Predicting stability and change in loneliness in later life

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Abstract

This study examined potential discriminators of groups of older adults showing different patterns of stability or change in loneliness over 5 years: those who *became lonely, overcame loneliness,* were *persistently lonely,* and were *persistently not lonely*. Discriminant function analysis results showed that the *persistently lonely*, compared with the *persistently not lonely*, were more often living alone, widowed, and experiencing poorer health and perceived control. Moreover, *changes* in living arrangements and perceived control predicted loneliness change. In conclusion, perceiving that one is able to meet social needs is a predictor of loneliness and loneliness change and appears to be more important than people's friendships. Because the predictors were better able to predict *entry* into loneliness, results point to the promise of prevention approaches to loneliness interventions.

Keywords

Living arrangements; loneliness; longitudinal; older adults; perceived control

What factors predict the emergence of loneliness in later life? And what can we learn from older adults who are not lonely or overcome loneliness over time? These questions are especially important given the detrimental consequences of loneliness to older people's health, quality of life, and even longevity (e.g., Cacioppo et al., 2002; Newall, Chipperfield, Bailis, & Stewart, 2012). With the increasing availability of longitudinal databases, there is a growing body of longitudinal research examining changes in loneliness over time in older adulthood. The present study adds to this research by assessing older adults' reports of loneliness over two points in time. Four patterns were identified by distinguishing between those who were *persistently lonely*, were *persistently not lonely*, *became lonely*, and *overcame loneliness*. A variety of characteristics were examined to gain an understanding of what distinguishes between older adults conforming to these unique patterns of loneliness. Understanding the predictors of loneliness is important to help identify appropriate interventions to target loneliness in later life.

Why might loneliness emerge in later life?

Why might loneliness change or not in later life? Based on the definition that loneliness is a perceived discrepancy between the quality and quantity of relationships that people *have* versus those that they *want* (e.g., de Jong Gierveld, 1987; Peplau & Caldwell, 1978; Perlman, 2004), it follows that changes to people's actual and/or desired relationships could cause changes in loneliness (Dykstra, van Tilburg, & de Jong Gierveld, 2005). For example, Dykstra et al. (2005) posited that as people age, they may *gain* or *lose* friends and partners as well as opportunities to socialize due to changes in health. At the same time, older people might experience drops in desire for relationships or an increase in the quality of relationships. Aartsen and Jylha (2011) discussed loneliness being caused by *losses* or *gains* in personal resources (e.g., health) or social resources (e.g., social activity). Cohen-Mansfield, Shmotkin, and Goldberg (2009) hypothesized the Model of Depression and Loneliness (MODEL) in which loneliness in later life is caused by environmental, health, psychological, and situational factors. Finally, Schnittker (2007) argued that there are demographic, socioemotional selectivity, and psychological explanations for changes in loneliness with age. The present study, similar to other research, posited that changes in loneliness could be the result of many factors including changes in one's network (widowhood, friendships) due to controllable or uncontrollable factors, changes in health, income, or living environment due to relocation, and changes in activities.

Longitudinal research

As longitudinal data are becoming available from different countries, studies examining change in loneliness over time are beginning to emerge based on different methodologies. Taken together, this research appears to indicate that in later life loneliness generally decreases over time but then increases for the "oldest" age groups, and substantiates cross-sectional research that shows the importance of partner status (e.g., widowhood) and health to loneliness (e.g., Cohen-Mansfield et al., 2009; Demakakos, Nunn, & Nazroo, 2006; Dykstra et al., 2005; Pinquart & Sorensen, 2001; Theeke, 2010; Tijhuis, de Jong Gierveld, Feskens, & Kromhout, 1999; Wenger & Burholt, 2004). Moreover, this research shows that for some, loneliness can *decrease* over time (Dykstra et al., 2005) and that people appear to *overcome* loneliness (Jylha, 2004; Wenger & Burholt, 2004). For example, Dykstra et al. (2005) found a decrease in loneliness with gains in functional status and social networks.

Most relevant to the present study in terms of similar methodology, Jylha (2004) assessed 10-year changes in older adults' (aged 60+ years) self-reported loneliness at two points in time. At the 10-year follow-up, the largest proportion did not feel lonely over the two time periods (51%) and a much smaller proportion continuously felt lonely (17%). Another 19% *became* lonely (named "incident" loneliness) and 13% *overcame* or "recovered" from loneliness. Jylha found that the majority of people who did not report loneliness at either time point had good functional ability at baseline and there were no significant differences between the groups in baseline gender or social participation. However, as Jylha acknowledged, feelings of loneliness expressed at the end of the study were likely due to *changes* in predictor variables that occurred after baseline, rather than the baseline situation itself. Using this same database, Aartsen and Jylha (2011) examined the *emergence* of

loneliness by comparing older adults who *became* lonely over the 28-year follow-up and those who did not. Importantly, *changes* in predictor variables were also assessed and the following *change variables* predicted the emergence of loneliness: losing a partner, reduced social activities, increased physical disability, and increased feelings of low mood, uselessness, and nervousness. In the present study, we were also interested in examining baseline and changes in predictors that related to the emergence of loneliness; however, in addition, we were interested in examining whether those factors are related to older adults *overcoming* loneliness.

