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Chapter 6

Dispositional optimism and loneliness in older men

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Abstract

Background Dispositional optimism, defined as a generalized tendency to positive outcome expectancies, is associated with well-being and successful aging. However, it remains unclear whether optimism is also correlated to less feelings of loneliness over time. We aimed to determine whether dispositional optimism is prospectively associated with less feelings of loneliness, independently of potential confounders inherent to the aging process.

Methods We followed 416 older men aged between 70 and 89 years (mean 74.9 years, SD 4.7) within the population-based Zutphen elderly study during up to 10 years of follow-up. Baseline dispositional optimism was assessed using a four-item questionnaire. Presence of feelings of loneliness, the main outcome of our study, was assessed using the 11-item loneliness scale of De Jong Gierveld in 1990, 1993, 1995, and 2000. The association between baseline dispositional optimism and loneliness over time was tested using multilevel regression analysis and adjusting for potential confounders (i.e. age, living arrangement, social contacts, widowhood, memberships, self-rated health, and depressive symptoms).

Results Feelings of loneliness significantly increased during 10 years of follow-up, but showed temporal stability (reliability coefficient 0.78). Low baseline dispositional optimism was strongly associated with loneliness over time, also in the adjusted analysis. A one standard deviation (SD) increase in baseline dispositional optimism was associated with a 0.14 SD (95% confidence interval: 0.04 to 0.23) lower level of loneliness ($F(1, 320) = 7.8; p = 0.006$).

Conclusions Dispositional optimism is correlated to lower feelings of loneliness over time in older men, independently of depression or changes in social network.

Introduction

Dispositional optimism is a stable personality trait defined as the generalized tendency towards positive outcome expectations, life engagement, and a future orientation (Scheier *et al.*, 1994). Optimists are more likely to engage in problem-solving coping strategies, which enhance their ability to deal with stressful events and consequently improve their psychological well-being (Nes & Segerstrom, 2006). Although the underlying mechanisms are largely unknown, it is conceivable that optimism leads to a more positive appraisal of the existing social network or to the active pursue of new social relationships to cope with adversities (Carver *et al.*, 2010). In this way, dispositional optimism may lead to a better social embedding and protect against loneliness. Although little is known on the potential protective effect of dispositional optimism on loneliness, several cross-sectional studies have shown that optimism is linked to loneliness in low-vision older women (Barron *et al.*, 1992) and college students (Montgomery *et al.*, 2003; Neto & Barros, 2003). However, their cross-sectional designs preclude making causal inferences of the direction of the relationship between optimism and loneliness.

We are only aware of three prospective studies and a cross-lagged longitudinal study investigating the relationship between dispositional optimism, social resources, and loneliness (Brissette *et al.*, 2002; Jackson *et al.*, 2000; Nurmi *et al.*, 1996). The first study investigated the changes and appraisal in social network experienced by a group of 89 students starting college, showing that higher optimism was prospectively associated with greater increases in perceived social support over six months of follow-up (Brissette *et al.*, 2002). The second study examined the effect of dispositional optimism and quality of close relationships on loneliness in 180 students during a six-week follow-up period. They found that lower levels of optimism and social support were associated with more feelings of loneliness (Jackson *et al.*, 2000). The third study investigated the association between cognitive and behavioural strategies and loneliness among 303 students during a one-year follow-up period. Their results indicated that less optimistic students were more likely to use a social-avoidance coping strategy and felt more lonely than their more optimistic peers (Nurmi *et al.*, 1996).

