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## Loneliness and depressive symptoms: the moderating role of the transition into retirement

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### ABSTRACT

**Objectives:** The transition to retirement implies significant changes in daily routine and in the social environment. More specifically, it requires more self-directed efforts in order to stay socially engaged. Hence, for those who suffer from loneliness, the transition to retirement could result in increased depressive symptoms due to the lack of structured daily routine.

**Methods:** We used two waves of the Health and Retirement Study, and tested whether the transition to retirement between the two waves moderates the effects of loneliness on depressive symptoms.

**Results:** The transition to retirement moderated the effect of loneliness in wave 1 on depressive symptoms in wave 2, such that for those who retired, the effect was stronger in comparison to those who stayed employed.

**Conclusions:** Although many manage to easily transition into retirement, lonely older workers are at increased risk for maladjustment and the experience of depressive symptoms following retirement. This group could perhaps benefit from interventions aimed at increasing daily social interactions and establishing a socially satisfying routine.

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### KEYWORDS

Loneliness; depressive symptoms; retirement

### Introduction

The increase in life expectancy has made retirement a very long and meaningful phase in later life. Hence, the proportions of older adults in general, and retirees in particular, continue to rise (Jonsson, 2011; Toossi, 2004). These trends require a deep examination of the association between retirement and emotional and social functioning among older adults. The present study aims to examine the relationship between loneliness and depressive symptoms following retirement, in comparison to continuous employment.

Loneliness is defined as a subjective sense of distress and discomfort with one's social ties (Andersson, 1998). It is distinguished from aloneness, which is the objective experience of inadequate social ties (Shankar, Hamer, McMunn, & Steptoe, 2013). Loneliness has been identified as a predictor of a variety of negative outcomes. Past research has shown that individuals who report high levels of loneliness are more likely to utilize healthcare services (Gerst-Emerson & Jayawardhana, 2015; Newall, McArthur, & Menec, 2015) and to suffer from poor health outcomes (Cornwell & Waite, 2009). They are also more likely to die earlier compared with their non-lonely counterparts (Shiovitz-Ezra & Ayalon, 2010). Mentally, higher levels of loneliness have been associated with a risk for reporting a wish to die (Ayalon & Shiovitz-Ezra, 2011). Loneliness has also been associated with higher levels of depressive symptoms (O'Lunaigh et al., 2012; Prince, Harwood, Blizard, Thomas, & Mann, 1997; Tiikkainen & Heikkinen, 2005). In a systematic review, O'Lunaigh et al. (2012) conclude that not only does loneliness have detrimental effects on health, it is also an independent risk factor for depression. Using a longitudinal study, loneliness was found to affect the prognosis of depression, such that it was associated with more severe

depressive symptoms, and reduced the probability of remission (Holvast et al., 2015). In a comprehensive study of 229 respondents between the ages of 50 and 68, the authors examined simultaneously the reciprocal associations between depressive symptoms and loneliness. Their conclusion was that it was loneliness that contributed to depressive symptoms, rather than the other way around (Cacioppo, Hawkley, & Thisted, 2010). The explanation provided to these findings was that the needs for companionship and closeness are basic human needs, which have to be fulfilled; in their absence, loneliness is likely to increase. The perceived absence of social ties thus results in negative emotional consequences (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). Examining the co-occurrence of loneliness and depression van Beljouw et al. (2014) found that older people perceive depressive symptoms as a logical consequence of their loneliness. In support of these findings, a meta-analysis found that the quality of social contact, more than its quantity, is particularly important for the well-being of older adults (Pinquart & Sörensen, 2000).

Reversed causality – that is that depression increases loneliness (that in turn increases depression) is also plausible. According to the interactional perspective on depression (Coyne, 1976; Joiner & Coyne, 1999), the expressed symptoms of depression are aversive to the social environment of the depressed person, and at the same time, elicit guilt. The aversion depression arises prompts the close environment to reject the depressed person, whereas the guilt felt prompts expression of nongenuine support. The discrepancy between the (nongenuine) support and the actual rejection increases the depression and the expression of depressive symptoms, thus creating further rejection from the social environment. Empirical results suggest that chronic depression in old age

results in smaller social networks and greater loneliness (Houtjes et al., 2014).

