

PLEASE NOTE! THIS IS PARALLEL PUBLISHED VERSION /
SELF-ARCHIVED VERSION OF THE OF THE ORIGINAL ARTICLE

This is an electronic reprint of the original article.
This version *may* differ from the original in pagination and typographic detail.

Author(s): Pynnönen, Katja; Rantanen, Taina; Kokko, Katja; Tiikkainen, Pirjo; Kallinen, Mauri;
Törmäkangas, Timo

Title: Associations between the dimensions of perceived togetherness, loneliness, and depressive symptoms among older Finnish people

Version: Accepted Manuscript (AM)

Please cite the original version:

Pynnönen, K., Rantanen, T., Kokko, K., Tiikkainen, P., Kallinen, M. & Törmäkangas, T. (2017). Associations between the dimensions of perceived togetherness, loneliness, and depressive symptoms among older Finnish people. *Aging & Mental Health*.
doi:10.1080/13607863.2017.1348479

URL: <https://doi.org/10.1080/13607863.2017.1348479>

HUOM! TÄMÄ ON RINNAKKAISTALLENNE

Rinnakkaistallennettu versio *voi* erota alkuperäisestä julkaistusta sivunumeroiltaan ja ilmeeltään.

Tekijä(t): Pynnönen, Katja; Rantanen, Taina; Kokko, Katja; Tiikkainen, Pirjo; Kallinen, Mauri;
Törmäkangas, Timo

Otsikko: Associations between the dimensions of perceived togetherness, loneliness, and depressive symptoms among older Finnish people

Versio: Accepted Manuscript (AM)

Käytä viittauksessa alkuperäistä lähdettä:

Pynnönen, K., Rantanen, T., Kokko, K., Tiikkainen, P., Kallinen, M. & Törmäkangas, T. (2017). Associations between the dimensions of perceived togetherness, loneliness, and depressive symptoms among older Finnish people. *Aging & Mental Health*.
doi:10.1080/13607863.2017.1348479

URL: <https://doi.org/10.1080/13607863.2017.1348479>

Associations between the Dimensions of Perceived Togetherness, Loneliness, and Depressive Symptoms among Older Finnish People

Katja Pynnönen¹, Taina Rantanen¹, Katja Kokko¹, Pirjo Tiikkainen², Mauri Kallinen^{3,4}, Timo Törmäkangas¹

¹Gerontology Research Center and Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland.

²JAMK University of Applied Sciences, Jyväskylä, Finland

³Department of Medical Rehabilitation, Oulu University Hospital, Oulu, Finland

⁴Center for Life Course Epidemiology Research, University of Oulu, Oulu, Finland

Corresponding author: Katja Pynnönen, Gerontology Research Center and Faculty of Sport and Health Sciences, University of Jyväskylä, P.O.Box 35, Jyväskylä FIN-40014, Finland.

E-mail: katja.pynnonen@jyu.fi

Associations between the Dimensions of Perceived Togetherness, Loneliness, and Depressive Symptoms among Older Finnish People

Abstract

Objectives: We studied the associations between perceived togetherness, depressive symptoms, and loneliness over a six-month period among 222 people aged 75-79 who reported loneliness or depressive mood at baseline.

Method: The present cross-lagged models utilized baseline and six-month follow-up data of a randomized controlled trial that examined the effects of a social intervention on loneliness and depression (ISRCTN78426775). Dimensions of perceived togetherness, i.e., attachment, social integration, guidance, alliance, nurturance, and reassurance of worth, were measured with the Social Provisions Scale, depressive symptoms with a short form of the Geriatric Depression Scale, and loneliness with a single item.

Results: After controlling for baseline loneliness and depressive symptoms, baseline higher attachment in all participants and baseline higher opportunity for nurturance in the social intervention group predicted lower depressive mood at follow-up. No cross-lagged associations between the dimensions of perceived togetherness at baseline and loneliness at follow-up were observed. In addition, depressive symptoms and loneliness at baseline tended to negatively predict the dimensions of perceived togetherness at follow-up.

Discussion: Depressive symptoms and loneliness appear to be precursor for perceived togetherness, rather than dimensions of perceived togetherness to be antecedents of loneliness and depressiveness among older people.

Keywords: Cross-lagged modeling, mental health, social need, social provision

Introduction

People have a fundamental need and motivation to form frequent, affectively pleasing, and relatively enduring relationships with at least a few other people (Baumeister & Leary, 1995). In his social provision theory, Robert Weiss (1974) proposed that people need various kinds of social relationships to fulfill their various social needs. Weiss (1974) identified six dimensions that describe the social needs of people; these he termed social provisions. They were named: *attachment*, *social integration*, *guidance*, *sense of reliable alliance*, *opportunity for nurturance*, and *reassurance of worth*. *Attachment* stems from the feeling of safety and security, most often experienced in spousal relationships or relationships with close friends. *Social integration* refers to the sense of belonging to a group, for example, one feels that there are people around one who appreciate the same things, or have the same concerns. *Reliable alliance* refers to relationships in which the person can count on assistance under any circumstances. *Guidance* is available in relationships with trustworthy and authoritative individuals who can provide advice and assistance. *Opportunity for nurturance* refers to feelings of being responsible for the well-being of another, typically most often present in spousal relationships and relationships with children. *Reassurance of worth* refers to the feeling that the person's skills and abilities are acknowledged. We use the term *perceived togetherness* to refer to the six dimensions of social provisions described above (Tiikkainen, Heikkinen, & Leskinen, 2004) as it illustrates a positive angle on social relations better than the term social provisions. To summarize, perceived togetherness refers to the way people feel their existing social relations meet their needs and expectations.

The theoretical model of social provisions proposed by Weiss (1974) was subsequently operationalized by Cutrona and Russell (1987), who developed the Social Provisions Scale. Respondents are asked to rate the degree to which their social relationships currently supply attachment, social integration, guidance, sense of reliable alliance, opportunity for nurturance,

and reassurance of worth. For the internal consistency of the whole scale, Cutrona, Russell, and Rose (1986) reported values ranging from .85 to .92 in different populations and the value of .92 in a sample of older adults. In a study of Finnish 80-year-olds, Cronbach's alpha for the whole scale was .86, with alphas for the individual dimensions ranging from .53 (social integration) to .66 (reliable alliance) (Tiikkainen & Heikkinen, 2005).

Theoretically, feelings of loneliness may result from a deficit in one or more dimensions of perceived togetherness (see Weiss, 1973). Loneliness can be viewed as the outcome of discrepancy between a person's social needs and the degree to which those needs are satisfied (Rokach, 2011; Russell, Cutrona, Rose, & Yurko, 1984; Weiss, 1973). From the point of view of well-being, satisfaction with the social relationships a person has is more central than the actual size and composition of their network (Antonucci, Fuhrer, & Dartigues, 1997; Fuller-Iglesias, 2015), although these two factors have been found to correlate, particularly among men (Pulkkinen, Lyyra, & Kokko, 2011).