Loneliness is defined as a pervasive state caused by a discrepancy between the individual's desired and actual relationships (Jong-Gierveld, 1987). It has to be discriminated from social isolation, which refers to the more objective absence of social contacts (Routasalo *et al.*, 2006). Weiss (Weiss, 1973) discerned two subtypes of loneliness: emotional and social loneliness. The former is related to the absence of one or more intimate figures, whereas the latter refers to the absence of a broader social network. Emotional loneliness may be particularly relevant when studying older subjects, as they are more likely to suffer bereavement. Furthermore, these losses appear to be more salient for men as they rely more on their spouses and less on other social contacts for seeking support (Antonucci & Akiyama, 1987; Srivastava *et al.*, 2006). There are several known factors underlying loneliness: household composition, social participation, church affiliation, memberships, voluntary work, level of education, income, health, and functional status (Savikko *et al.*, 2005; Wenger *et al.*, 1996). Older adults seem to be at greater risk of feeling lonely due to the inevitable transitions of late life, such as loss of a spouse or disability-related obstacles for social interaction.

The purpose of this prospective study is to investigate the relationship between dispositional optimism and presence of feelings of loneliness in older men. We hypothesize that higher optimism scores at baseline will be associated with less loneliness over time, regardless of (changes in) potential confounders. We base this hypothesis on the findings of previous

research showing that an approach-oriented strategy, which characterizes dispositional optimism, is associated with reduction of loneliness (Masi *et al.*, 2010). The elucidation of potential predictors of loneliness is clinically of importance, as the co-occurrence of loneliness with other health problems has been related to a worse prognosis in older adults (Stek *et al.*, 2005).

Methods

Study sample

The Zutphen elderly study is a prospective population-based study among older male inhabitants of Zutphen, the Netherlands. The study characteristics of the cohort have previously been described in detail (Feskens *et al.*, 1993). Briefly, in 1990, elderly men who were previously examined in 1985 were asked to participate. There were a priori no selection criteria for demographic or health characteristics. Participants were visited for face-to-face interviews and were followed during 10 years. Informed consent was obtained from all study participants. The study was approved by the Medical Ethics Committee of the Leiden University Medical Centre, and in 1995 and 2000, by the Medical Ethics Committee of The Netherlands Organization for Applied Scientific Research (TNO).

Of the 560 subjects who participated in the study in 1990 (response rate 78.0%), 127 subjects were excluded due to missing information on the loneliness or optimism scores, and 17 subjects with a Mini Mental State Examination (MMSE) score <19 were excluded (Folstein *et al.*, 1975). Thus, cross-sectional analyses were based on 416 subjects. During the 10 years of follow-up, all surviving cohort members were invited for each consecutive survey wave in 1993 (response rate 70.5%), in 1995 (response rate 74.2%), and in 2000 (response rate 72.8%). During the 10 years of follow-up, 225 subjects (54.1%) of the initial study sample died.

Dispositional optimism

To assess baseline dispositional optimism, participants were tested in 1990 using a four-item questionnaire (Giltay *et al.*, 2006a) from a survey of Statistics Netherlands (CBS) consisting of the following statements – “I still expect much from life”, “I do not look forward to what lies ahead for me in the years to come”, “My days seem to be passing by slowly”, and “I am still full of plans” (our translations). Subjects were asked to express the extent of their agreement with each of the items, coding their responses on a 0-2 Likert type scale. Within the four score items, two negatively stated items required reversed coding. The additional answer category “do not know” was also coded as the midpoint (score 1). The optimism questionnaire score ranges from 0-8 points, with higher scores being indicative of higher optimism levels. Internal consistency was of moderate strength (Cronbach’s alpha was 0.65 in 1990). The test-retest reliability coefficient was 0.82 for the optimism scale over 10 years.