### Loneliness and depression: the role of employment status

The present study examines the association between loneliness and depressive symptoms in light of one's employment status, focusing on the differences between those who had recently retired, vs. those who were continuously employed. Employment provides several important resources. It is suggested that through the performance of the work-role workers define themselves (Stryker & Statham, 1985), gain social support (Nathanson, 1980), and link themselves to the society at large (Kahn, 1972). The ability to work could be thought of as a valuable resource by itself, enhancing self-perceptions of capability (Segel-Karpas, 2015). In addition, most work environments provide opportunities for daily social interactions and social engagement.

According to role theory, the transition to retirement could be viewed as a role loss, and especially in the absence of other important social roles, it might take a toll on one's sense of well-being (Stryker & Statham, 1985). Moreover, the change in the social environment following retirement increases one's responsibility to cultivate his or her social relationships. The time flexibility associated with retirement, and the reduction in the role of work as a main venue for time structure, self-definition, and daily social interaction, could enhance the link between the new (and chosen) activities, social contacts and interactions, and well-being.

Despite extensive research, it has been argued that the effects of retirement on one's emotional functioning are not uniform, but rather depend on a variety of exogenous variables (for details see Segel-Karpas, Bamberger & Bacharach, 2013; Wang, 2007). For instance, a prospective cohort study of 3939 British civil servants has found strong associations between mid-life adversities and depressive symptoms subsequent to retirement (Virtanen et al., 2015). Another study, based on the Health and Retirement Study (HRS), which is a US nationally representative panel survey, has found that when retirement was seen as too early or forced, individuals were more likely to report depressive symptoms (Szinovacz & Davey, 2004b). Yet, a different HRS study has stressed the role of financial status by showing how forced retirement is particularly detrimental for the mental well-being of individuals of low socioeconomic status, but not for those of higher socioeconomic status (Gallo et al., 2006). A large body of research has focused on the direct effect that retirement exerts on mental well-being (Segel-Karpas, 2015). We, however, argue that retirement-employment status could act as a moderator, modifying the association between loneliness and depression. Examining the moderating role of employment and retirement on the associations between physical and mental health, Segel-Karpas (2015) found that the association between objective health and subjective health was stronger among employees in comparison to retirees, indicating that employment strengthens the tie between experienced health problems and self-perceived health. However, the association between self-perceived health and depression was stronger for retirees rather than employees, indicating that employment could protect from the translation of perceived ill-health into mental distress.

Similarly to one's mental health and well-being, social functioning is also impacted by the transition to retirement. According to the Survey of Health Ageing and Retirement in Europe (SHARE), early retirement, in particular, results in a decrease in size and intensity of social relations (Borsch-Supan & Scuth, 2013). The importance of marital relationships was also stressed by showing how men who recently retired are more likely to report depressive symptoms if their wife is still in the workforce, whereas a joint retirement has a beneficial effect on both partners (Szinovacz & Davey, 2004a). Consistently, a recent meta-analysis has shown that social role interventions can be particularly beneficial for the well-being of individuals who transition to retirement (Heaven et al., 2013).

Based on research on the relationship between loneliness and depressive symptoms and the fact that retirement likely impacts both emotional and social functioning, the present study examines whether retirement status serves as a moderator of this relationship. We propose that the negative effects of loneliness on one's depressive symptoms depend on one's retirement status. The social interactions and daily engagement provided by employment could mitigate the negative effects of loneliness on depressive symptoms. The transition to retirement, however, and the role loss associated with it, could enhance the feelings of isolation and the translation of loneliness to depressive symptoms. Following retirement, social contact and engagement require more self-directed efforts, and one's social functioning may play a more significant role in contributing to one's mental health and well-being than during the working years. Thus, we hypothesize that the effect of loneliness at T1 on depressive symptoms at T2 is moderated by the transition to retirement, such that the effect is stronger for those who transitioned to retirement than for those who remained employed.

## Method

### Participants

Data were derived from two waves of the Health and Retirement Study (HRS) – 2010 and 2012. The HRS is a US longitudinal panel study that assesses a variety of demographic, financial, and health related variables. Its sampling method is based on a stratified multi-stage area probability sample of US households. The first wave of data was collected in 1992, where households age-based participation eligibility was determined by at least one member born between 1931–1941. Their spouse was interviewed regardless of age. Respondents from other birth cohorts, both older and younger, were added to the sample later on. The core questionnaire collects detailed data regarding work, health, disability and financial situation. Starting in 2006, the HRS randomly assigned half the respondents to a face-to-face interview, where additional physical and biological data were collected, or to a lifestyle and psychosocial questionnaire, which was left by the interviewer and returned by mail (the 'leave behind' questionnaire). The response rate in 2010 was 89% and 90% in 2012. (More detailed information about the HRS sample is available online at <http://hrsonline.isr.umich.edu/>) (HRS, 2016).

