groups validity (Mokkink et al., 2010).

The postulated existence of two dimensions has been examined by two variations of latent structure analysis. First we applied latent class analysis (LCA) performed in Latent Gold to examine which number of factors results in the best fitting model. We compared the fit of models with one to four underlying factors to find parsimonious models. We computed Bayesian information criterion (BIC) and Akaike information criterion (AIC) as measures of the relative quality of a statistical model for a given set of data. As the number of factors increases, fit of the factor model to the observed data becomes better. The model with the

lowest BIC and AIC has the best balance between fit to the data and the number of factors required. BIC penalizes model complexity more heavily than AIC. Second we applied confirmatory factor analysis (CFA) performed in Stata using the method of Maximum Likelihood. The aim was to determine to which extent the latent structure model derived from LCA fits the data. We used common tests: the comparative fit index (CFI, a noncentrality-based index computed as a function of chi-square, degrees of freedom and sample size), the root mean square error of approximation (RMSEA) as measure for model fit, and the standardized root mean squared residual (SRMR, an absolute index of the fit between obtained and implied covariance matrices). CFI ≥ 0.95 , RMSEA ≤ 0.06 , and SRMR ≤ 0.08 support acceptable model fit (Hu & Bentler, 1999).

Structural validity was investigated by examining whether the DJGLS and the two subscales correlated more highly with conceptually similar constructs (convergent validity) than with conceptually less similar constructs (divergent validity). Quality of life, emotional well being, and social functioning—constructs that have been shown to be associated with loneliness in prior research (Iecovich, 2013; Luanaigh & Lawlor, 2008)—were included to examine convergent validity, two IADL items ("help in taking medicines" and "help in dealing with finances") were included to examine divergent validity. Spearman correlation coefficients and Mann-Whitney's U-test were used because of the skewed distribution of the DJGLS.

Known groups validity, comparing mean scores across groups known to differ in underlying concepts of interest, was evaluated by comparing subgroups of participants that were differentiated on relevant sociodemographic and health variables known to affect (emotional and social) loneliness feelings. We hypothesized that those aged 65 and older, who do not have a partner and reported lower health or limitations in daily functioning, would report higher levels of loneliness (Fokkema et al., 2012; Fokkema & Naderi, 2013; Hawkey et al., 2008; Luanaigh & Lawlor, 2008; Savikko et al., 2005).

If the outcomes of the LCA, CFA, and results of the structural and known groups validity are acceptable, the construct validity of the Dutch DJGLS among older Surinamese and the translated version of the DJGLS among older Turks and Moroccans are also acceptable. Due to the small sample size of Moroccan participants who completed the questionnaire in the Tarifit language ($n = 29$), these participants were excluded from the analyses and therefore the tests of the DJGLS within the Moroccan group refer to the Arabic translation of the scale. Participants with missing data on the DJGLS ($n = 39$) were excluded, resulting in a starting sample of 215 Turkish, 138 Moroccan Arabic, 172 Surinamese Creole, 65 Surinamese Hindustani, and 488 native Dutch older adults. A few additional cases were lost per analysis due to missing values on other variables; this did not lead to any bias. Apart from the LCA and CFA,

data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 19.0.

Results

Sample Background Characteristics

The characteristics of the five distinct groups—Dutch, Turkish, Moroccan, Surinamese Creole, and Surinamese Hindustani older adults—are summarized in Table 1. Compared with the natives, the percentage of women among the Surinamese is higher, whereas there are notably fewer women among the Moroccans. The lower percentage of female participants within the Moroccan groups is in line with previous Dutch studies (Reijneveld, Spijker, & Dijkshoorn, 2007; Spijker et al., 2004). Reasons for non-participation could be sought in lack of interest, feeling too ill, and not being allowed to participate by their family. In the Turkish and Moroccan ethnic groups, three-quarters of participants had either no formal education or only primary school. Turkish, Moroccan, and Surinamese Hindustani participants were married more often than the Surinamese Creole and native Dutch groups, and they also reported poorer self-rated health and more functional limitations.