Loneliness

Feelings of loneliness were assessed in 1990, 1993, 1995, and 2000 using the Loneliness Scale of De Jong Gierveld, an 11-item questionnaire consisting of two subscales: the emotional loneliness scale and the social loneliness scale (Jong-Gierveld, 1987). The loneliness scale comprises five positive stated items and six negative stated items, and ranges from 0-11 points, with higher scores being indicative of higher loneliness levels. The total loneliness score was calculated by assigning a score of one point to the responses indicating a (certain) feeling of loneliness. If a respondent had one missing value, the missing item was imputed

with the median of the remaining 10 items for that particular subject. The emotional loneliness score was the result of the sum of the positively or neutral stated answers on six items, whereas the social loneliness score was the sum of the negatively and neutral stated answers on its five corresponding items. No missing values were allowed for the computation of both subscales. The 11-item De Jong Gierveld Loneliness Scale has proved to be a valid and reliable instrument for the assessment of overall, emotional, and social loneliness (Pinquart & Sorensen, 2001).

Social isolation

Social isolation was assessed in 1990, 1993, 1995, and 2000 using a structured questionnaire on social contacts and memberships. The social contacts questionnaire consists of six items and inquires the frequency of social contacts with relatives and friends (i.e. children living nearby, children living far away, grandchildren, other relatives, friends and acquaintances, and neighbours). The degree of social participation was assessed with a membership questionnaire in which participants reported their degree of participation, if any, in eight organizations of society (i.e. religious community, political organization, social club, sport club, socio-cultural organization, senior club, voluntary work, and other social organizations). A missing value on any of the items of the membership questionnaire was considered as being non-active in that particular organization. Widowhood was dichotomized on being widowed or not, and institutionalized was dichotomized on being institutionalized in a nursing or residential care home, or not.

Possible confounders

Sociodemographic and lifestyle parameters were obtained using structured questionnaires. Educational attainment was categorized into two levels depending on the highest level of education completed; smoking history was classified as no smoking, former smoking, and current smoking. Alcohol consumption was considered high when the consumption was higher than 20 grams of alcohol a day (i.e. two units of alcohol a day). Participants were asked to report their health status (i.e. self-rated health) which was subsequently dichotomized on feeling healthy or feeling (rather) unhealthy (Pijls *et al.*, 1993). Body Mass Index (BMI) was calculated from the measured weight (kg) and height (m). Presence of depressive symptoms was assessed using the Dutch translation of the Zung self-rating depression scale (Zung SDS), with scores >60 indicating presence of depressive symptoms (Zung, 1965; Coulehan *et al.*, 1989). Presence of chronic diseases, defined as having either a cardiovascular disease (i.e. stroke, myocardial infarction, or heart failure), diabetes mellitus, or cancer, was determined by a survey questionnaire and confirmed with hospital discharge data and written information from the general practitioner. Finally, presence of disability was assessed with the 13-item Activities of Daily Living (ADL) questionnaire (van den Brink *et al.*, 2005). Only 13 participants (3.1%) had one missing value on covariates.

Statistical analysis

The baseline characteristics of the participants were compared between not lonely and lonely participants (defined with a cut off score ≥ 3 on the De Jong Gierveld Loneliness Scale) (Scharf & Jong-Gierveld, 2008), using the chi-square test and two sample t-tests when appropriate. Results are presented as numbers and percentages for categorical variables, and median and interquartile ranges (IQR) for continuous skewed variables. Logistic regression was used to calculate the odds ratios (with 95% confidence intervals [CI]). Reliability coefficients (i.e., an

intraclass correlation coefficient with a one-way random effects model with average-measure reliability) were used to examine temporal stability of loneliness and its two subscales over the four time points.

Linear mixed models were used to assess the progression of the main outcome variable loneliness and its potential confounders over 10 years of follow-up. When statistically significant, post hoc paired comparisons were made by using a Sidak test to identify significant differences for continuous variables and chi-squared tests for categorical variables. Back-transformed geometric means were presented for those continuous variables with a positively skewed distribution which had to be log-transformed before the analysis (i.e. loneliness score and its two subscales, social contacts score, and membership score). Untransformed estimated means were given for those variables with a normal distribution (i.e. dispositional optimism).