We set our inclusion criteria as employment in T1 ( $N = 7882$ ), and either continuous employment in T2 ( $N = 5867$ ) or transition to retirement ( $N = 740$ ). Out of those meeting our initial inclusion criteria, 3384 were eligible to

**Table 1.** Descriptive statistics and correlations between study variables ( $N = 2329$ ).

Variable	M/%	SD	1	2	3	4	5	6	7	8	9	10	11
1. Age	58.58	7.93											
2. Gender (1 = male)	43.1%	–	0.12***										
3. Race (1 = white)	77.6%	–	0.14***	0.09***									
4. Married (1 = yes)	68.8%	–	–0.06**	0.17***	0.15***								
5. School years	14.31	7.06	–0.04	0.02	0.14***	0.08***							
6. ADL	0.06	0.31	0.05*	0.001	0.008	–0.05*	–0.09***						
7. Activities	10.32	4.31	–0.08***	–0.03	–0.005	0.08***	0.29***	–0.06**					
8. Network	3.44	0.71	–0.04*	0.05*	0.09***	0.60***	0.007	–0.05*	0.12***				
9. Depressive symptoms T1	0.87	1.39	–0.08***	–0.10***	–0.11***	–0.08***	–0.14***	0.16***	–0.10***	–0.08***			
10. Loneliness T1	1.47	0.42	–0.03	0.06**	–0.06**	–0.12***	–0.11***	0.09***	–0.19***	–0.18***	0.29***		
11. Retirement (1 = retired)	13%	–	0.32***	0.04*	0.03	0.006	–0.05*	0.06**	–0.03	–0.007	0.01	0.004	
12. Depressive symptoms T2	0.88	1.47	–0.04*	–0.08***	–0.12***	–0.05*	–0.16**	0.19***	–0.12***	–0.07**	0.47***	0.26***	0.04 <sup>+</sup>

Note: +  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

participate in the lifestyle evaluation. Fourteen respondents were dropped from the analysis since data on this questionnaire was provided by someone other than the designated respondents, leaving a sample size of 3370. Only 2329 participants provided data on all study variables, where most missing data were due to non-response in items from the lifestyle questionnaire (i.e. loneliness (939 missing), participation in communal activities (932 missing) and social network (931 missing)). Analysis for non-random attrition showed that, on average, those who provided complete data were older (58.85 vs. 56.45  $t_{(2132)} = -8.58$ ,  $p < 0.001$ ), more educated (14.31 school years vs. 13.67,  $t_{(3368)} = -2.88$ ,  $p < 0.05$ ), were less depressed at T1 (0.87 vs. 1.255  $t_{(1474)} = 6.26$ ,  $p < 0.001$ ) and at T2 (0.88 vs. 1.17  $t_{(1628.99)} = 4.91$ ,  $p < 0.001$ ), and were slightly more engaged in communal activities (10.32 vs. 9.07  $t_{(2436)} = -2.76$ ,  $p < 0.01$ ). Women ( $\chi^2 = 22.23$ ,  $\Phi = -0.081$ ,  $p < .001$ ), white respondents ( $\chi^2 = 155.21$ ,  $\Phi = 0.215$ ,  $p < .001$ ) and those who retired by T2 ( $\chi^2 = 8.26$ ,  $\Phi = 0.05$ ,  $p < .01$ ) were more likely to provide full data. In order to examine the effect that the substantial number of missing values exerted on the results, we used multiple imputations, imputing the lifestyle variables (i.e. loneliness, engagement in communal activities and social network) and depression at T1 and T2. The processes generated 3284 valid observations. Comparing the results between the models with the imputed data and the original dataset revealed that the results were similar, and hence in the tables we provide below, the results are based on the original dataset, without imputations. The results using the imputed data are included in the Appendix.

Seventy-six respondents had a valid retirement date earlier than 2010. We performed sensitivity analysis, analyzing the model omitting those with valid retirement date prior to 2010 from the analysis. Results remained stable. The average retirement length for respondents who provided a retirement date between 2010 and 2012 was of 0.99 years. For the full analyzed sample, mean age at T1 was 58.85 ranging from 30 to 96, and 43.1% were male. Complete descriptive statistics are provided in Table 1.