Information about the scores on the overall loneliness scale and on the two subscales is also presented. Relatively low floor and high ceiling effects for the total DJGLS score were especially observed among the Turkish respondents. The highest average loneliness score and the greatest proportion of lonely people were found among the Turks—two thirds of them had moderate or severe feelings of loneliness with an average score of 5.1—followed by the Surinamese Hindustani, Moroccan, and Surinamese Creole groups. The native group had the lowest average loneliness score (2.6) and the lowest proportion of lonely people (37.9%). These variations by ethnicity were almost entirely a reflection of differences in emotional loneliness.

Reliability

Cronbach's α coefficients for the DJGLS were moderate to high across the ethnic groups (Table 2). For the total scale, alphas ranged from 0.85 (Moroccans) to 0.92 (Surinamese Creole). The alphas were 0.73 (Moroccans) or higher for the emotional loneliness subscale and 0.78 (Surinamese Hindustani) or higher for the social loneliness subscale.

Construct Validity

Latent class analysis

In all five ethnic groups, BIC is lowest for the two-factor solution (Table 3). This solution is parsimonious and fits with the theoretical concept of loneliness. On the basis of AIC, a three-factor solution is preferred over the other models in the Turkish and the Moroccan groups, and a four-factor solution is preferred in the Surinamese Creole, Surinamese Hindustani, and Dutch groups.

Confirmatory factor analysis

We assessed the two postulated underlying factors of the scale in each of the ethnic groups (Table 4). The CFA showed a good fit for the Turkish group with respect to all three criteria. Fit was not sufficient in the other groups, in particular for CFI and RMSEA where thresholds were exceeded. In the Surinamese Hindustani group, fit was most problematic. Estimated loadings of the single-scale items on the two factors are reported in Table 5. All are higher than 0.50, with one exception (0.49 for social loneliness, item 5, in the Moroccan group).

Structural Validity

To examine the structural validity of the DJGLS and the two subscales, for each ethnic group, correlations were computed of (emotional and social) loneliness with several constructs that are generally associated with loneliness and two variables that were expected to be weakly associated with loneliness—help with taking medicines and help dealing with finances (Table 6). The correlations for emotional and social loneliness were generally close to those of total loneliness and will not be discussed. The overall loneliness score showed significant correlations with the quality-of-life items. Participants who scored high on loneliness were more likely to experience poorer quality of life (range $r = 0.28$ [Moroccans]– 0.47 [natives], $p < .01$) and indicate a lower report mark for their life (range $r = -0.35$ [Moroccans] to -0.46 [natives], $p < .01$). The overall loneliness score was also significantly correlated with the emotional well-being subscale in all the ethnic groups, and the correlations are in the expected direction. Participants who scored high on loneliness were more likely to score more negatively on their emotional state (range $r = -0.49$ [Surinamese Creole] to -0.54 [natives], $p < .01$). And finally, participants who scored high on loneliness reported more often that their physical health or emotional problems hampered their social activities (range $r = -0.17$ [Moroccans] to -0.51 [Surinamese Creole], $p < .05$ to $p < .01$). A much weaker correlation was found between the loneliness scores and the need for help with taking medication and in dealing with finances, respectively (range $r = -0.08$ [Surinamese Hindustani] to -0.16 [Moroccans], ns to $p < .05$ and range $r = -0.07$ [natives] to -0.20 [Surinamese Creole], ns to $p < .01$, respectively).