Multilevel regression analysis (i.e. linear mixed models) was used to analyse the association of baseline dispositional optimism with loneliness scores from 1993 till 2000 in 316 men. Subjects were measured up to three times and the continuous loneliness score was the main outcome variable. Time was used as a categorical variable with categories corresponding to the years 1990, 1993, 1995, and 2000. In multilevel analysis, we used an unstructured covariance model with a two-level structure consisting of the four observations (lower level) and the subject (higher level). We additionally adjusted for the effects of known confounders (Savikko *et al.*, 2005; Wenger *et al.*, 1996). First, we tested the effect of dispositional optimism on the loneliness scores in a crude model. Subsequently, we adjusted for age, living arrangement, social contacts, widowhood, memberships, self-rated health, and depressive symptoms. Finally, a linear regression analysis was used to explore the correlations between baseline optimism and changes in loneliness scores over time, adjusting for baseline loneliness and the other covariates that were also used in the multilevel regression analysis.

All p-values are two-tailed and considered statistically significant at the level of $p < 0.05$. Data analyses were performed using SPSS for Windows, version 17.0 (Chicago, IL).

Results

Table 1 shows the baseline characteristics of 416 men according to the presence of subjective feelings of loneliness. At baseline, participants were on average 74.8 (S.D. 4.6) years old (range 70 to 89). Loneliness was present in 186 (44.7%) of the participants. It was associated

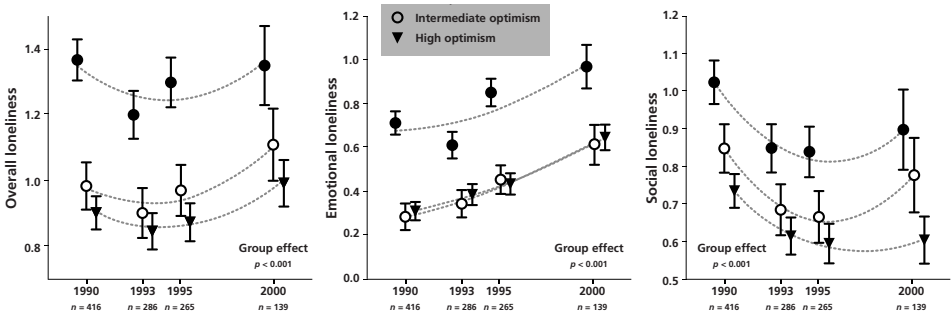


Figure 1. Progression of the total, emotional, and social loneliness scores during 10 years of follow up, according to baseline tertiles of dispositional optimism. Error bars represent 95% confidence intervals of the mean (297 × 210 mm [200 × 200 dots per inch]).

Table 1. Baseline characteristics of 416 elderly men in 1990 according to the loneliness status