The present study: discriminating among groups of older adults

The present study posited that changes in loneliness could be the result of many factors including changes in one's social network, changes in health, income, or living environment, and changes in social activities. In addition, we also considered perceived control and changes in perceptions of control as a potential psychological variable that could explain changes in loneliness in older adults. Perceived control is a psychological resource that may account for why some people are lonely and some people are not, given similar *objective* social environments or demographic trends. For example, drawing on the discrepancy theory of loneliness (Perlman, 2004), perceived control may foster a sense of confidence that people can align their actual and desired relationships (Newall, Chipperfield, Clifton, Perry, Swift, & Ruthig, 2009). Scholars have argued that maintaining a belief in the ability to exercise control over one's life is crucial for psychological and physical health and is a cornerstone of successful aging (e.g., Chipperfield, Newall, Perry, Stewart, Bailis, & Ruthig, 2012; Rodin, Timko, & Harris, 1985). Although there is variability in preferences for control (Rodin, 1986), the general expectation in the present study was that a *greater* degree of perceived control would have beneficial effects on well-being. However, we were especially interested in whether perceived control would be an important predictor in the context of other established correlates of loneliness. The present study therefore adds to research examining how personal control, self-efficacy, or control beliefs relate to feelings of loneliness (e.g., Anderson & Riger, 1991; Fry and Debats, 2002; Kramer, Kapteyn, Kuik, & Deeg, 2002; Moore & Schulz, 1987; Newall et al., 2009; Solano, 1987).

In order to address our questions of interest, older adults were categorized based on data collected at two points in time, 5 years apart as: (1) not lonely at either point in time; (2) lonely at both points in time; (3) became lonely over time; and (4) changed from being lonely to not lonely over time. These longitudinal data provided an opportunity to examine the ideas of *emergence*, *persistence* (of being lonely or not), and *overcoming* of loneliness. In particular, the present study used discriminant function analysis that helps to determine which predictors (if any) can *best* discriminate between the most divergent groups. In addition to examining baseline variables, changes in these predictors were also considered. This permitted insight, for example, into whether the predictors of the *emergence* of loneliness differ from the predictors of the *persistence* of loneliness.

Because of the richness of our database, we were able to examine a variety of established factors that could predict changes in loneliness such as changes in social network (friends and marital partner), health, sociodemographics (age and income), living environment,

activities, and perceptions of control. Beyond bivariate associations between a given variable and loneliness, the present study sought to determine: (1) whether the four groups of older adults showing different loneliness patterns over time differed from each other in their baseline predictors and changes in predictors and (2) which baseline or change predictors would be the *most important* discriminators of the groups.

Methods

Participants

Participants took part in both the Aging in Manitoba (AIM) 1996 ($N = 1868$) and AIM 2001 ($N = 1012$) studies. The AIM studies, conducted in the province of Manitoba, Canada, began in 1971 with a sample of older adults (aged 65+ years) stratified by age, gender, and region (e.g., Chipperfield, Havens, & Doig, 1997). Additional samples of older adults (60+ years) were drawn in 1976 and 1983, with follow-up studies occurring 2–3 times per decade, until the final data collection in 2006. Loneliness was included for the first time in the AIM 1996 data collection. Important in terms of generalizing study results, the sample selection processes derived a sample representative of the larger population of older Manitobans, both at initial assessment (Mossey, Havens, Roos, & Shapiro, 1981) and at follow-up (Chipperfield et al., 1997). The inclusion criteria for AIM 1996 and 2001 were broad, and samples included people living in personal care homes as well as in the community (rural and urban), people whose first language was English or another language other than English, and people with cognitive impairment who needed a proxy respondent to either complete the survey for them or help them to complete the survey. A total of 856 people who participated in AIM 1996 did not participate in AIM 2001. Eighty-seven percent of these participants were deceased at Time 2.

A total of 1012 adults participated in both AIM 1996 and AIM 2001. Of these 1012 participants, 70 had a proxy to complete the interview in either 1996 or 2001 data collection and therefore had incomplete data for all of the subjective interview questions, including loneliness. Reasons for having a proxy respondent included that the participant was: unavailable ($n = 19$), unable to hear questions ($n = 19$), physically incapable of completing an interview ($n = 44$), or mentally incapable of completing an interview ($n = 129$). In one case, the reason for having a proxy was undetermined ($n = 12$). These 223 participants were excluded from the analyses, reducing the sample to 789 participants. A small number of additional exclusions ($n = 28$) were participants who had missing information for one or both of the AIM 1996 or 2001 questions about loneliness. Finally, from the remaining 761 people, one person was excluded because she/he was younger than the 60+ years cutoff point for the 1983 recruitment and data collection (aged 56 in 1983). This left a total of 760 people for the study analyses.