Known Groups Validity

A summary of the results of the known groups validity analyses is presented in Table 7. The results for the emotional and social subscales were close to those of the total scale and will not be discussed. The strongest and the most consistent evidence of known groups validity was found in that the DJGLS discriminated clearly and in the expected direction between the groups regarding health. Participants who gave good ratings to their health situation or who

Table 1. Background Characteristics and Loneliness of the Participants by Ethnic Origin

	Turkish	Moroccan	Surinamese Creole	Surinamese Hindustani	Dutch
Background characteristics, <i>n</i>	215	138	172	65	488
Age (in years)					
Range	55–83	55–83	55–87	55–87	55–94
Mean (<i>SD</i>)	63.8 (6.7)	63.7 (6.5)	66.1 (8.0)	65.4 (7.8)	67.6 (8.1)
Sex (female, %) ^a	55.8	31.2	64.5	61.5	51.8
Education (%) ^a					
No education	32.6	42.0	—	3.1	—
Low	53.5	41.3	23.3	55.4	10.5
Middle	9.3	10.1	62.8	29.2	63.9
High	4.7	3.6	14.0	10.8	24.6
Missing	—	2.9	—	1.5	1.0
Living situation (living alone, %) ^a	12.6	8.0	54.7	32.3	28.5
Marital status (%) ^a					
Married	79.5	89.9	27.9	53.8	65.2
Divorced	4.2	4.3	24.4	16.9	11.7
Widowed	12.6	5.1	15.7	16.9	12.1
Never married	3.3	0.7	31.9	12.3	10.7
Missing	0.5	—	—	—	0.4
Self-rated health (%) ^a					
Excellent	0.5	5.1	4.7	4.6	10.5
Very good	3.3	3.6	5.2	1.5	18.4
Good	24.7	22.5	30.8	26.2	44.1
Reasonable	46.0	48.6	51.2	49.2	24.4
Poor	25.6	19.6	6.4	18.5	2.3
Missing	—	0.7	1.7	—	0.4
Functional limitations (≥1, %) ^a	24.2	17.4	26.7	27.7	10.9
Missing	2.8	0.7	1.2	3.1	1.0
Loneliness, <i>n</i>	215	138	172	65	488
Loneliness categories (%) ^a					
Not (score 0–2)	32.6	44.9	55.8	46.2	62.1
Moderate (score 3–8)	43.3	42.8	30.2	41.5	32.0
Severe (score 9+)	24.1	12.3	14.0	12.3	5.9
Mean score (0–11) ^b	5.1	3.6	3.4	3.9	2.6
% Floor ^b	15.3	18.8	29.1	20.0	35.0
% Ceiling ^b	10.2	1.4	5.8	6.2	2.3
Emotional loneliness (0–6), <i>n</i>	212	133	158	63	460
Mean score ^b	3.2	1.7	1.6	1.9	1.1
Missing, <i>n</i>	3	5	14	2	28
Social loneliness (0–5), <i>n</i>	209	132	165	64	482
Mean score ^b	1.9	1.9	1.8	2.0	1.9
Missing, <i>n</i>	6	6	7	1	6

Notes: Data source: SYMBOL study (Parlevliet et al., 2014).

^aDifferences by ethnicity were statistically significant at $p < .001$; tested with Kruskal–Wallis and chi-square test. ^bDifferences by ethnicity were statistically significant at $p < .10$; tested with *F*-test.

did not have any limitations in daily functioning exhibited lower levels of loneliness. There was also evidence of known groups validity when comparing the DJGLS scores of persons with a partner with the scores of those without a partner. The hypothesis that persons with a partner would report lower DJGLS scores was confirmed for all ethnic groups except for the Turkish and Moroccans. Contrary to expectations, no significant difference in DJGLS scores

was observed between the two age groups (55–64 years vs ≥65 years) in any of the groups. In total, 39 of the 75 results corresponded with the hypotheses.

Discussion

The 11-item DJGLS, developed in the mid-1980s in the Netherlands, is a frequently used reliable and validated

Table 2. Reliability Tests (Cronbach's α Coefficients): Total, Emotional, and Social Loneliness Scales

Scale	Turkish	Moroccan	Surinamese Creole	Surinamese Hindustani	Dutch
Loneliness, <i>n</i>	215	138	172	65	488
	0.90	0.85	0.92	0.87	0.87
Emotional loneliness, <i>n</i>	212	133	159	63	461
	0.85	0.73	0.92	0.86	0.83
Social loneliness, <i>n</i>	209	132	166	64	483
	0.82	0.81	0.82	0.78	0.81

Note: Data source: SYMBOL study (Parlevliet et al., 2014).