	Not lonely	Lonely ^a	OR (95%CI) for loneliness ^b	P-value ^c
N	230	186	–	–
Dispositional optimism, median (IQR)	6.27 (5.00;8.00)	5.16 (4.00;6.00)	0.70 (0.62–0.79)	<0.001
Age, mean ± SD	73.82 (71.00;77.00)	74.86 (71.00;78.00)	1.03 (0.99–1.08)	0.16
Widowhood (n, %)	29 (12.6%)	36 (19.4%)	1.66 (0.98–2.83)	0.06
Living alone (n, %)	31 (13.5%)	49 (26.3%)	2.30 (1.39–3.78)	0.001
Institutionalized (n, %)	8 (3.5%)	4 (2.2%)	0.61 (0.18–2.05)	0.42
Higher education ^d (n, %)	57 (24.8%)	40 (21.6%)	0.84 (0.53–1.33)	0.45
Social contacts, median (IQR)	2.8 (2.6;2.9)	2.6 (2.4;2.9)	0.38 (0.23–0.64)	<0.001
Memberships, median (IQR)	1.4 (0.7;1.8)	1.1 (0.7;1.6)	0.70 (0.53–0.93)	0.01
Smokers (n, %)				
• Never	32 (13.9%)	27 (14.5%)	1.0 (ref)	0.49
• Former	128 (55.7%)	93 (50.0%)	0.86 (0.48–1.53)	
• Current	70 (30.4%)	66 (35.5%)	1.12 (0.61–2.06)	
Alcohol users (n, %)				
• 0 g/ day	50 (21.7%)	48 (25.8%)	1.0 (ref)	0.11
• 1-19 g/ day	121 (52.6%)	106 (57.0%)	0.91 (0.57–1.47)	
• >20 g/ day	59 (25.7%)	32 (17.2%)	0.57 (0.32–1.01)	
Feeling unhealthy (self-rated) (n, %)	100 (43.5%)	105 (56.8%)	1.71 (1.16–2.52)	0.01
Any chronic disease ^e , (n, %)	48 (20.9%)	49 (26.3%)	1.41 (0.93–2.12)	0.11
Disability, (n, %)	96 (42.7%)	92 (50.5%)	1.37 (0.93–2.03)	0.11
BMI (kg/m ²), median (IQR)	25.71 (24.02;27.30)	25.27 (22.99;26.91)	0.95 (0.89–1.02)	0.15
Depression, (n, %)	10 (4.5%)	17 (9.4%)	2.21 (0.99–4.95)	0.05
MMSE, median (IQR)	27.00 (25.00;28.00)	27.00 (25.00;28.00)	0.96 (0.88–1.05)	0.36

IQR, interquartile ranges; BMI, body mass index; MMSE, mini mental state examination

a Being lonely was defined as having a loneliness score ≥ 3 points.

b Odds ratios (OR) with 95% confidence intervals (CI) by logistic regression analysis.

c P values by logistic regression analysis.

d Higher education level was defined as having a university or high school degree.

e Chronic disease was defined as having a cardiovascular disease (i.e. myocardial infarction, stroke, and heart failure), cancer or diabetes mellitus.

with low baseline optimism, living alone, and feeling unhealthy, as well as with widowhood and depressive symptoms, but on a borderline statistical significance. Furthermore, loneliness was related to a smaller social network, as evident from the lower social contacts and membership scores.

Table 2 summarizes the progression of the optimism and different loneliness scores from baseline through during follow-up. Optimism scores showed a statistically significant decrease over time. The total loneliness score remained rather stable over time, with an overall reliability coefficient of 0.78 (95% CI: 0.72 to 0.84), when analysing complete data of 128 men at all four time points. The reliability coefficients were 0.76 and 0.79 for the emotional and social loneliness subscales, respectively. As for the loneliness subscales, we observed a statistically significant increase in the emotional loneliness scores and a statistically significant decrease of the social loneliness scores during follow-up. The emotional loneliness scores

Table 2. Time course of dispositional optimism, loneliness and social contacts related factors over 10 years of follow-up in 416 elderly men

	1990 n= 416	1993 n= 286	1995 n= 265	2000 n= 139	P-value
Independent variable:					
• Dispositional optimism score	5.76 (5.58–5.93) ^a	5.31 (5.10–5.51) ^b	5.09 (4.86–5.32) ^b	4.62 (4.36–4.88) ^c	< 0.001
Dependent variables:					
• Loneliness score	1.88 (1.68–2.10)	1.55 (1.35–1.78)	1.72 (1.48–1.97)	1.91 (1.58–2.29)	0.59
• Emotional loneliness subscore	0.50 (0.41–0.59) ^a	0.50 (0.40–0.61) ^a	0.69 (0.56–0.83) ^b	1.00 (0.79–1.23) ^c	< 0.001
• Social loneliness subscore	1.36 (1.21–1.52) ^a	0.98 (0.84–1.13) ^b	0.97 (0.82–1.13) ^b	0.98 (0.79–1.18) ^b	< 0.001
Confounders:					
• Social contacts score	13.43 (12.79–14.07) ^a	5.20 (4.48–6.00) ^b	4.26 (3.64–4.97) ^c	1.37 (1.10–1.67) ^d	< 0.001
• Membership score	2.20 (1.99–2.42) ^a	1.14 (0.99–1.31) ^b	1.08 (0.93–1.24) ^b	0.42 (0.33–0.51) ^c	< 0.001
• Depression (n,%)	27 (6.7%)	27 (6.6%)	23 (8.7%)	10 (7.4%)	0.73
• Widowhood (n,%)	65 (15.6%) ^a	61 (21.3%) ^a	65 (24.4%) ^b	44 (31.0%) ^b	0.001
• Institutionalized (n, %)	12 (2.9%) ^a	12 (4.2%) ^a	9 (3.5%) ^a	19 (13.4%) ^b	< 0.001
• Living alone (n, %)	80 (19.2%) ^a	66 (22.8%) ^a	72 (27.1%)	49 (34.8%) ^b	0.001