Representativeness of sample: gender and marital status

Although the initial AIM samples were selected in a way to maximize representativeness of the older Manitoban population in terms of age and gender, it is of interest to examine how representative the *current sample* was compared to the older Manitoban population. Comparing the gender distribution of the sample of 760 participants (40.7% males) with the

Statistics Canada (1996) census data available on older Manitobans aged 75+ years (37.5% males; Statistics Canada, 1996) revealed no significant gender difference in the proportion of males and females, χ^2 (1, 760) = 3.23, $p > .05$. Similarly, comparing the marital status of the sample (55.7% married or single) with the 1996 census data available on older Manitobans aged 70+ years (54.8% married or single; Statistics Canada, 1996), revealed no significant differences, χ^2 (1, 760) = .23, $p > .05$. Although it was not possible to compare the health of the sample to the larger population, it is probable, due to reasons of attrition and due to the participant exclusions outlined above, that the present sample is slightly healthier than the overall population of older Manitobans. It is also possible that the sample is less lonely than the population of interest, given the relationship between loneliness and mortality (Cacioppo et al., 2002; Luo, Hawkley, Waite, & Cacioppo, 2012; Newall et al., 2012; Patterson & Veenstra, 2010; Shiovitz-Ezra & Ayalon, 2010).

Measures

Age—Participants' information on age, in years, was collected from participants in both AIM 1996 ($M = 79.15$; $SD = 4.81$; range = 72–95) and AIM 2001 ($M = 84.17$; $SD = 4.80$; range = 77–100).

Sex—Sex was coded as 0 = *women* (59.3%) and 1 = *men* (40.7%).

Education—*Education* reflected number of years of formal education ($M = 9.25$; $SD = 3.01$). Two people had missing information for both AIM 1996 and 2001 education. To be consistent throughout, any missing data were replaced with the mean (Tabachnick & Fidell, 2001). Replacement of missing values was carried out in order to retain as many participants as possible in the analyses. This method was deemed a suitable way to deal with missing values, given there was little missing data for the variables of interest.

Income inadequacy—The measure of *income inadequacy* was created from participant responses in 1996 ($M = 1.86$; $SD = .57$) and 2001 ($M = 1.79$; $SD = .60$) to the following question: "Can you tell me how well you think your income and assets (including that of your spouse, where applicable) currently satisfy your needs?" (1 = *very well*; 2 = *adequately*; 3 = *with some difficulty*; 4 = *not very well*; 5 = *totally inadequately*). The small number of responses of "*not very well*" and "*totally inadequately*" ($n = 16$ in 1996; $n = 11$ in 2001) were recoded as 3, together reflecting *not adequate* income. A variable reflecting *change in income adequacy* was also calculated by subtracting the 1996 from the 2001 values: −1 = *less adequate income over time* ($n = 137$); 0 = *no change in income adequacy* ($n = 441$); and 1 = *more adequate income over time* ($n = -182$) ($M = .06$, $SD = .64$).

Marital status—The *marital status* variable was dichotomized such that those who had experienced a *loss* in a marital partner (widowed or divorced) (AIM 1996 = 44.3%; AIM 2001 = 54.6%) could be contrasted with those who had not (married or single). A variable reflecting *chang*e in marital status over the 5 years was created: −1 = *became widowed or divorced* ($n = 83$); 0 = *had no change in marital status* ($n = 672$); and 1 = *became married* ($n = 5$) ($M = -.10$, $SD = .32$). Note that none of the "single" people became married over the 5-year time period.

Living arrangements—Participants were asked the number of people who lived with them (if any) in the same household. This variable was dichotomized to distinguish those who lived alone (AIM 1996 = 45.7%; AIM 2001 = 54.7%). A variable reflecting *change in living arrangements* over the 5 years was created: −1 = *change from living with someone to living alone* (n = 90); 0 = *no change in living arrangements* (n = 649); and 1 = *change from living alone to living with someone* (n = 21; M = −.09, SD = .37).

Type of housing—In 1996, .7% of participants lived in a personal care home (PCH), with the remainder living independently in the community. In 2001, 5.9% lived in a PCH. For subsequent analyses, a *change in PCH* variable was created as follows: 0= *did not move into a PCH* (n = 720) and 1 = *moved into a PCH* (n = 40; M = .05, SD = .22).