Table 3. Latent Factor Analysis Fit Results for One to Four Factors

	Turkish		Moroccan		Surinamese Creole		Surinamese Hindustani		Dutch	
<i>n</i>	215		138		175		67		492	
Factors	BIC	AIC	BIC	AIC	BIC	AIC	BIC	AIC	BIC	AIC
1	2579.70	2502.18	1697.24	1629.91	1875.23	1802.44	879.76	829.05	4768.44	4671.87
2	2501.08	2383.10	1673.76	1571.31	1806.41	1695.64	862.18	785.02	4546.97	4400.03
3	2537.14	2378.72	1692.59	1555.01	1835.52	1686.77	887.01	783.39	4547.01	4349.68
4	2579.66	2380.79	1718.66	1545.95	1864.05	1677.33	908.06	777.98	4587.68	4339.97

Note: Data source: SYMBOL study (Parlevliet et al., 2014).

AIC = Akaike information criterion; BIC = Bayesian information criterion.

Table 4. Confirmatory Factor Analysis Model Fit Results for the Two-Factor Model

	Turkish	Moroccan	Surinamese Creole	Surinamese Hindustani	Dutch
<i>n</i>	205	127	150	62	454
CFI (≥ 0.95)	0.96	0.92	0.95	0.89	0.93
RMSEA (≤ 0.06)	0.06	0.07	0.08	0.10	0.08
SRMR (≤ 0.08)	0.04	0.06	0.05	0.07	0.05

Note: Data source: SYMBOL study (Parlevliet et al., 2014).

CFI = comparative fit index; RMSEA = root mean squared error of approximation; SRMR = root mean squared residual.

Table 5. Estimated Loadings of the Single-Scale Items on the Two Factors

	Turkish	Moroccan	Surinamese Creole	Surinamese Hindustani	Dutch
<i>n</i>	205	127	150	62	454
Emotional loneliness					
1. Miss really close friend	0.629	0.526	0.705	0.669	0.672
2. Experience emptiness	0.767	0.550	0.857	0.743	0.703
3. Miss the pleasure of company	0.680	0.580	0.892	0.805	0.754
4. Circle of friends too limited	0.673	0.519	0.702	0.638	0.621
5. Miss having people around	0.808	0.673	0.895	0.795	0.773
6. Often, I feel rejected	0.652	0.570	0.802	0.578	0.523
Social loneliness					
1. Can talk about daily problems	0.538	0.684	0.638	0.684	0.559
2. People to lean on when I have problems	0.698	0.744	0.768	0.754	0.685
3. Many people I can trust	0.781	0.768	0.619	0.510	0.699
4. Enough people I feel close to	0.808	0.754	0.666	0.676	0.701
5. Can rely on friends whenever necessary	0.681	0.494	0.736	0.662	0.727

Note: Data source: SYMBOL study (Parlevliet et al., 2014).

Table 6. Correlations of Several Convergent and Divergent Variables and Total, Emotional, and Social Loneliness Scales