Empirical studies have shown that the Social Provisions Scale can be used in studies among diverse populations (see Cutrona & Russell, 1987), and that scores on it correlate negatively with measures of loneliness (Russell et al., 1984). Among community-dwelling 80-year-old persons, lack of attachment, social integration, and reliable alliance were associated with feelings of loneliness (Tiikkainen & Heikkinen, 2005). Among nursing home residents without cognitive impairment, lower attachment was associated with more feelings of loneliness, whereas social integration, nurturance, and reassurance of worth were not associated with feelings of loneliness (Drageset, Espehaug, & Kirkevold, 2012). Among college students, lower attachment, social integration, and reassurance of worth were related to the presence of loneliness (Kraus, Davis, Bazzini, Church, & Kirchman, 1993). These studies showing that low scores in dimensions of perceived togetherness co-exist with loneliness have all been cross-sectional; thus, whether the dimensions of perceived

togetherness are antecedents of loneliness has not been ascertained. Clearly, longitudinal studies on the association between perceived togetherness and loneliness are needed.

In older people, loneliness and depressive symptoms often co-occur (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). However, as depressiveness may stem not only from changes in social relationships but also from other non-social factors, it can be regarded as a broader phenomenon than loneliness. Older people who are lonely will often present with depressive symptoms but depressed individuals do not always report loneliness (Luanaigh & Lawlor, 2008). Some studies have shown that loneliness is a potential risk factor for depressiveness (Bergdahl, Allard, Alex, Lundman, & Gustafson, 2007; Heikkinen & Kauppinen, 2004; Kaneko, Motohashi, Sasaki, & Yamaji, 2007; Luanaigh & Lawlor, 2008); however, depressive symptoms may also increase the risk for loneliness (Routasalo, Savikko, Tilvis, Strandberg, & Pitkälä, 2006; Savikko, Routasalo, Tilvis, Strandberg, & Pitkala, 2005; Tiikkainen & Heikkinen, 2005). It is likely that loneliness and depression are related but distinct states (Luanaigh & Lawlor, 2008). Thus, before planning interventions to alleviate loneliness and to reduce depressive symptoms among older people, it would be important to find out whether depressive symptoms precede loneliness or vice versa. Of the dimensions of perceived togetherness, low scores for guidance, reliable alliance, reassurance of worth, and attachment have been found to explain higher depressive symptoms (Tiikkainen & Heikkinen, 2005), while higher attachment and reassurance of worth were associated with better emotional well-being (Stephens, Alpass, Towers, & Stevenson, 2011). In longitudinal studies among older people, a higher level of reliable alliance and reassurance of worth predicted a lower level of depressive symptoms (Russell & Cutrona, 1991). Cutrona and colleagues (1986) showed that higher levels of guidance and reliable alliance were related to subsequent positive mental health in conditions where older persons experienced many negative life events.

The relative importance of social needs may vary from person to person depending, for example, on age and life situation (Weiss, 1973). However, the theory does not adequately explain how the relative importance or experiences of the different dimensions of perceived togetherness change at different stages of life (Mancini & Blieszner, 1992). It is unclear whether all or only some of the dimensions of perceived togetherness are associated with both loneliness and depressive symptoms among older people.

This article reports an exploratory observational analysis of data collected as part of a randomized controlled trial that targeted community-dwelling older people who reported negative mood or loneliness at study entry (GoodMood; ISRCTN78426775) (Pynnonen, Tormakangas, Rantanen, Tiikkainen, & Kallinen, 2016). The objective of the study was to investigate longitudinal associations of the six dimensions of perceived togetherness with depressive symptoms and feelings of loneliness. We used cross-lagged analyses, as these enable study of whether the dimensions of perceived togetherness at baseline are associated with loneliness or depressive symptoms at follow-up after controlling for loneliness and depressive symptoms at baseline (Figure 1). Based on the theoretical standpoints discussed above, we hypothesized that deficits in the dimensions of perceived togetherness at baseline would longitudinally explain experiences of loneliness and depressive symptoms at follow-up.

[Figure 1 near here]

Methods

Study Population and Data Collection

The GoodMood project aimed to assess the effects of a six-month social intervention of choice (supervised exercise, social activity, or personal counseling) vs. self-directed group on loneliness and mood. Participants were 75- to 79-year-old persons living in the central area of

the city of Jyväskylä, Central Finland. Contact information was gathered from the Finnish population register and the suitability and interest of potential participants was assessed over the phone following a mailed information letter. Between September and November 2008, 223 persons took part in a structured face-to-face home interview and in one meeting with a counselor. All participants (a) had reported feelings loneliness, melancholy, or depressive mood at least sometimes, (b) scored higher than 21 in the Mini-Mental State Examination, and (c) gave their informed consent to participate in the study. Randomized social intervention (n=105) and self-directed (n=118) groups were formed. After the 6-month intervention, between April and June, 2009, a follow-up face-to-face interview was conducted in the participants' homes. In the follow-up interview, one participant was excluded, as the interviewer reported that the replies given were not valid. Thus, for the present exploratory analyses the *social intervention group* comprised 104 and the *self-directed group* 118 participants. The sampling procedure and study design have been described in more detail elsewhere (Pynnonen et al., 2016).

Social Intervention of Choice vs. Self-directed Control

The social intervention group members were allowed to select the intervention regime they thought would benefit them the most: supervised exercise in a group (selected by 44 participants), personal counseling (selected by 33 participants), and a social activity program (selected by 27 participants). Each regime included social interaction and participants were able to influence the content of the meetings. The exercise and social activity programs were held once a week and 19–21 times in total during the intervention. The personal counseling meetings were held approximately every third week and each participant attended 4–5 meetings. The self-directed group received one counseling session, which included discussion of the participant's life situation and available social support and the services offered by the

municipality and other service providers. The social intervention group received more social attention and activity than the self-directed group.

Measurements

Depressive symptoms were measured using a short form of the Geriatric Depression Scale (GDS-15). The GDS is specially designed to screen for depressed mood in older adults (see Greenberg, 2007). A larger score indicates greater severity of symptoms and the scale maximum is 15. We used the sum score in the analyses. Experience of *loneliness* was assessed with the question: “Do you feel lonely?” The response options were “very rarely or never”, “sometimes”, and “often or almost always”.