## Measurements

### Depressive symptoms

The frequency of depressive symptoms was evaluated by the shortened version of the Center for Epidemiologic Studies Depression Scale (CES-D), developed for the Established Populations for Epidemiologic Study of the Elderly (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993). The CES-D was designed specifically to be used in surveys (Radloff, 1977),

and in its short form includes eight items evaluating the experience of depressive symptoms during ‘much of the time in the past week.’ Responses were coded as yes or no, and overall score was calculated as the sum of the items with a ‘yes’ answer, such that a higher score reflects more depressive symptoms. For the purpose of this study, we included only 7 items, omitting the item related to loneliness. Hence, scores ranged from 0 to 7 ( $\alpha = .78$ ).

### Loneliness

Loneliness was measured using an 11-item scale drawn from the Revised UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980). Items (such as ‘you lack companionship’ or ‘isolated from others’) were rated on a scale ranging from 1 ‘hardly ever or never’ to 3 ‘often.’ Loneliness score was created by averaging the scores across the 11 items, ranging from 1 to 3 ( $\alpha = .89$ ). The scale has been widely used, including in studies focusing on loneliness in older populations (Cacioppo et al., 2006).

### Employment/retirement status

Employment/retirement status was self-reported. Respondents were asked to indicate whether they were employed, retired, unemployed and looking for a job, temporarily laid off, homemakers, or other. For the purpose of this study we limited our sample to those who reported being employed at T1, and either continued to work or were retired at T2. The variable was constructed as a binary variable differentiating between those who retired between the waves (1) and those who continued working (0).

### Covariates

We controlled for respondents’ age at T1, gender, number of school years, marital status, and race/ethnicity status. Marital status was coded as 1 for married and 0 for not married. Race/ethnicity status was coded as 1 for white and 0 for non-white. We also controlled for Activities of Daily Living (ADL) at T1. This scale includes a summary score of five tasks (bathing, eating, dressing, walking across a room, and getting in or out of bed), and respondents are asked to report whether they are able to perform these tasks without assistance. Scores were coded such that 0 indicated that no assistance was required, and 1 indicated that participants required assistance to perform these tasks. Items were summed, such that scores ranged from 0 to 5. Finally, we controlled for depressive symptoms at T1, and added the interaction term between loneliness at T1 and depression at T1, as the two may interactively affect depression at T2.

In addition, as we were interested in the subjective experience of loneliness, rather than aloneness, we controlled for

participation in communal activities, and the composition of respondents' social network. To measure engagement in communal activities we used five items evaluating the frequency of engagement in volunteer and charity work, attendance of educational or training courses, participation in sports clubs or other social clubs, and attendance of non-religious organizations (political, community, or other interest groups). Scores for each item ranged from 1 (never) to 7 (daily). We summed the items to create the composite score ranging from 1 to 33. To measure network composition, we summed the scores of four items, asking respondents whether they live with a spouse or a partner, have any living children, any other immediate family, and any friends. Each item was coded as 1 for 'yes' and 0 for 'no'. Scores ranged from 0 to 4.

### Analysis

To test whether the effect of loneliness on depression depends on retirement status, we used stepwise regression. In the first step, we entered the covariates and the two predictors – loneliness at T1 and retirement status between T1 and T2 (transitioning to retirement or continuous employment). In the second step, we included the interaction term between loneliness and retirement. We complemented the analysis by performing simple estimates, evaluating the slopes between loneliness at T1 and depressive symptoms at T2 for retirees and employees. Loneliness was centered around the mean prior to analysis.

### Results

Descriptive statistics and correlations between study variables are presented in Table 1. Depressive symptoms at T2 are positively (but only marginally) correlated with being retired ( $r = .04, p < .10$ ) and moderately correlated with loneliness at T1 ( $r = .26, p < .001$ ). Loneliness and retirement status are not significantly correlated.

To test our hypothesis, we performed a stepwise regression analysis (Table 2). In the first step we included the covariates, loneliness and employment status, and the interaction term between loneliness and depressive symptoms at T1, and in the second step we added the interaction term between loneliness and employment. The effects of loneliness at T1 on depression