	Turkish		Moroccan		Surinamese Creole		Surinamese Hindustani		Dutch	
	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>
<i>Convergent validity</i>										
Quality of life general (excellent to poor)										
Total	213	0.329**	138	0.283**	166	0.437**	64	0.448**	486	0.468**
Emotional	210	0.353**	133	0.265**	153	0.481**	62	0.509**	458	0.422**
Social	207	0.269**	132	0.277**	159	0.348**	63	0.293*	480	0.394**
Report mark (0–10)										
Total	210	–0.464**	115	–0.345**	167	–0.497**	64	–0.415**	486	–0.461**
Emotional	208	–0.470**	110	–0.414**	153	–0.491**	62	–0.520**	458	–0.422**
Social	204	–0.393**	112	–0.235*	162	–0.422**	63	–0.212	480	–0.388**
Emotional well being (0–100)										
Total	213	–0.534**	138	–0.538**	171	–0.485**	64	–0.534**	486	–0.540**
Emotional	210	–0.475**	133	–0.544**	157	–0.556**	62	–0.593**	458	–0.479**
Social	207	–0.543**	132	–0.430**	164	–0.342**	63	–0.364**	481	–0.463**
Hampered social activities (continuously to never)										
Total	213	–0.470**	138	–0.172*	169	–0.512**	65	–0.283*	480	–0.437**
Emotional	210	–0.430**	133	–0.240**	155	–0.558**	63	–0.339**	454	–0.428**
Social	207	–0.440**	132	–0.118	162	–0.398**	64	–0.177	474	–0.357**
<i>Divergent validity</i>										
Medication ^a (yes/no)										
Total	212	–0.110	136	–0.163	171	–0.112	64	–0.078	486	–0.095*
Emotional	209	–0.135*	131	–0.203*	157	–0.153	62	–0.079	458	–0.106*
Social	206	–0.089	130	–0.117	164	–0.062	63	0.246	480	–0.049
Money ^b (yes/no)										
Total	211	–0.142*	137	–0.132	170	–0.198**	65	–0.106	486	–0.072
Emotional	208	–0.147*	132	–0.109	156	–0.244**	63	–0.172	458	–0.097*
Social	205	–0.120	131	–0.150	163	–0.119	64	0.027	480	–0.047

Note: Data source: SYMBOL study (Parlevliet et al., 2014).

^{a,b}Mann–Whitney's U-test was used for this dichotomous variable.

** $p < .01$. * $p < .05$ (two tailed).

instrument to measure loneliness, particularly among native older adults in European countries (Grygiel et al., 2013; van Tilburg et al., 2004). To our knowledge, this is the first study to validate a translated version of the DJGLS among older migrants of Turkish and Moroccan descent as well as the Dutch version of the scale among two groups of Surinamese older adults in the Netherlands: Surinamese Creole and Surinamese Hindustani. In doing so, we took into account the threefold use of the DJGLS: to measure overall loneliness and to measure emotional and social loneliness.

This study provides abundant evidence that the reliability of the DJGLS was satisfactory for measuring (emotional and social) loneliness among the four distinct migrant groups. In addition to reliability, the scale had satisfactory construct validity for a two-factor model reflecting the 6-item emotional loneliness and 5-item social loneliness subscales. However, a closer examination revealed that fit statistics for the measurement of loneliness were sufficient for the Turkish group but not all were so for the other groups. Poor fit was observed in particular among Surinamese Hindustani, which

is likely caused by its small sample size. Furthermore, results support the convergent validity of the loneliness scale, revealing significantly strong correlations with several similar constructs. As expected, the DJGLS was found to be negatively associated with quality of life, positive emotions, and social functioning. Moreover, known groups comparisons provide results consistent with what had been hypothesized: for all ethnic groups, lower levels of loneliness was found when participants reported their health situation as better or did not experience ADL limitations. Having a partner showed to be a protective factor against loneliness only among the Surinamese and natives. Level of loneliness did not differ with respect to age, which is in line with other studies (de Jong Gierveld & van Tilburg, 1999b; Leung et al., 2008; Theeke, 2009) and may be attributed to the fact that the study sample included relatively few elderly participants, especially in the migrant groups.