Dimensions of perceived togetherness were measured using the Social Provisions Scale developed on the basis of Weiss’ theory (Cutrona & Russell, 1987). Its 24 items are equally divided between the six different dimensions: attachment, social integration, guidance, reliable alliance, opportunity for nurturance, and reassurance of worth. Two of the four questions in each dimension are positively and two negatively worded. On a scale from “strongly disagree” (scored 1) to “strongly agree” (scored 4), the respondents were asked to assess to what extent they thought each statement described their current social relationships. Example items are *attachment*: “I do not have a feeling of closeness with anyone”; *social integration*: “there are people who like the same social activities I do”; *guidance*: “there is no one I feel comfortable talking about problems with”; *reliable alliance*: “there are people I know will help me if I really need it”; *opportunity for nurturance*: “I feel responsible for taking care of someone else”; and *reassurance of worth*: “there are people who value my skills and abilities”. The responses to the negatively worded items were reversed. A sum score was calculated for each dimension with scores ranging between 4 and 16, where larger values indicate a more positive situation.

Information on age (in years), gender, living alone (no/yes), co-morbidity, cognitive functioning, and mobility were gathered during the face-to-face interviews. The models were adjusted for living alone and difficulties in mobility. Living alone is associated with loneliness (Routasalo et al., 2006; Russell, 2009); it also reflects marital status and tells about the loss or absence of everyday companionship. In addition, a spouse usually provides a close and intimate tie among older people. Mobility is a good health indicator, as mobility decline captures the overall impact of chronic conditions (Guralnik et al., 1993), the effect of physiological changes (Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995; Rantanen et al., 2001), and lifestyle activities (Avlund, Vass, & Hendriksen, 2003; Fujita, Fujiwara, Chaves, Motohashi, & Shinkai, 2006). Mobility was assessed by asking about perceived difficulties in walking 2 km, 500 m, ambulating indoors, and climbing stairs. The response options for these were “not able” (scored 0), “not able without somebody to help” (scored 1), “yes, but has difficulties” (scored 2), or “yes, without difficulties” (scored 3). The measure of mobility was computed as the sum of the four perceived difficulty items. Co-morbidity was assessed by asking the participant to state all physician-diagnosed chronic diseases of longer than three months’ duration. Cognitive functioning was assessed with the Mini-Mental State Examination, MMSE (Folstein, Folstein, & McHugh, 1975).

Statistical Analysis

Cross-lagged modeling was used to estimate associations between the studied variables (Figure 1). Weighted least square estimator (WLSMV) was used to obtain parameter estimates. The dimension of perceived togetherness, loneliness, and depressive symptoms at baseline were adjusted for baseline status of living alone (with somebody vs. alone) and baseline perceived difficulties in mobility. In the follow-up situation, the studied variables were adjusted for baseline living situation and follow-up perceived difficulties in mobility. When the direction was set from depressive symptoms to loneliness, the estimates of the root

mean square error of approximation (RMSEA), a measure of model fit, were smaller than when the direction was set in the opposite direction. Thus, models with the direction from depressive symptom to loneliness fitted the data better than those with the direction from loneliness to depressive symptoms. For the GDS-15, Cronbach's alphas were 0.66 at baseline and 0.73 at follow-up, and for the Social Provisions Scale 0.91 and 0.89 respectively. The correlation between the different dimensions of perceived togetherness varied between 0.44–0.71 at baseline and 0.39–0.88 at follow-up in the social intervention group and between 0.34–0.77 at baseline and 0.24–0.75 at follow-up in the self-directed group. To avoid multicollinearity owing to the rather high correlations, the different dimensions of perceived togetherness were analysed in separate models.

The social intervention group received more social attention and activity compared to the self-directed reference group. Thus, we first built the models estimating the associations between the variables separately for the social intervention and self-directed group. Each association was then tested for group equality using the likelihood ratio test (LRT). As the LRT showed significant worsening of model fit for group equality, path coefficients and 95 % confidence intervals are shown separately for the social intervention group (upper values in the figures) and self-directed group (lower values in the figures). As the models included both categorical and continuous variables, we used the robust mean- and variance-adjusted weighted least square estimator (WLSMV). As model fit indices, we report the Comparative fit index (CFI>0.95) due to its conceptual similarity to proportion variance explained, and root mean squared error of approximation (RMSEA<0.06) as a measure of adequacy between model and observed data (see Skrondal & Rabe-Hesketh 2004 for further details). The analyses were performed with MPLUS version 5.21 (Muthén & Muthén, 1998-2009). The proportion of missing data in the individual variables varied between 0 and 3.6 %. The Multiple Imputation (MI) procedure of SAS for Windows (version 9.1) was used to impute missing values using

available information on sociodemographic factors; physical and cognitive health and functional capacity; social relationships, loneliness, and perceived togetherness; and depressive symptoms and quality of life.

Results

Mean participant age was 77.0 years at baseline, 75 % were women, and 65 % lived alone (Table 1). In cognitive functioning (MMSE), the mean score was 27.2 and the mean number of chronic diseases was 2.9. Approximately 40 % of participants reported difficulties in at least one mobility task. The mean number of depressive symptoms was 3.6, and 31 % of participants had at least mild depression ($GDS \geq 5$). Two-thirds of the participants reported experiencing loneliness at least sometimes at baseline and one-half at follow-up. Experiences of perceived togetherness were highest in guidance and reliable alliance, and lowest in reassurance of worth and opportunity for nurturance at both baseline and follow-up. No significant differences were observed between the groups in either the background or studied variables.

[Table 1 near here]

The baseline and follow-up values of the dimensions of perceived togetherness, depressive symptoms, and loneliness correlated statistically significantly. After controlling for the previous measurements of each variable studied, the analyses revealed only a few cross-lagged links from the dimensions of perceived togetherness to depressive symptoms. A higher level of attachment in all participants and opportunity for nurturance in the social intervention group at baseline predicted fewer depressive symptoms at follow-up (Figures 2–3). No cross-lagged associations were observed between the dimensions of perceived togetherness at baseline and loneliness at follow-up.

However, several cross-lagged associations were observed between baseline loneliness and depressive symptoms and the follow-up dimensions of perceived togetherness. Lower feelings of loneliness at baseline predicted higher perceived social integration, guidance, and reliable alliance at follow-up (Figure 4, other figures not shown are available on request). Fewer depressive symptoms at baseline preceded higher perceived attachment, social integration, guidance, and reassurance of worth at follow-up (Figures 2, 4).