Data are backtransformed estimated marginal means (with 95% confidence intervals [CI]), except for dispositional optimism for which untransformed estimated marginal means (with 95% CI) are given.

Data on depression (Zung score>60), widowhood, institutionalized, and living alone are represented as n (%).

Values in the same row with different superscript letters are significantly different ($p<0.05$) in the post-hoc Sidak test for continuous variables and in the chi-square test for categorical variables.

P-values for linear trend over time using multilevel linear models, except for depression, widowhood, institutionalized, and living alone using chi-squared test linear-by-linear term.

were similar for the years 1990 and 1993, whereupon they increased in 1995 and 2000 (Table 2 and Figure 1). In contrast, social loneliness scores decreased from 1990 until 1993, and remained rather stable thereupon (Table 2 and Figure 1). The cross-sectional Spearman correlation coefficients between emotional loneliness and social loneliness varied in 1990, 1993, 1995, and 2000 between 0.20 and 0.45, showing that emotional and social loneliness scores were positively associated at all time points, but also rather independent constructs. As expected, the percentage of widowers increased during follow-up. Also, the percentage of the participants who were institutionalized in a residential care home and of those who lived alone increased during follow-up. Both social network size and the level of active participation in social organizations showed a strong and highly statistically significant decrease over time.

Table 3 shows both the cross-sectional and longitudinal associations between baseline dispositional optimism and the presence of feelings of loneliness over time. Prospective analyses were based on 316 older men who completed at least one other assessment of loneliness during seven years of follow-up (1993-2000). There was a strong, inverse association between baseline optimism and loneliness scores, with high levels of optimism being related to lower levels of subjective loneliness (effects on the intercept). This association persisted after adjusting for potential confounders. A 1 standard deviation (SD) increase in dispositional optimism was associated with a 0.14-SD lower level of loneliness (95% CI: 0.04 to 0.23; $p<0.001$). When examining the association between baseline dispositional optimism and the loneliness subscales, we observed a strong inverse association for both emotional loneliness (beta=-0.11; 95% CI: -0.02 to -0.21; $p=0.02$), and social loneliness (beta=-0.11; 95% CI: -0.01 to 0.21; $p=0.03$). Results from the linear regression analysis showed that baseline opti-

Table 3. Prediction of loneliness scores in elderly men according to baseline optimism in 1990 during 7 years of follow-up (1993 till 2000)