This study has some limitations. Firstly, in the structural validity analyses, we could not include direct measures of loneliness (e.g., “Do you feel lonely?”) or other variables that are theoretically related to loneliness (e.g., size and

Table 7. Known Groups Validity of the DJGLS: Total, Emotional, and Social Loneliness Scales

	Turkish	Moroccan	Surinamese Creole	Surinamese Hindustani	Dutch
Age ^a					
Total	○	○	○	○	○
Emotional	○	○	○	○	○
Social	○	○	○	○	○
Partner status ^a					
Total	○	○	●	●	●
Emotional	○	○	●	●	●
Social	○	○	○	●	○
Self-rated health ^b					
Total	●	●	●	●	●
Emotional	●	●	●	●	●
Social	●	●	●	○	●
Functional limitations ^a					
Total	●	●	●	○	●
Emotional	●	●	●	●	●
Social	●	●	●	○	●

Note: Data source: SYMBOL study (Parlevliet et al., 2014).

● = statistically significant difference at $p < .05$ between the known groups. ○ = no statistically significant difference between the known groups.

^aGroup differences were tested with the Mann–Whitney's U-test. ^bGroup differences were tested with Kruskal–Wallis test.

functioning of the social network, length of stay in the Netherlands) because they were not part of our questionnaire. Secondly, test–retest reliability could not be assessed as the study was a population-based, cross-sectional study. Thirdly, we did not assess whether factor loadings were similar in the five groups. Finally, caution is needed in generalizing the results, as the sampling procedure does not ensure that the samples are representative.

Despite these limitations, the study's findings indicate that the translated versions of the DJGLS for older Turks and Moroccans as well as the Dutch version of the DJGLS for older Surinamese have overall satisfactory psychometric properties, similar to those observed in the Dutch population (van Tilburg et al., 2004). This favors the practicability of the DJGLS among older migrants of Turkish, Moroccan, and Surinamese descent. Participants of the four migrant groups reported significantly higher levels of loneliness than their native peers. This holds especially with regard to emotional loneliness and for the Turkish older migrants, despite the possible bias caused by different modes of administration: while native and Surinamese participants completed the questionnaire by themselves, Turkish and Moroccan participants preferred a face-to-face interview, which is likely to result in less self-disclosure and therefore in lower levels of loneliness (van Tilburg & de Leeuw, 1991). It is of great interest and worthy of future research to shed light on the variation in level and determinants of loneliness among representative samples. In this context, developing preventive programs and customized effective loneliness interventions for the aging migrants remains essential. While taking advantage of our translated versions, it is also interesting to study differences in feelings of loneliness among Turkish and Moroccans in various European

countries. The only available quantitative loneliness research among Turks in Germany (Fokkema & Naderi, 2013) shows that their high level of loneliness was due to relatively poor health and lack of financial resources. Future research should determine whether these two explanations also apply for other European countries with different welfare regimes.

Supplementary Material

Please visit the article online at <http://psychsocgerontology.oxfordjournals.org/> to view supplementary material.

Funding

Tineke Fokkema's research is part of the 'Families in Context' project, funded by an Advanced Investigator Grant of the European Research Council (ERC, 324211).

Acknowledgments

The SYMBOL study was financed by the Health Insurance Innovation Foundation. We thank all the research assistants, the general practitioners, and older people who took part in this study. We also thank Dr. P. Jellema, Department of Midwifery Science, EMGO+ Institute, VU University Medical Center for her help conducting the analyses and Prof. Dr. B. A. Schmand, Department of Medical Psychology, Academic Medical Center, and Faculty of Social and Behavioural Science, program group Brain and Cognition, University of Amsterdam for his critical appraisal of earlier versions, especially regarding methodological aspects of the manuscript. Part of the current information was presented at the Geriatriedagen, February 2012 in 's Hertogenbosch, The Netherlands (abstract number: P23). Ö. Uysal-Bozkir planned the study, supervised the data analysis, and wrote the paper. T. Fokkema performed some statistical analyses and

contributed to revisions of the paper. J. L. Macneil-Vroomen helped in performing some statistical analyses. T. G. van Tilburg performed some statistical analyses and contributed to the final revision of the paper. S. E. de Rooij contributed to revising the paper.

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