Duration in household—Participants were asked the number of years that they had lived in their present household (5 = *over 5 years*; 4 = *3–5 years*; 3 = *1–3 years*; 2 = *less than 1 year but greater than 6 months*; and 1 = *less than 6 months*) in AIM 1996 (M = 4.68; SD = .80) and AIM 2001 (M = 4.50; SD = 1.02). A *change in household* variable was created such that people had either *not* moved in the last 5 years (code = 1; n = 574) or moved in the last 5 years (code = 2; n = 186) (M = 1.24, SD = .43).

Close friends—Participants were asked how many friends they had that they could confide in. This variable was dichotomized to assess an important distinction: how many people indicated having no close friends (AIM 1996 = 20%; AIM 2001 = 28%) versus having at least one close friend. In addition, a *change in friend* variable was created: −1 = *change from having a friend to not having a friend* (n = 133); 0 = *no change in friend* (n = 555); and 1 = *change from not having a friend to having a friend* (n = 72) (M = −.08, SD = .51).

Social and solitary activity participation—Respondents were asked about whether they had participated in a variety of 14 *social activities* during the past week (e.g., visiting family; visiting friends; playing sports or games; doing church-related activities). Affirmative responses were summed to create a measure of social activity participation in AIM 1996 (M = 6.17; SD = 2.11) and AIM 2001 (M = 4.89; SD = 1.85). *Change in social activities* was also assessed by subtracting the 1996 responses from the 2001 responses such that higher scores reflected increased activities (M = −1.28, SD = 2.07, range =−10.00 to 7.00). Note that 65.7% (n = 499) *decreased* their social activities, 15.5% had no change (n = 116), and 19.1% (n = 145) *increased* their social activities.

Respondents were also asked about whether they had participated in a variety of six *solitary activities* during the past week (reading or writing or Internet; handwork hobbies such as carving). Affirmative responses were summed to create a measure of solitary activity participation in AIM 1996 (M = 3.91; SD = 1.13) and AIM 2001 (M = 3.36; SD = 1.18). *Change in solitary activities* was also assessed by subtracting the 1996 responses from the 2001 responses such that higher scores reflected increased activities (M =−.56, SD =1.27, range = −5.00 to 4.00). Approximately 50% (n = 383) *decreased* their solitary activities, 32.2% (n = 245) had no change, and 17.4% (n = 132) *increased* their solitary activities.

Functional status—Participants' *functional status (independence)* was measured by asking whether or not they were independently capable of performing 12 specific instrumental activities of daily living (IADL; e.g., light housework, laundry, and food preparation). Based on similar IADL measures (e.g., Lawton & Brody, 1969), a composite score was created by summing the items so that higher scores reflected greater independence in AIM 1996 (M = 10.10; SD = 1.64) and AIM 2001 (M = 8.67; SD = 2.72). A *change in functional status* variable was created by subtracting the 1996 from the 2001 responses such that higher scores reflected an increase in independence (M = 1.44, SD = 2.34; range = −11.00 to 5.00). In total, 59.1% (n = 449) had a loss in functionality, 26.7% (n = 203) had no change, and 14.2% (n = 108) had a gain in functionality.

Health status—Participants' health status was measured in two ways. Individuals' general perceived health was assessed by asking them to rate their health compared to other people of their own age. This measure has been shown to predict objective health status, mortality, and health care use (Bailis, Segall, & Chipperfield, 2003; Menec, Chipperfield, & Perry, 1999; Mossey et al., 1981). Possible responses range on a 5-point scale (4 = *excellent*; 3 = *good*; 2 = *fair*; 1 = *poor*; 0 = *bad*). The small number of "bad" responses (n = 2 for AIM 1996; n = 4 for AIM 2001) were recoded as "poor" health (AIM 1996 M = 2.63; SD = .69; AIM 2001 M = 2.60; SD = .71). In addition, *change in general perceived health* was assessed by subtracting the 1996 values from the 2001 values, such that higher scores reflected a gain in health (M = −.04, SD = .79, range = −3.0 to 2.0). Note that 23.7% (n = 180) had a decline in health, 55% (n = 418) had no change, and 21.3% (n = 162) had an improvement in perceived health.

Individuals were also asked whether they currently had, or were still feeling the aftereffects of, 21 specific health conditions (e.g., heart and circulation problems, arthritis, etc.). These items were summed to create a composite measure, with higher scores indicating poorer health in AIM 1996 (M = 3.68; SD = 2.50) and AIM 2001 (M = 4.22; SD = 2.48). For *change in chronic conditions*, 2001 scores were subtracted from 1996 scores, such that higher scores reflected better health (decrease in number of conditions) (M = −.54, SD = 2.25, range = −7.0 to 8.0). In total, 49.7% (n = 378) had a decline in health (i.e., gain in number of health conditions), 21% (n = 160) had no change, and 29.2% (n = 222) had an improvement in health (i.e., reduction in number of health conditions).