	Baseline	Follow-up			
	1990	1993	1995	2000	For 1993 till 2000
Loneliness score					
• Crude	-0.40 (-0.31;-0.48) ^a	-0.26 (-0.14;-0.38) ^a	-0.26 (-0.13;-0.38) ^a	-0.26 (-0.07;-0.44) ^b	-0.27 (-0.17;-0.37) ^a
• Adjusted	-0.30 (-0.21;-0.40) ^a	-0.11 (-0.24; 0.01)	-0.09 (-0.22; 0.03)	-0.18 (-0.38; 0.01)	-0.14 (-0.04;-0.23) ^b
Emotional loneliness score					
• Crude	-0.42 (-0.34;-0.50) ^a	-0.22 (-0.10;-0.34) ^a	-0.29 (-0.16;-0.42) ^a	-0.24 (-0.05;-0.44) ^b	-0.25 (-0.15;-0.35) ^a
• Adjusted	-0.31 (-0.22;-0.39) ^a	-0.11 (-0.23; 0.01)	-0.09 (-0.20; 0.03)	-0.12 (-0.33; 0.04)	-0.11 (-0.02;-0.21) ^b
Social loneliness score					
• Crude	-0.29 (-0.20;-0.38) ^a	-0.16 (-0.03;-0.28) ^b	-0.17 (-0.05;-0.29) ^b	-0.17 (-0.01;-0.34) ^b	-0.18 (-0.09;-0.28) ^a
• Adjusted	-0.24 (-0.13;-0.34) ^a	-0.04 (-0.18; 0.09)	-0.09 (-0.22; 0.02)	-0.12 (-0.29; 0.06)	-0.11 (-0.01;-0.21) ^b

Betas (with 95% confidence intervals) and P-values using multilevel linear models (for 1990 till 2000).

aBetas were significant at $p < 0.005$.

bBetas were significant at $p < 0.05$.

Adjusted for age, living arrangement, social contacts, widowhood, memberships, self-rated health, and depressive symptoms.

mism was not correlated to changes in loneliness scores over time after adjustment for baseline loneliness scores and other covariates (in 1993: $\beta = -0.01$, $p = 0.82$; in 1995: $\beta = -0.01$, $p = 0.87$; in 2000: $\beta = -0.12$, $p = 0.18$).

Figure 1 depicts the impact of time and baseline optimism on the total, emotional, and social loneliness scores. To facilitate presentation of data, categorization of dispositional optimism into tertiles was used instead of continuous data. There was a statistically significant effect of the optimism score on all three loneliness scores ($p < 0.001$), showing that men with the highest optimism scores were not only the least lonely at baseline, but also remained the least lonely throughout the entire follow-up period. Furthermore, we observed a substantial time effect after adjustment for potential confounders, with all three groups of optimism showing an increase of the mean total loneliness and emotional loneliness scores. An attenuated effect of time was observed in opposite direction with regard to the social loneliness scores, which decreased over time. Somewhat contrary to our expectations, the time effect on the decrease in the social loneliness scores could not be explained by the formation of new social contacts in a residential or nursing home, as the time effect persisted after adjustment for social contacts.

Discussion

In this prospective cohort study, lower levels of dispositional optimism at baseline were strongly associated with higher feelings of loneliness in community-dwelling older men. The inverse relationship with baseline dispositional optimism persisted over 10 years of follow-up,

also after adjusting for potential sociodemographic and clinical confounders. Our findings indicate that older men with positive expectations towards the future are less likely to suffer from subjective feelings of loneliness, despite aging-related negative life events such as bereavement and deteriorating health.

There are some limitations that ought to be discussed. Dispositional optimism was assessed with a four-item questionnaire, and not with the more often used LOT-R scale (Life Orientation Test–Revised) (Scheier *et al.*, 1994). However, the four-item questionnaire shares with the LOT-R a focus on the future, having a tendency towards reflecting life engagement, vitality, and having a purpose in life. A further limitation of our study is that our findings cannot be generalized to women, since the Zutphen elderly cohort was only composed of men. Next, it is possible that the advanced age of our sample determined our results. Therefore, it needs to be established whether optimism predicts changes in loneliness in longitudinal studies among younger subjects. The main strength of our study lies on its prospective design with a long follow-up period. In addition, we adjusted for many important confounders, such as social isolation and depressive symptoms, which have been previously reported to be determinants of loneliness. It is well-known that lonely individuals are more susceptible to develop depressive symptoms compared to non-lonely individuals (Luanaigh & Lawlor, 2008; Tijhuis *et al.*, 1999; Prince *et al.*, 1997; Green *et al.*, 1992; Heikkinen & Kauppinen, 2004). Also, low dispositional optimism has been documented as a risk factor for depressive symptoms in older adults (Isaacowitz & Seligman, 2001; Giltay *et al.*, 2006b). It is therefore important to note that the association under study was independent of depressive symptoms. Finally, the internal consistency and reliability of both the optimism and loneliness scales was reasonable, indicating that both optimism and loneliness remained rather stable over time in the old age, despite the gradual within-person decline in optimism with aging.