**Table 2.** The effects of loneliness and retirement on depressive symptoms.

Variable	Step 1 <sup>a</sup>		Step 2 <sup>b</sup>	
	B	SE	B	SE
Intercept	1.526***	.30	1.52***	.30
Age	-.003	.004	-.003	.004
Gender (1 = male)	-.12*	.05	-.13*	.05
Race (1 = white)	-.21**	.06	-.21**	.06
Married (1 = yes)	.09	.07	.09	.07
School years	-.04***	.01	-.04***	.01
ADL	.52***	.08	.52***	.08
Activities	-.01	.006	-.01	.006
Network	-.02	.05	-.02	.05
Depressive symptoms T1	.37***	.02	.37***	.02
Loneliness T1	.38***	.07	.32***	.07
Retirement (1 = retired)	.12	.08	.12	.08
Loneliness T1*depression T1	.18***	.04	.17***	.04
Loneliness T1*retirement			.50**	.18
$R^2$	0.272		0.275	
$\Delta R^2$			0.003**	

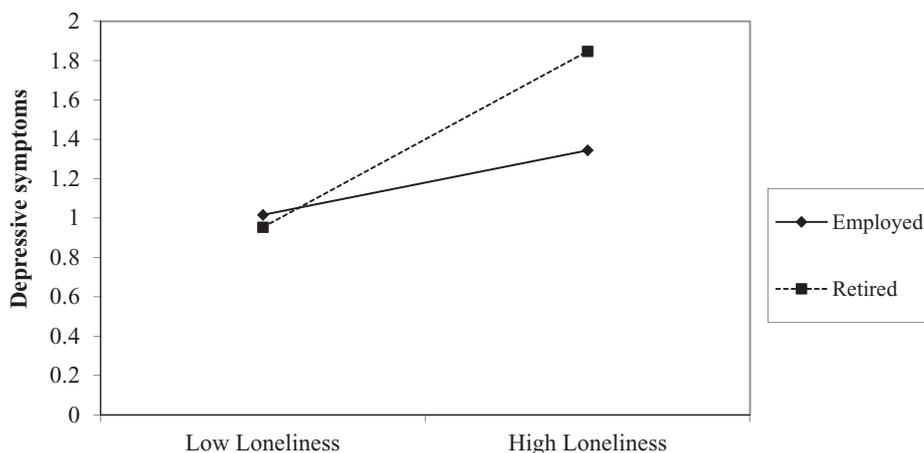
Note: +  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

<sup>a</sup>In Step 1, covariates and the main effects of loneliness and retirement status were entered into the equation.

<sup>b</sup>In step 2, the interaction term between loneliness and retirement status was added.

at T2 was significant ( $b = .38, p < .001$ ), suggesting that loneliness at T1 increases depressive symptoms at T2. The interaction term between loneliness and depressive symptoms at T1 was also significant ( $b = .18, p < .001$ ), suggesting that loneliness aggravates the trajectory of depression. The transition to retirement did not significantly affect depressive symptoms at T2. In support of our hypothesis, the interaction term between loneliness and retirement is also significant ( $b = .54, p < .01$ ), suggesting that the effect of loneliness on depressive symptoms depends on retirement status. In order to examine the differential effect of loneliness on depressive symptoms for the two groups (retirees and employees), we performed simple estimates analysis. The results show that indeed the effect is stronger for retirees than for employees ( $b = .89, p < .001$ ;  $b = .35, p < .001$ , respectively), thus lending support to our hypothesis (see Figure 1).

As education and engagement in communal activities could be related to both depression and retirement age, we tested their moderating role in two-way interactions: once with retirement and once with loneliness, and in a three-way interaction with retirement and loneliness, and found no significant results. Therefore, we conclude that the effects found are stable across different levels of education and communal engagement. To test whether the interactive effect of loneliness and retirement



**Figure 1.** The effect of loneliness on depression is dependent upon retirement status.<sup>1</sup>

Note: 1. Low and high values of loneliness are calculated as 1 SD below and above the mean, respectively.

status depends on the level of depressive symptoms at T1, we tested a three-way interaction between retirement status, depressive symptoms at T1 and loneliness. The three-way interaction term was not significant.

## Discussion

The results of the study suggest that employment can be considered a protective factor, buffering the adverse effects of loneliness on depressive symptoms. While previous studies provided mixed evidence regarding the effects of employment on mental health, this study offers a different perspective on the issue, examining the moderating role of employment (Segel-Karpas, 2015).

Employment provides several important resources, such as the formation of a 'worker's identity' (Stryker & Statham, 1985), social engagement and social support (Nathanson, 1980). The transition to retirement entails many lifestyle changes. One of the most prominent is the change in daily routine and social environment. The transition to retirement could allow individuals to engage in desired activities that were held on the 'back burner' while heavily engaged in the work role. It could also allow individuals to cultivate desired social relationships. When not intensively engaged in the work-role, however, maintaining or forming social relationships requires more initiative and self-directed efforts. Thus, the importance of social relationships could be enhanced, thereby amplifying the effects of a perceived lack of meaningful social relationships on well-being. In other words, the transition to retirement could increase the relative importance attributed to social relationship due to the decrease in the importance of the work role. For those who felt lonely before retirement but were distracted by their engagement in work, the transition to retirement could force them to confront their perceived lack of adequate social relationships, thus enhancing their experienced depressive symptoms.