Perceived control—Perceptions of control were assessed in AIM 1996 and AIM 2001 with the five-part question: "Now we would like to know about the influence or control you have over certain aspects of your life. In other words, we want to know whether you can personally influence things by what you say or do". Participants indicated the amount of control they felt they had over physical health, thoughts and feelings, the things done for fun and enjoyment, managing the usual tasks that need to be done to keep up, and life in general (1 = *almost no control*; 10 = *almost total control*). Similar to past research (e.g., Chipperfield, Campbell, & Perry, 2004; Ruthig & Chipperfield, 2006), a composite measure of global perceived control was created by calculating the mean of the five items in AIM 1996 (M = 8.05; SD = 1.70; Cronbach's α = .79) and AIM 2001 (M = 7.67; SD = 1.88; Cronbach's α = .84).

In addition, in keeping with past research (Chipperfield et al., 2004), a *change in perceived control* variable was created by subtracting the 1996 values from the 2001 values, such that higher scores reflected a gain in perceived control ($M = -.38$, $SD = 1.98$, range = −7.0 to 7.2). In sum, 51.7% ($n = 393$) had a loss in perceived control, 9.1% ($n = 69$) had exactly no change, and 39.2% ($n = 298$) had a gain in perceived control.

Loneliness—To assess loneliness, participants were asked, in 1996 and 2001, "If we divide people into four categories, where 1 is '*the not lonely*', 2 is '*the moderately lonely*'," 3 is '*the severely lonely*', and 4 is '*the extremely lonely*', what do you consider yourself to be?" The obtained values are as follows: for Time 1 (AIM 1996): not lonely ($n = 525$); moderately lonely ($n = 225$); severely lonely ($n = 4$), and extremely lonely ($n = 6$); for Time 2 (AIM 2001): not lonely ($n = 553$), moderately lonely ($n = 194$); severely lonely ($n = 6$), and severely lonely ($n = 7$). As we were interested in the major distinction between being lonely or not, this variable was dichotomized into 1 = *not lonely* and 2 = *moderately to extremely lonely*. This decision could also be justified based on the small number of severely/extremely lonely individuals at each time point.

A variable was created to categorize people across time into four groups based on the two dichotomized 1996 and 2001 items: 1 = *lonely in both 1996 and 2001* (persistently lonely); 2 = *lonely in 1996 and not lonely in 2001* (overcoming loneliness); 3 = *not lonely in 1996 and lonely in 2001* (becoming lonely); and 4 = *not lonely in 1996 or 2001* (persistently not lonely). This variable was used as the outcome variable (i.e., the four groups to be discriminated) in the discriminant function analyses as described more below.

Results

Study findings are reported in two sections. First, descriptive findings are presented with regard to the categorization of older adults into four loneliness groups. Second, findings are presented from discriminant function analyses and group mean comparisons examining how well the predictor variables discriminated the four groups and which predictors were the most important in discriminating the groups.

Loneliness categorization

Table 1 shows the four groupings of older adults based on their self-reported loneliness at two points in time, in 1996 and 2001. A *slight reduction* in the proportion of older adults who were lonely over time is suggested by comparing the percentages of participants who were lonely at Time 1 to those lonely at Time 2 (30.9% vs. 27.2%). This is because more people *overcame* loneliness than *became lonely* as discussed next.

An examination of 1996–2001 loneliness patterns shows that the majority of older adults belonged in the persistently not lonely group (56.6%). The next largest groups were the overcoming loneliness group (16.2%), the persistently lonely group (14.7%), and the becoming lonely group (12.5%). Approximately 43% of respondents categorized themselves as being lonely *at least once* over two points in time and a small proportion (14.7%) reported being lonely at both times. This underscores the transitory nature of loneliness for most

people. Indeed, 52% of the lonely at baseline *overcame* their loneliness, whereas, 18% of the not lonely at baseline *became* lonely.

Discriminant function analysis

The initial purpose of the discriminant function analysis was simply to identify which groups can be reliably differentiated from each other. A statistically significant discriminant function isolates the linear combinations of variables (the *discriminant functions*) that *maximize* the differences between the four groups. In brief, discriminant function analysis allowed us to address: (1) which groups can be discriminated by our predictor variables (if any) and (2) which predictor variables *best* discriminate the groups. Prior probabilities were set to reflect the percentage of participants in each group.

Two discriminant functions were statistically significant. Function 1 accounted for 65% of the variance between groups, Wilks' $\lambda = .65$, $\chi^2(78, N = 760) = 321.09$, $p < .01$. Function 2 accounted for an additional 27% of the variance, Wilks' $\lambda = .86$, $\chi^2(50, N = 760) = 116.79$, $p < .01$. Thus, together, the two functions accounted for 92% of the variance in the dependent variable.