Our results are consistent with the findings of the aforementioned prospective studies among college students, which reported that lower optimism levels predicted more feelings of loneliness (Jackson *et al.*, 2000; Brissette *et al.*, 2002; Nurmi *et al.*, 1996). We now extend these findings by showing in a prospective study with a longer follow-up period that dispositional optimism was also related to subjective feelings of loneliness in a larger sample of older men. On the other hand, our results contrast with the results of previous studies that found that different precursors and coping strategies were differently associated to emotional or social loneliness in younger adults (Russell *et al.*, 1984; DiTommaso & Spinner, 1993), as we found that low optimism was associated to both emotional and social loneliness scores to a similar extent. The divergence of our results in an old sample with those of the previously described studies among younger samples is probably due to the nature of life-events specific for the elderly. Older adults may be more prone to emotional and social loneliness because of the increasing risk of bereavement due to death of a partner or disability that may hinder activities and social interaction.

The intriguing question remains how dispositional optimism correlates to less feelings of loneliness in older men. Optimism may stimulate ways that people cope with adversity (Andersson, 1996; Fredrickson, 2001) and seek social support (Brissette *et al.*, 2002), enhancing consequently psychological well-being (Isaacowitz & Seligman, 2002). It is conceivable that, after a negative event, optimists use coping strategies that foster more positive appraisals of the existing social network or lead to actively pursue new social relationships (Scheier *et al.*, 1986). In this way, dispositional optimism might lead to the achievement of a better social embedding and protect against feelings of loneliness.

In clinical practice, it has been reported that loneliness is associated with a myriad of

adverse outcomes in the elderly. Loneliness has been related to sleep disturbances (Cacioppo *et al.*, 2002; Jacobs *et al.*, 2006), poor immune functioning (Glaser *et al.*, 1985), poor cardiovascular functioning (Hawkey *et al.*, 2006), and increased mortality (Stek *et al.*, 2005). Hence, the alleviation of loneliness may improve physical and mental well-being. Our findings suggest that subjects with low levels of optimism are more vulnerable to loneliness and might therefore benefit from more clinical attention and interventions aimed to prevent and alleviate loneliness. In a recent meta-analysis, interventions that addressed maladaptive social cognitions had a superior effect compared to interventions that addressed social support, social skills, and opportunities for social interaction (Masi *et al.*, 2010). Their results suggest that maladaptive social cognitions are crucial for the development and maintenance of loneliness, and that reducing social isolation does not necessarily improve feelings of loneliness. In turn, interventions that increase perceived social support may influence self perceptions along dimensions that may improve the quality of social interactions (Cacioppo *et al.*, 2006). Future intervention studies should investigate the effects of cognitive and behavioural interventions focused on challenging generalized negative expectations about social relationships, reframing perceptions of loneliness and personal control, and developing more optimistic appraisals that encourage seeking social support as a response to negative cognitions and life events (Hawkey & Cacioppo, 2010; Fava & Tomba, 2009).

We conclude that older men with positive outcome expectations are less likely to experience feelings of loneliness, despite the age-related stressful transitions of late life. Since aging is inevitably related to stressful life events, clinicians and social workers should be aware of the susceptibility of less optimistic older adults to feelings of loneliness in order to offer them adequate care and support.

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