Several limitations of this study should be noted. Analyses were performed on a relative small sub-sample of the HRS (i.e. those who were working at T1 and either retired or continued working at T2, participated in the lifestyle and psychological assessment, and provided full data). Testing for non-random attrition, we found significant differences between those who met the inclusion criteria but were not included in the final analyses due to missing data and the analyzed sub-sample. The respondents in our sample were more educated, more engaged in communal activities and less depressed than those who were excluded. As both high levels of education and engagement, and low levels of depression could facilitate active engagement in activities in retirement, it is possible that those who suffered the most from the deterioration in their mental health following retirement were not included in the analyses. In other words, it is possible that for them the effect found would be even stronger.

While the use of two waves of the HRS could offer some support for the proposed direction of causality, it does not eliminate alternative explanations. It is possible that a third factor, such as adverse social environment, increases one's propensity to experience both loneliness and depressive symptoms. Similarly, as suggested by Coyne (1976), the relationship between depression and loneliness could be reciprocal, where the expression of depressive symptoms consequent in rejection from others and increased loneliness, that in turn, results in increased depression. In addition, for

the sake of clarity, we only focused on the transition from employment to retirement, and did not consider other changes in workforce participation, such as temporary unemployment. The reason we chose to focus on retirement is that this transition is usually more likely to be permanent and implies reduced commitment to the work role (Feldman, 1994). It is also important to note that loneliness was measured using a very brief measure. This is contrasted with past research, which has differentiated between social loneliness and emotional loneliness (Weiss, 1973). While social loneliness refers to the absence of valued social networks, emotional loneliness refers to the absence of intimate ties. It is expected that following retirement, social loneliness will be particularly pronounced, whereas emotional loneliness is less likely to be affected. However, the current measure of loneliness did not allow making this differentiation. Future research could benefit from testing whether indeed the interactive effect of retirement with social loneliness on depression is stronger than its interactive effect with emotional loneliness. Finally, the underlying mechanisms for the effect we found were not directly studied, but rather theoretically generated. Future research could benefit from directly examining whether it is the lack of routine, the reduction in social interactions or the meaning that retirees attribute to the social environment that is responsible for the effect.

Despite these limitations, we believe that the study offers important theoretical and practical implications. Theoretically, the study offers a unique perspective on the role of retirement in the association between experienced loneliness and mental well-being. It joins the body of knowledge regarding risk factors for depression in later life, demonstrating that in addition to loneliness, retirement could be thought of as a risk factor that under certain conditions, amplifies the negative outcomes of loneliness.

Practically, the findings of this study could be used by practitioners to identify populations at greater risk for the experience of depressive symptoms. For those who experience loneliness, the transition to retirement could result in depression. Interventions aimed at establishing daily routine and increasing social interactions could potentially help these more vulnerable retirees.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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## Appendix 1

The effects of loneliness and retirement on depressive symptoms – imputed data ( $N = 3284$ ).

Variable	Step 1 <sup>a</sup>		Step 2 <sup>b</sup>	
	B	SE	B	SE
Intercept	1.80***	.25	1.52***	.30
Age	-.007*	.003	-.003	.004
Gender (1 = male)	-.12*	.05	-.13*	.05
Race (1 = white)	-.14**	.05	-.21**	.06
Married (1 = yes)	.06	.06	.09	.07
School years	-.03***	.01	-.04***	.01
ADL	.55***	.07	.52***	.08
Activities	-.01*	.005	-.10	.006
Network	-.05	.03	-.02	.04
Depressive symptoms T1	.36***	.02	.37***	.02
Loneliness T1	.42***	.06	.32***	.07
Retirement (1 = retired)	.15	.08	.12	.08
Loneliness T1*depression T1	.15***	.03	.17***	.04
Loneliness T1*retirement			.50***	.18
$R^2$	.273		.275**	
$\Delta R^2$			.002	

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

<sup>a</sup>In Step 1, covariates and the main effects of loneliness and retirement status were entered into the equation.

<sup>b</sup>In step 2, the interaction term between loneliness and retirement status was added.