Discriminating between groups

In order to determine which groups could be discriminated by our predictor variables, group centroids were examined for each significant function. As can be seen (Figure 1), Function 1 (*x*-axis) separated most starkly the group that was persistently *lonely* (group centroid = −1.03) from the group that was persistently *not lonely* (group centroid = .45). The centroids for the other two groups were less extreme as follows: overcoming loneliness (group centroid = −.47) and becoming lonely (group centroid = −.22). Therefore, Function 1 appeared to be reflecting differences in *frequency or occurrence of loneliness* ranging from not being lonely at either time to being lonely at both times.

Function 2 (*y*-axis) most clearly separated the *becoming* lonely group (group centroid = −.88) from the *overcoming* loneliness group (group centroid = .42), and less extremely from the persistently not lonely (group centroids = .06) and persistently lonely (group centroid = .05) (see Figure 1). Therefore, Function 2 appeared to be reflecting *change in loneliness*, ranging from a negative change (becoming lonely) to a positive change (overcoming).

Best discriminators of the occurrence of loneliness and the change in loneliness

In order to determine the predictor variables that *best* discriminated the group differences, correlations between the predictor variables and the discriminant functions (i.e., the structure matrix) were examined. In addition, because of the large number of predictors included in the analysis, a stepwise discriminant function analysis was performed to obtain *F*-to-remove statistics for each variable, which indicates the variables that make a significant unique contribution to the discrimination. The structure matrix coefficients for the six significant variables are shown in Table 2, along with their respective group mean comparisons.

Function 1, which reflected frequency of loneliness, had strong positive correlations with the *baseline* variables of living arrangements, perceived control, perceived health, and marital

status (Table 2). Thus, the lonely (Group A) and the overcoming (Group B) groups (both lonely at baseline) had significantly lower baseline perceived control and perceived health than the becoming (Group C) and not lonely (Group D) groups. In addition, the lonely and overcoming groups were more likely to be living alone or widowed/divorced at baseline compared to the other groups.

Function 2, which reflected change in loneliness, could be defined by a negative correlation with baseline marital status as well as strong positive correlations with *change* in living arrangements and *change* in perceived control (Table 2). Based on group mean comparisons, the group that *became lonely* over time (Group C) had significantly greater *changes* in living arrangements (i.e., changed from living with someone to living alone) and perceived control compared to the other groups. In addition, these individuals were also more likely to be married at baseline, perhaps reflecting the fact that they had the most to *lose* over time.

In sum, Functions 1 and 2 appear to tell similar messages: being not lonely has to do with one's living arrangements, marital status, perceived control, and health (Function 1). Moreover, "becoming" lonely has to do with *changes* (losses) to living arrangements and perceived control (Function 2).

Discussion

Our findings showed that 15% of older adults were lonely at two points in time. This finding is remarkable as similar proportions were found using different samples and different methodologies out of countries such as Great Britain (Victor, Scambler, Bowling., & Bond, 2005) and Finland (Jylha, 2004). Thus, across several countries, it appears that a sizable proportion of older people experience persistent or chronic loneliness. Furthermore, results showed that 43% of participants reported being lonely at least once over two points in time. Together, results suggest that loneliness is a chronic or transitory problem for a significant proportion of older adults.

A longitudinal discriminant function analysis was conducted to help understand some of the nuances of what characterized older people who were persistently lonely, persistently not lonely, became lonely, or overcame loneliness. The use of this approach allowed us to examine whether baseline levels or changes in our predictors could discriminate the four groups of older adults and which predictors were the most important discriminators. *Persistently lonely*, compared with the *persistently not lonely* were more often living alone, widowed/divorced, in poor health, and experiencing lower perceptions of control. Moreover, *changes* in living arrangements and *changes* in perceptions of control further predicted loneliness change. Social contact variables such as friendships and social activities did not turn out to be significant discriminators among the four groups. Of course, that is not to say that these variables are irrelevant or unimportant in terms of understanding loneliness. However, this study considered a wide range of other variables, and the findings suggest that *in the context of these other variables*, such as health or perceived control or living arrangements, the ability of friendships to discriminate between groups is limited. The idea that loneliness transcends friendships or social activities describes loneliness as a more

profound sense of isolation and highlights the distinction found in past research between loneliness and social support or social networks (e.g., Penninx et al., 1999).

That a change in living arrangements proved to be an important predictor of loneliness change corroborates past research indicating that living alone is a major risk factor for loneliness in older adults (de Jong Gierveld, 1987). There seems to be something about living alone that goes beyond any association it may have with social participation or friendships or health that places it as a major discriminator. That is, it is not simply that people who live alone participate less socially than those who live with others. Perhaps further insight could be gleaned by comparing people who are living alone *by choice* versus those who are living alone due to circumstances beyond their control (such as widowhood) or by examining how long people have lived by themselves. And perhaps more could be learned by studying younger people. It is not as likely that a younger person would be living alone due to widowhood, rather there would be other reasons. Would the same pattern of results emerge in younger adults? These questions all deserve more attention.