In addition to cross-lagged associations, cross-sectional associations between the dimensions of perceived togetherness and depressive symptoms and feelings of loneliness were observed. At baseline, higher perceived attachment, guidance, and reliable alliance were related to a lower level of loneliness (Figure 2). At follow-up, higher perceived attachment and opportunity for nurturance were associated with a lower level of loneliness (Figures 2–3). All the dimensions of perceived togetherness were associated with fewer depressive symptoms at baseline, and all, except for attachment, at follow-up (Figures 2–4). In general, the cross-sectional associations between the variables in the groups were similar. However, the groups differed in that higher perceived opportunity for nurturance at baseline was related to fewer depressive symptoms at follow-up in the social intervention group. In addition, at follow-up, higher perceived social integration, guidance, and reliable alliance were associated with fewer depressive symptoms, but only in the social intervention group.

[Figures 2-4 near here]

Of the variables adjusted for, living alone was associated with a higher level of loneliness at baseline in all models. Living alone was also associated with a lower level of attachment. Living alone and perceived difficulties in mobility were associated with a lower level of opportunity for nurturance at baseline. At follow-up, perceived difficulties in mobility were related to depressive symptoms.

All the cross-lagged models fitted the data well. In the models in which attachment, guidance, and reliable alliance were analyzed as potential explanatory factors for depressive symptoms and loneliness, the CFI values were 1.000 and RMSEA values less than 0.0005. In the model for social integration, the CFI value was 1.000 and RMSEA 0.004. For reassurance of worth, the respective values were 0.970 and 0.055, and for opportunity for nurturance 0.995 and 0.022.

Discussion

Based on Weiss' (1973; 1974) theoretical model of social provisions and on earlier studies we hypothesized that deficits in the dimensions of perceived togetherness are related to experiences of loneliness and depressive symptoms in older people. Cross-lagged modeling revealed, however, that after controlling for baseline depressive symptoms and loneliness, experiences of attachment in all participants and opportunity for nurturance in the social intervention group were the sole dimensions of perceived togetherness that predicted depressive symptoms at follow-up. No cross-lagged associations between perceived togetherness at baseline and loneliness at follow-up were observed.

This study extends the earlier knowledge by providing evidence based on longitudinal analyses that allowed us to take into account stability in loneliness and depressive symptoms. Weiss (1973, 17) theorized that "loneliness appears always to be a response to the absence of some particular relational provision". Thus, he indicated that a deficit in the dimensions of perceived togetherness should be an antecedent of loneliness. Several earlier cross-sectional studies have provided indirect evidence for the theory by observing that deficits in the dimensions of perceived togetherness are more prevalent among people who report loneliness than among those who do not (Drageset et al., 2012; Tiikkainen & Heikkinen, 2005).

However, after controlling for the baseline scores and cross-sectional associations of the characteristics in question, the results of our longitudinal analyses do not indicate that deficits in the dimensions of perceived togetherness are antecedents of loneliness. Instead, our results suggest that lower scores in the dimensions of perceived togetherness may describe features of loneliness, or even that loneliness precedes the dimensions of perceived togetherness. The theory of social provisions and loneliness has not properly been tested in a comparable longitudinal study earlier.

For depressive symptoms, our findings do not contradict those of earlier studies. Weiss (1973, 148) states: “Each form of loneliness is marked by restless depression and amorphous, unfocused dissatisfaction.” Thus, an explicit association is suggested between perceived togetherness and depression. Our results, like those of earlier studies, show that reassurance of worth is related to depressive symptoms (Russell & Cutrona, 1991; Tiikkainen & Heikkinen, 2005) or to other indicators of emotional well-being (Stephens et al., 2011). There are also differences with earlier studies. While Russell and Cutrona (1991) found that reliable alliance predicted fewer depressive symptoms, we found that higher perceived attachment and opportunity for nurturance predicted fewer depressive symptoms. It is possible that in different life situations and phases different dimensions of social togetherness become more central to mental wellbeing. In old age, having opportunities for nurturance and reassurance of worth may increase individuals’ experiences of mattering to others and so give meaning to life, thereby reducing the risk for depression (Boman, Gustafson, Häggblom, Santamäki Fischer, & Nygren, 2015; Taylor & Turner, 2001; Van, Dezutter, & Beyers, 2015).

The cross-sectional associations between the dimensions of perceived togetherness and loneliness and depressive symptoms found in our study are in line with Weiss’ theory (1974) and the results other empirical studies (see Cutrona et al., 1986; Drageset et al., 2012; Russell & Cutrona, 1991; Tiikkainen & Heikkinen, 2005). In our study, attachment seemed to be

important dimension of perceived togetherness in relation to depressive symptoms and feelings of loneliness. Weiss (1973) suggested that emotional loneliness appears in the absence of a close reliable emotional attachment. In the present study, lower attachment at both baseline and follow-up coexisted with loneliness and predicted depressive symptoms at follow-up. Attachment stems from a sense of safety, security, and being loved, which are most often experienced in relationships with one's spouse or close friends (Weiss, 1973). Deficit in attachment may underlie earlier findings that people living alone (Routasalo et al., 2006), not married (Jakobsson & Hallberg, 2005) or reporting lack of friends (Savikko et al., 2005) experience loneliness more often than others. Fulfilment of the need for attachment in one's social relationships may provide a sense of mattering to others, which in turn, reduces the risk for depression (Taylor & Turner, 2001).

Instead of cross-lagged associations from perceived togetherness at baseline to loneliness and depressive symptoms at follow-up, we found several cross-lagged associations in the reverse direction, i.e. from loneliness and depressive symptoms at baseline to perceived togetherness at follow-up. A higher level of loneliness at baseline was associated with a lower sense of guidance, reliable alliance, and social integration at follow-up. A higher score on depressive symptoms at baseline was related to lower feelings of attachment, social integration, guidance, and reassurance of worth at follow-up. This is in line with the results of a six-month follow-up study on the predictors of social support in older people by Cutrona and colleagues (1986). They formed a latent factor describing baseline mental health by combining life satisfaction, loneliness, and depressive symptoms. They found that mental well-being at baseline predicted perceived togetherness at follow-up. A possible explanation for this finding is that a depressed person or somebody suffering from loneliness may not have the energy for social contacts. In addition, feelings of loneliness and depressive mood may evoke negative thoughts and thus impair perceptions of togetherness. Negative emotional states narrow a

person's outlook on life (Fredrickson, 2009) while positive emotions broaden thought-action repertoires and expand awareness, allowing people to take in more contextual information, at least temporarily (Fredrickson, 2001; Fredrickson, 2013).

One finding in the present study may stem from the study design. In the social intervention group but not in the self-directed group, higher perceived social integration, guidance, and reliable alliance at follow-up were associated with fewer depressive symptoms at follow-up. Joining a group may decrease preferences for staying at home, perceptions of having lost valued activities, feelings that life is empty, or perceiving other people are better off than oneself, all of which are items rated in the Geriatric Depression Scale (Greenberg, 2007).