A particularly intriguing finding was that changes in *perceptions of control* predicted changes in loneliness. Loneliness, by definition, may be the discrepancy between actual and desired social relationships, but to maintain this discrepancy within acceptable limits is a self-control challenge, similar to any other goal pursuit. The emergence of perceived control among the top predictors of both persistent loneliness and loneliness change thus seems to underscore, in terms of preventing loneliness, the potential importance of factors impinging on a person's ability to manage the pursuit of his/her needs or goals. It is possible that having high levels of perceived control represents the perceived ability to access friends and help *if and when need be*. Thus, this cuts across *actual* numbers of friends or social activities —regardless of the number of friends, it is this idea of being able to count on friends or social support when in need that may be important. People high in perceived control may also simply believe they can obtain their desires and wishes without relying on other people. Dykstra et al. (2005) discussed the idea that certain factors, like a decline in health, could affect people's ability to manage their tasks, resulting in *unmet needs* if help cannot be obtained: with unmet needs along with feelings of dependency and disappointment leading to loneliness. Having low perceptions of control as well as living alone (i.e., not having someone to help us with our daily tasks) may foster "unmet" needs in older adults.

Although our study design precludes making statements of causality, the finding that perceptions of control predict loneliness is consistent with a large body of research showing perceived control predicting a variety of health indicators in later life (e.g., Chipperfield, 1993; Rodin, et al., 1985). However, the relationship between perceptions of control and loneliness could also be reciprocal. For example, Cacioppo and Hawkley (2009) discussed how lonely people's cognitive biases may elicit negative social interactions that could, in turn, confirm their lack of personal control. Insight into these ideas may be gleaned in future research by examining not only people's general perceptions of control over their life but specifically people's control over friendships or social needs and activities. Taken together, insights can arise from such interpretations that frame loneliness within a *cognitive perspective* focusing on people's *preferences*, *expectations*, or *perceptions of control* surrounding social relationships and loneliness.

It is notable that when we examined how the four groups of older adults differed in terms of the *change* variables (Table 2), the mean scores were all *negative* or close to zero. Given that a *positive change* (e.g., an increase in perceived control, or a change from living alone to living with others) is indicated by positive change scores, this suggests that, in general, the best scenario was to see "no change" or "no loss" in such factors as living arrangements rather than improvement to a better state. Moreover, differences among the four groups appeared to reflect either more or less *loss*. In this regard, the group that *became* lonely had *more loss* than the other groups. This striking pattern of results suggests two things that deserve to be pursued further in future research: (1) *overcoming* loneliness or being persistently *not lonely* can be characterized more as a "no loss" or "no change" rather than a "gain" per se; (2) the predictor variables may be better able to predict *entry* into loneliness (becoming) rather than *exit* from loneliness (overcoming).

In light of the present study's results, it seems that developing interventions that focus on preventing entry into loneliness may be a promising avenue to pursue. Negative changes in perceptions of control or living arrangements were found to be risk factors for negative changes in loneliness. Thus, maintaining constancy in our living arrangements and perceptions of control would seem to be a line of defense against loneliness. In terms of living arrangements, many older people who lose a spouse and are living alone may indeed eventually prefer to live alone, but perhaps others would choose a more social living space, given suitable options. There would seem to be a balance to be played out in terms of individuals being independent and being socially isolated. Given that perceptions of control may be more malleable than our living arrangements, results from this study suggest that prevention efforts could focus on providing older adults with the tools and opportunities to maintain or enhance their personal control surrounding their life in general and their social needs in particular. For example, an internet intervention that facilitates social interactions would ideally be designed to allow users to feel more in control of their social relationships and interactions. Further to this, any evaluative efforts could incorporate a pre- and post-analysis not only of people's loneliness but also of people's feelings of control.

Study limitations and strengths

The present study incorporated relatively *large* and *representative* samples, which can allow generalizability of findings. Another strength of the study was the breadth of information on participants, including sociodemographic, health, social, and psychological information. The study was limited though in that cause and effect relationships could not be established due to correlational design. Therefore, it cannot be concluded that the predictors *caused* loneliness. At the same time, however, the longitudinal design strengthens our conclusions, and the empirical results support findings from previous studies as well as from theory that would predict such causal relationships.

Examining participants' loneliness at only two points in time can be seen as another limitation (e.g., Dykstra et al., 2005), since observed changes in loneliness could simply be due to unreliability of the measure. Measuring loneliness at multiple time points would help alleviate the concern that changes in loneliness simply reflected measurement error. The practicalities of this, however, are daunting in that it would require very large samples. By

focusing on data over two points of time, we were able to retain a large enough sample size to produce meaningful findings.

Another limitation was that we did not assess relationship *preferences* and quality that are important in a consideration of loneliness (e.g., Dykstra & Fokkema, 2007). For example, it is difficult to untangle or clarify the social needs and the discrepancy theories of loneliness without knowing how many people who lived alone might have *preferred to live alone*. In addition, we did not assess relationship *quality* that has been found to be an important risk factor for loneliness (e.g., Hawkley et al., 2008). It might be more important to know about the quality of a friend, for example, rather than the mere presence of a friend, as suggested by Rook's (2009) distinction between *substituting* versus *compensating* for social ties. Another limitation was that perceived rather than objective health measures were used. It should also be noted that it is possible that due to the stigma of loneliness that some participants may not have wanted to admit to being lonely. In addition, this study did not investigate differences in loneliness intensity. It is possible that someone who is extremely lonely may need a different type of intervention than someone who is only moderately lonely.

Conclusion

The results from this study suggest that maintaining constancy in our social environment and perceptions of control may be important in guarding against loneliness. However, maintaining constancy in one's living arrangements may be difficult when certain events occur, such as losing a spouse. Thus, it is possible that interventions to reduce loneliness could be aimed at the more malleable predictor: such as enhancing or maintaining high levels of *perceived control.* Continuing to learn about loneliness among older adults and trying to do something to prevent it is an important endeavor, especially considering the costs of being lonely to the individual in terms of health and quality of life and the potential costs to communities and societies as a whole in terms of social participation and community vibrancy.

Acknowledgments

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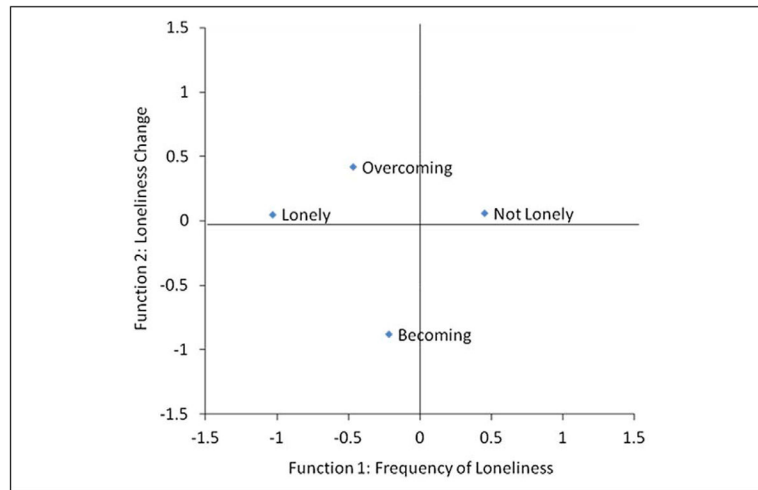
Figure 1.
Group centroids.

Table 1

Four groups of older adults based on self-reported loneliness at two points in time.

AIM 1996	AIM 2001		Total N (%)
	Lonely, N (%)	**Not lonely, N (%)**	**Total N (%)**
Lonely	Persistently lonely, 112 (14.7)	Overcoming, 123 (16.2)	235 (30.9)
Not lonely	Becoming, 95 (12.5)	Persistently not lonely, 430 (56.6)	525 (69.1)
Total N (%)	207 (27.2)	553 (72.8)	760 (100)

Table 2

Correlations with discriminant functions, means, *SD*s, and *F*-ratios for the six significant predictors based on *F*-to-remove statistics.

Predictors	Function 1 r	Function 2 r	Group A (Lonely)	Group B (Overcoming)	Group C (Becoming)	Group D (Not lonely)	Group differences, $F(1, 226)$	Significant contrasts
Living arrangements[a]	.48	−.27					20.71**	n/a
M			1.31	1.36	1.60	1.64		
SD			.47	.48	.49	.48		
Perceived control	.45	−.19					16.93**	a–d**, b–d**, a–c**, b–c*
M			7.30	7.54	8.14	8.37		
SD			1.80	1.86	1.48	1.58		
Perceived health	.42	−.31					17.34**	a–d**, b–d**, a–c**, b–c**
M			2.32	2.44	2.77	2.75		
SD			.69	.71	.69	.64		
Marital status[b]	.39	−.39					17.00**	n/a
M			1.38	1.36	1.66	1.63		
SD			.49	.48	.48	.48		
Change in living arrangements	.09	.56					11.04**	a–c**, b–c**, c–d**
M			−.11	−.03	−.28	−.06		
SD			.41	.25	.48	.35		
Change in perceived control	.07	.39					5.63**	b–c**, c–d**
M			−.60	.01	−1.01	−.30		
SD			2.14	2.18	1.83	1.87		

Note. N = 760. Group mean differences were tested using univariate *F* tests. For completeness, both categorical and continuous variables were tested. To determine significant contrasts, follow-up Bonferroni post hoc analyses were performed for the continuous variables.

[a] The means for living arrangements signify the percentages within each group of people living with others (e.g., 1.31 = 31%).

[b] The means for marital status signify the percentages within each group of people who are married or single.

*
p .05.

**
p .01.