The present findings raise the question as to which comes first, perceived togetherness, loneliness or depressive symptoms. Our findings lay the foundation for future research on whether the dimensions of perceived togetherness may in fact be features of depressive symptoms and loneliness or even their consequences rather than their antecedents. The findings suggest that having a lower level of depressive symptoms and loneliness may be antecedents of perceived togetherness rather than vice versa. However, we cannot rule out the possibility of a reciprocal relationship. It would be important to approach loneliness from various aspects as it has many different causes. Theories of loneliness emphasize factors relating to personality or traits, or various situations in a person's life. Loneliness may be associated with the loss of a confidant and the resultant grief, lack of meaningful social relationships, dissatisfaction with existing relationships, existential questions, deficits in early attachment relationships, or shyness and fears in social situations.

This study has weaknesses as well as strengths. First, the longitudinal design and the cross-lagged modelling were strengths. In cross-lagged models, baseline measurements and their stability can be incorporated into the analyses. Longitudinal cross-lagged associations

describe existing associations between variables and provide evidence indicative of causality. However, we estimated models including both cross-sectional and longitudinal pathways. Cross-lagged modeling allowed us to include several variables in the analyses at the same time, and to inspect the simultaneous links between them. Analyzing the different dimensions of perceived togetherness in separate models rendered detectable differences in the associations of these dimensions with loneliness and depressive symptoms. Second, the results of the study may be generalized to community-dwelling older people experiencing some degree of loneliness or melancholy. In health and socio-economic situation, participants were comparable to those who did not meet the study inclusion criteria of experiencing feelings of loneliness or melancholy. Third, the study broadened understanding of the possible relations between the dimensions of perceived togetherness, loneliness, and depressive symptoms among older people.

A weakness of the study is that we assessed loneliness with a single question, which does not allow a distinction to be made between emotional and social loneliness (Weiss, 1973).

However, the question is understandable, has good content validity, and measures loneliness directly as perceived by the respondents (Bowling, 2005). Another weakness related to the purpose of the study is that the analyses utilized data from a randomized controlled trial.

However, since the groups randomized for the study were alike in most of the variables of interest and the initial design was taken into account in the analyses, we do not believe that this materially biased the results. The participants reported feelings of loneliness or melancholy at study entry, as these were inclusion criteria for the original intervention study.

Consequently, our study included a larger proportion of people feeling loneliness and depressive symptoms and fewer people with high emotional wellbeing compared to the general population of corresponding age. In this sense, the distribution was truncated. Of the participants, 31 % had depressive symptoms ($GDS \geq 5$) (Greenberg, 2007), and 14 % reported

having feelings of loneliness often or continuously and 55 % have such feelings sometimes. In an earlier study among a representative sample in a similar geographical area, 5 % reported feeling lonely often or almost always (Tiikkainen & Heikkinen, 2005). A truncated distribution typically leads to the underestimation of associations. Consequently, we cannot rule out the possibility that the lack of cross-lagged associations between the dimensions of perceived togetherness at baseline and feelings of loneliness at follow-up are due to the sample, in which loneliness and depressive mood may be more stable than in a population with a wider range of characteristics. However, selecting the sample with characteristics that we wished to study is not a weakness, as it captures a high enough prevalence to enable multivariate analyses.

Conclusion: Among older people, depressive symptoms and loneliness may be precursors of the dimensions of perceived togetherness, rather than perceived togetherness being an antecedent of loneliness and depressiveness. Further longitudinal studies are needed in diverse populations to confirm these findings.

Practical implications include, first, importance of taking into account depressive symptoms and loneliness and their relation to experiences of perceived togetherness, and second, provision of opportunities for older people to give support for other people e.g. by promoting volunteering.

References

Antonucci, T. C., Fuhrer, R., & Dartigues, J. (1997). Social relations and depressive symptomatology in a sample of community-dwelling French older adults. *Psychology and Aging, 12*(1), 189-195. doi:<http://dx.doi.org/10.1037/0882-7974.12.1.189>

- Avlund, K., Vass, M., & Hendriksen, C. (2003). Onset of mobility disability among community-dwelling old men and women. the role of tiredness in daily activities. *Age and Ageing*, 32(6), 579-584.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497-529. doi:<http://dx.doi.org/10.1037/0033-2909.117.3.497>
- Bergdahl, E., Allard, P., Alex, L., Lundman, B., & Gustafson, Y. (2007). Gender differences in depression among the very old. *International Psychogeriatrics*, 19(6), 1125-40. doi:10.1017/S1041610207005662.
- Boman, E., Gustafson, Y., Häggblom, A., Santamäki Fischer, R., & Nygren, B. (2015). Inner strength – associated with reduced prevalence of depression among older women. *Aging & Mental Health*, 19(12), 1078-1083. doi:10.1080/13607863.2014.977775
- Bowling, A. (2005). *Measuring health: A review of quality of life measurement scales*. Maidenhead, Berkshire, England: McGraw-Hill Education.
- Cacioppo, J. T., Hughes, M. E., Waite, L. J., Hawkley, L. C., & Thisted, R. A. (2006). Loneliness as a specific risk factor for depressive symptoms: Cross-sectional and longitudinal analyses. *Psychology and Aging*, 21(1), 140-151. doi:<http://dx.doi.org/10.1037/0882-7974.21.1.140>
- Cutrona, C. E., & Russell, D. W. (1987). The provisions of social relationships and adaptation to stress. *Advances in Personal Relationships*, 1, 37-67.
- Cutrona, C. E., Russell, D. W., & Rose, J. (1986). Social support and adaptation to stress by the elderly. *Journal of Psychology and Aging*, 1, 47-54.

- Drageset, J., Espehaug, B., & Kirkevold, M. (2012). The impact of depression and sense of coherence on emotional and social loneliness among nursing home residents without cognitive impairment - a questionnaire survey. *Journal of Clinical Nursing, 21*(7-8), 965-974. doi:10.1111/j.1365-2702.2011.03932.
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*(3), 189-198. doi:0022-3956(75)90026-6
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*(3), 218-226.
doi:<http://dx.doi.org/10.1037/0003-066X.56.3.218>
- Fredrickson, B. L. (2009). *Positivity*. New York: Three Rivers Press.
- Fredrickson, B. L. (2013). Updated thinking on positivity ratios. *American Psychologist, 68*(9), 814-822. doi:<http://dx.doi.org/10.1037/a0033584>
- Fujita, K., Fujiwara, Y., Chaves, P. H., Motohashi, Y., & Shinkai, S. (2006). Frequency of going outdoors as a good predictors for incident disability of physical function as well as disability recovery in community-dwelling older adults in rural Japan. *Journal of Epidemiology / Japan Epidemiological Association, 16*(6), 261-270.
- Fuller-Iglesias, H. (2015). Social ties and psychological well-being in late life: The mediating role of relationship satisfaction. *Aging & Mental Health, 19*(12), 1103-1112.
doi:10.1080/13607863.2014.1003285

Greenberg, S. A. (2007). How to try this: The geriatric depression scale: Short form. *The American Journal of Nursing*, 107(10), 60-69.

doi:10.1097/01.NAJ.0000292204.52313.f3

Guralnik, J. M., Ferrucci, L., Simonsick, E. M., Salive, M. E., & Wallace, R. B. (1995).

Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. *The New England Journal of Medicine*, 332(9), 556-561.

doi:10.1056/NEJM199503023320902

Guralnik, J. M., LaCroix, A. Z., Abbott, R. D., Berkman, L. F., Satterfield, S., Evans, D. A., & Wallace, R. B. (1993). Maintaining mobility in late life. I. Demographic characteristics and chronic conditions. *American Journal of Epidemiology*, 137(8), 845-857.

Heikkinen, R. L., & Kauppinen, M. (2004). Depressive symptoms in late life: A 10-year follow-up. *Archives of Gerontology and Geriatrics*, 38(3), 239-250.

doi:10.1016/j.archger.2003.10.004

Jakobsson, U., & Hallberg, I. R. (2005). Loneliness, fear, and quality of life among elderly in Sweden: A gender perspective. *Aging Clinical and Experimental Research*, 17(6), 494-501. doi:10.1007/BF03327417

Kaneko, Y., Motohashi, Y., Sasaki, H., & Yamaji, M. (2007). Prevalence of depressive symptoms and related risk factors for depressive symptoms among elderly persons living in a rural Japanese community: A cross-sectional study. *Community Mental Health Journal*, 43(6), 583-590. doi:10.1007/s10597-007-9096-5

- Kraus, L. A., Davis, M. H., Bazzini, D., Church, M., & Kirchman, C. M. (1993). Personal and social influences on loneliness: The mediating effect of social provisions. *Social Psychology Quarterly*, 56(1), 37-53. doi:10.2307/2786644
- Lunaigh, C. O., & Lawlor, B. A. (2008). Loneliness and the health of older people. *International Journal of Geriatric Psychiatry*, 23(12), 1213-1221. doi:10.1002/gps.2054
- Mancini, J. A., & Blieszner, R. (1992). Social provisions in adulthood: Concept and measurement in close relationships. *Journal of Gerontology*, 47(1), P14-20.
- Muthén, L. K., & Muthén, B. O. (1998-2009). *Mplus. statistical analysis with latent variables*. (Fifth edition ed.). Los Angeles: CA: Muthén & Muthén.
- Pulkkinen, L., Lyyra, A., & Kokko, K. (2011). Is social capital a mediator between self-control and psychological and social functioning across 34 years? *International Journal of Behavioral Development*, 35(6), 475-481. doi:10.1177/0165025411422993
- Pynnonen, K., Tormakangas, T., Rantanen, T., Tiikkainen, P., & Kallinen, M. (2016). Effect of a social intervention of choice vs. control on depressive symptoms, melancholy, feeling of loneliness, and perceived togetherness in older Finnish people: A randomized controlled trial. *Aging & Mental Health*, 1-8. doi:10.1080/13607863.2016.1232367
- Rantanen, T., Guralnik, J. M., Ferrucci, L., Penninx, B. W., Leveille, S., Sipila, S., & Fried, L. P. (2001). Coimpairments as predictors of severe walking disability in older women. *Journal of the American Geriatrics Society*, 49(1), 21-27.
- Rokach, A. (2011). From loneliness to belonging: A review. *Psychology Journal*, 8(2), 70-81.

- Routasalo, P. E., Savikko, N., Tilvis, R. S., Strandberg, T. E., & Pitkälä, K. H. (2006). Social contacts and their relationship to loneliness among aged people - A population-based study. *Gerontology*, *52*(3), 181-187. doi:10.1159/000091828.
- Russell, D., Cutrona, C. E., Rose, J., & Yurko, K. (1984). Social and emotional loneliness: An examination of Weiss's typology of loneliness. *Journal of Personality and Social Psychology*, *46*(6), 1313-1321. doi:http://dx.doi.org/10.1037/0022-3514.46.6.1313
- Russell, D. W., & Cutrona, C. E. (1991). Social support, stress, and depressive symptoms among the elderly: Test of a process model. *Psychology and Aging*, *6*(2), 190-201. doi:http://dx.doi.org/10.1037/0882-7974.6.2.190
- Russell, D. (2009). Living arrangements, social integration, and loneliness in later life: The case of physical disability. *Journal of Health and Social Behavior*, *50*(4), 460-475.
- Savikko, N., Routasalo, P., Tilvis, R. S., Strandberg, T. E., & Pitkala, K. H. (2005). Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics*, *41*(3), 223-233. doi:S0167-4943(05)00036-1
- Skrondal, A., & Rabe-Hesketh, S. (2004). *Generalized latent variable modeling: multilevel, longitudinal, and structural equation models*. Boca Raton: Chapman & Hall/CTC.
- Stephens, C., Alpass, F., Towers, A., & Stevenson, B. (2011). The effects of types of social networks, perceived social support, and loneliness on the health of older people: Accounting for the social context. *Journal of Aging and Health*, *23*(6), 887-911. doi:10.1177/0898264311400189

- Taylor, J., & Turner, R. J. (2001). A longitudinal study of the role and significance of mattering to others for depressive symptoms. *Journal of Health and Social Behavior*, 42(3), 310-325.
- Tiikkainen, P., & Heikkinen, R. -. (2005). Associations between loneliness, depressive symptoms and perceived togetherness in older people. *Aging & Mental Health*, 9(6), 526-534. doi:10.1080/13607860500193138
- Tiikkainen, P., Heikkinen, R., & Leskinen, E. (2004). The structure and stability of perceived togetherness in elderly people during a 5-year follow-up. *Journal of Applied Gerontology*, 23(3), 279-294. doi:10.1177/0733464804267582
- Van, d. H., Dezutter, J., & Beyers, W. (2015). Meaning in life and depressive symptoms: A person-oriented approach in residential and community-dwelling older adults. *Aging & Mental Health*, 19(12), 1063-1070. doi:10.1080/13607863.2014.995589
- Weiss, R. S. (1973). *Loneliness: The experience of emotional and social isolation* /. Cambridge, Mass.: MIT Press,.
- Weiss, R. S. (1974). The provision of social relationships. In Z. Rubin (Ed.), *Doing unto others* (pp. 17-26). New Jersey: Prentice-Hall Inc., Englewood Cliffs.

Table 1. Means, standard deviations (sd), and proportions of characteristics in participants of the GoodMood study at baseline and at six-month follow-up (n=222).

	Baseline^a	Follow-up^a
	Mean (sd)	Mean (sd)
Age	77.0 (1.43)	-
Number of chronic diseases	2.9 (1.61)	-
Mobility^b	10.9 (1.81)	10.9 (1.83)
Cognitive functioning	27.2 (2.07)	-
Depressive symptoms	3.6 (2.45)	3.5 (2.68)
Social integration	12.5 (2.16)	12.9 (2.05)
Attachment	12.3 (2.42)	12.9 (2.23)
Guidance	12.8 (2.47)	13.4 (2.05)
Reliable alliance	13.1 (2.23)	13.3 (2.04)
Opportunity for nurturance	11.8 (2.53)	11.9 (2.64)
Reassurance of worth	11.7 (2.03)	12.0 (1.84)
	%	%
Women	75.2	-
Lives alone	65.3	-
Loneliness		
-no/very rarely	31.5	50.9
-sometimes	54.5	37.8
-often or continuously	14.0	11.3

Note ^a=Any differences between the social intervention and self-directed groups were not observed in the variables shown in the table.

Note ^b= Sum of the variables of perceived ability to walk outdoors 2km, 0,5km, walk indoors, and climb stairs. 0=Is not able, 1=Need other person to help, 2=Is able but has difficulties, 3=Is able, no difficulties.

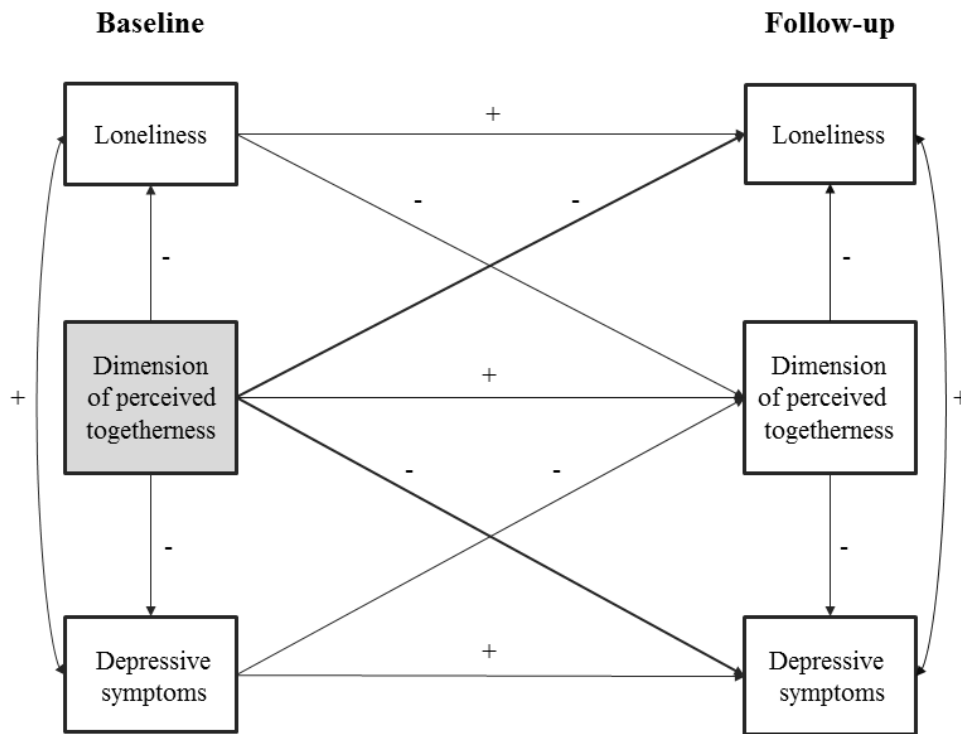


Figure 1. Theoretical model linking the dimensions of perceived togetherness, depressive symptoms, and feelings of loneliness.

Note 1. Results for dimensions of perceived togetherness (attachment, social integration, guidance, reliable alliance, opportunity for nurturance, reassurance of worth) are shown in separate figures.

Note 2. +: theoretically positive coefficient; -: theoretically negative coefficient.

Note 3. Thicker lines highlight the cross-lagged associations of primary interest.

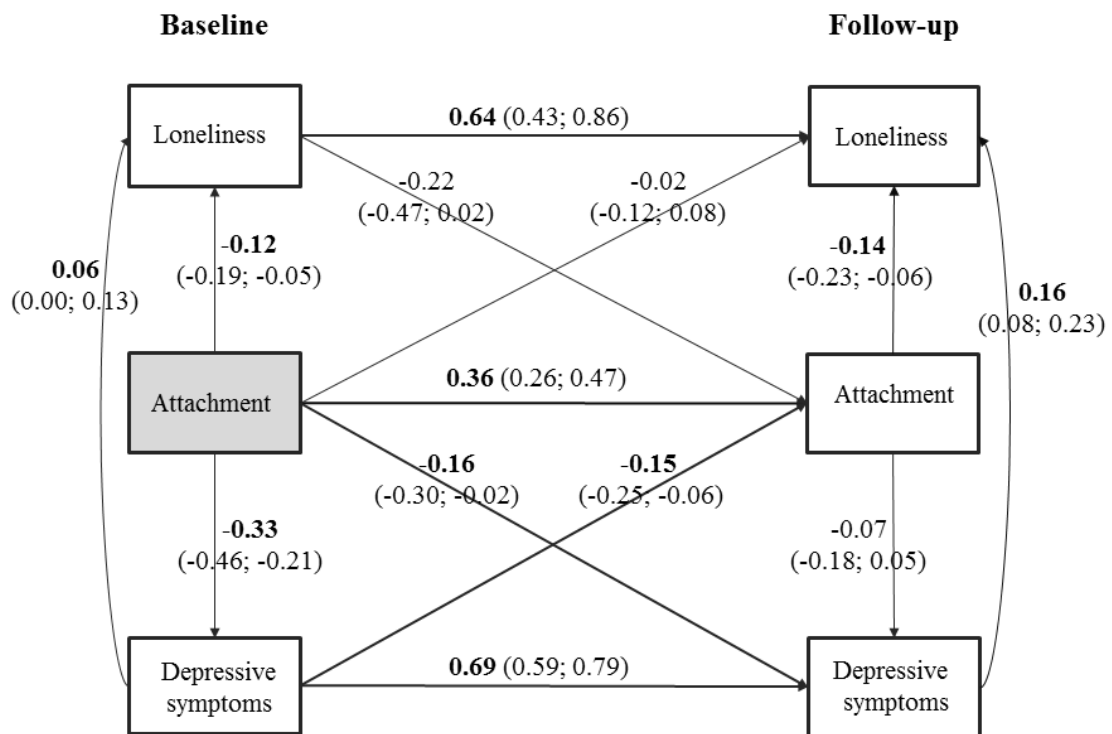


Figure 2. Unstandardized coefficients (95 % confidence intervals) of cross-lagged model with six-month follow-up for perceived attachment, depressive symptoms, and loneliness adjusted for living alone and perceived difficulties in mobility (n=222).

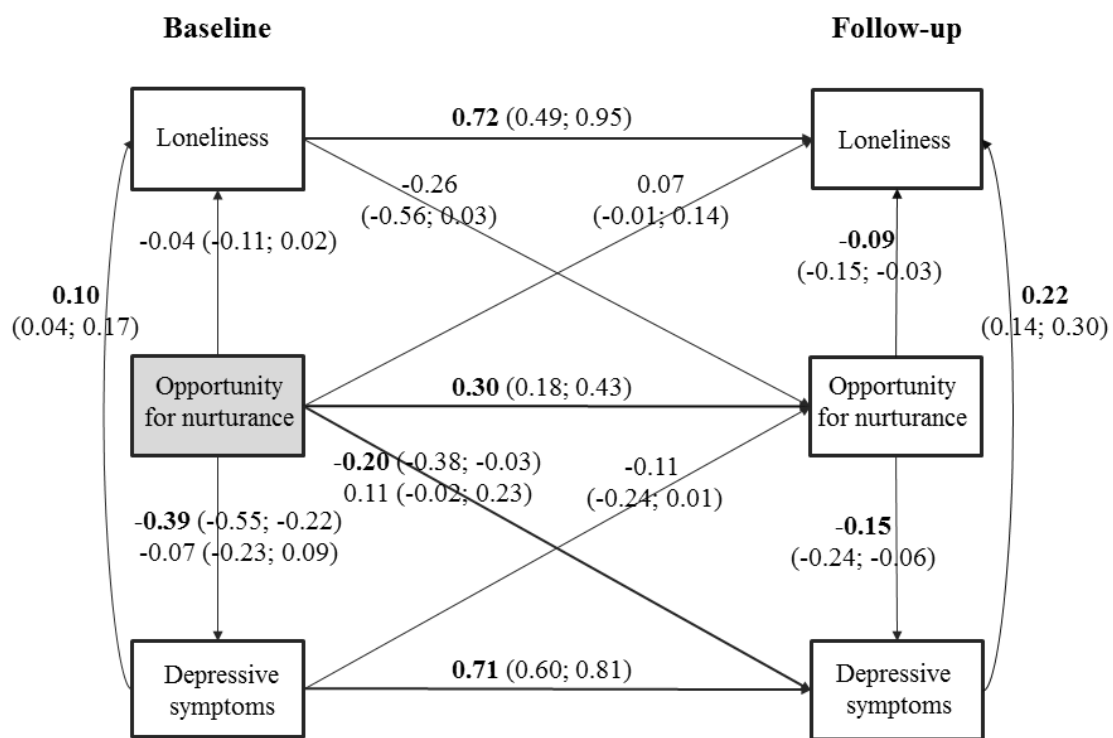


Figure 3. Unstandardized coefficients (95 % confidence intervals) of cross-lagged model with six-month follow-up for perceived opportunity for nurturance, depressive symptoms, and loneliness adjusted for living alone and perceived difficulties in mobility (n=222).

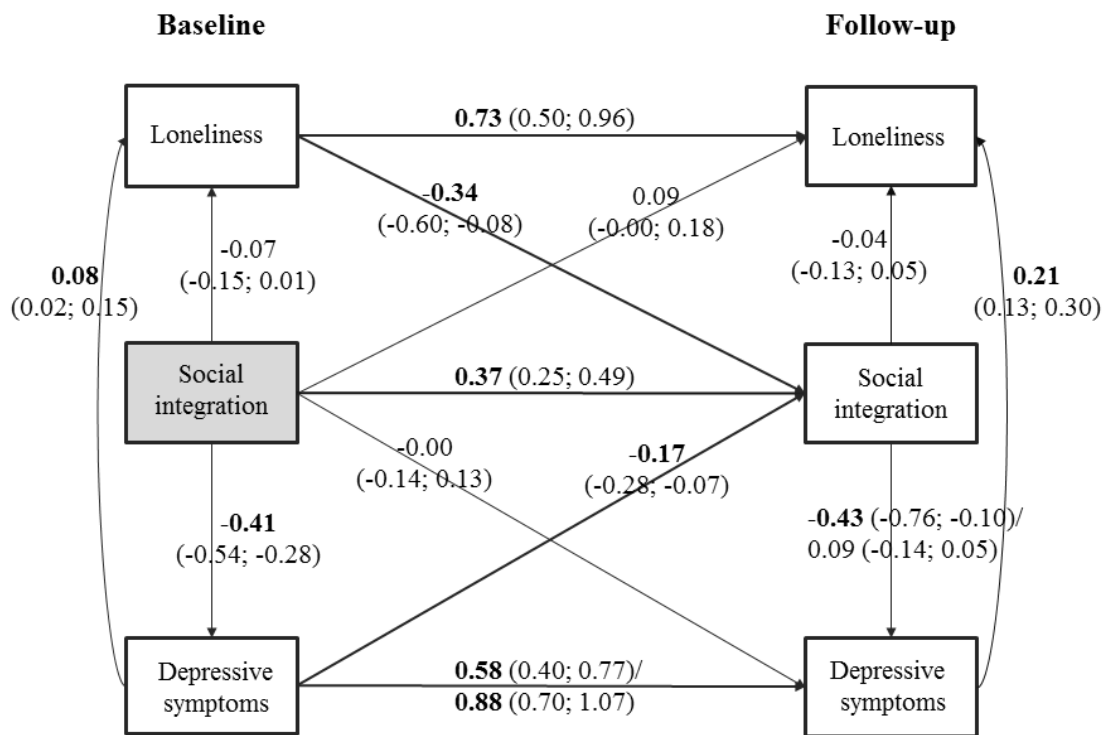


Figure 4. Unstandardized coefficients (95 % confidence intervals) of cross-lagged model with six-month follow-up for perceived social integration, depressive symptoms, and loneliness adjusted for living alone and perceived difficulties in mobility (n=222).

Note: When the association cannot be set equal between the groups, the upper value is the value of the social intervention group and the lower value is the value of the self-directed group.