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Retirement and depressive symptoms: A 10-year cross-lagged analysis

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ABSTRACT

The effect of retirement on depressive symptoms remains a subject of scientific inquiry, given the fact that previous studies have found mixed results. Moreover, the possible effect of depressive symptoms on the propensity to retire remains relatively understudied. Given the sheer number of retirees, and the significance of depressive symptoms for individuals' well-being and ability to work, as well as for societies at large, we used a large longitudinal dataset to examine the reciprocal effects of retirement on depressive symptoms, and of depressive symptoms on the propensity to retire. Using six waves of the Health and Retirement Study (HRS) data collected over a period of 10 years (N = 6584), we tested cross-lagged models of the reciprocal relationships between retirement and depressive symptoms. The analysis revealed that retirement results in increased depressive symptoms, and that depressive symptoms increase the likelihood of retirement. No sex differences in the lagged associations were found. We conclude that depressive symptoms are a risk factor for retirement, and practitioners should try and identify older workers suffering from depression prior to the retirement transition. Similarly, as retirement increases depressive symptoms, the transition should be treated as an important and sometimes risky milestone, where adequate preparation is required.

1. Introduction

The transition to retirement is a meaningful phase in older adulthood, and marks the beginning of the 'third age' (Laslett, 1991). For many, this transition entails desired opportunities for leisure activities (Dorfman, 2013) and a reduction in the daily stress associated with employment (Blekesaune and Solem, 2005). At the same time, employment also provides important resources, first and foremost, a sense of connectivity to a structured and social daily routine (Kahn, 1972; Nathanson, 1980; Segel-Karpas, 2015). Hence, the transition to retirement could weaken social connectedness, and decrease the individual's available resources.

Empirical results have been inconclusive, thus far, regarding the effect of retirement on physical and mental health. While some found that retirement is associated with lower well-being and increased risk for physical and mental morbidity (Dave et al., 2008), others found that retirement is related to improved well-being (Drentea, 2002) and better physical and mental health (Westerlund et al., 2010). Whereas retirement could potentially affect mental health, studies also demonstrated that ill mental or physical health encourage withdrawal from the labor force, and promote retirement (Lee and Smith, 2009).

This study uses the Health and Retirement Study (HRS) – a large and representative North American survey - to follow a sample of employees/retirees over a 10 year period – from 2004 to 2014, *simultaneously* estimating the lagged effects of retirement on depressive symptoms, and depressive symptoms on retirement. By doing so, we add to the existing body of literature describing health—employment trajectories in later life. In contrast to past research, which has examined either one of the proposed temporal associations separately, this study capitalizes on advancements in statistics, which allow for the examination of bi-directional temporal associations.

1.1. Retirement and depression

According to 'role theory', through the performance of a work-role, individuals connect to society (Kahn, 1972), form identity (Stryker and Statham, 1985) and gain social support (Nathanson, 1980). Retirement is conceptualized as a role loss, and is expected to result in reduced well-being (Stryker and Statham, 1985). On the other hand, retirement can also release one from an unfavourable work-environment and work-related stress, thus resulting in improved well-being (Wang et al., 2011).

Studies examining the effects of retirement on mental health and well-being have thus far been inconclusive. Using the first six waves of

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the HRS, Mandal and Roe (2008) found that retirement results in lower levels of depressive symptoms. Similar results are reported by Kolodziej and García-Gómez (2017). Using the Survey of Health Retirement and Ageing in Europe, and examining the relationship between older adults' employment rate and mental health across countries, the authors conclude that retirement has a protective effect, and that the protective effect is stronger for individuals who are just above the clinical threshold for depression. Other studies reported similar patterns, according to which retirement positively affects mental health (Eibich, 2015; Mein et al., 2003; Westerlund et al., 2010). On the other hand, some studies found that retirement was associated with lower levels of well-being and mental health (Butterworth et al., 2006). Using a large Australian study, Vo et al. (2015) found that the relationship between retirement and mental health depended on age and gender, such that being retired was associated with lower levels of mental health for men and women aged 46–64, and for men aged 65–74. Using seven waves of the Health and Retirement Study, Dave et al. (2008) reported that retirement results in a 6% − 9% decrease in mental health. Also using the HRS, Segel-Karpas et al. (2016) reported that the transition into retirement strengthened the effect that loneliness exerted on depression. Yet, other studies found no effect of retirement on mental health. Using a large-scale Canadian sample, Latif (2013) reports no significant effects of retirement on mental health. In a sample of Korean workers, Lee and Smith (2009) found that retirement was not associated with depression, but that depression led to reduced labor force participation. Rhee et al. (2016) reported no overall effect of retirement on mental health, but rather a mediated effect that depended on the voluntariness of the transition. Whereas voluntary retirement positively affected mental health through increased perceived financial control, involuntary retirement negatively affected mental health through decreased perceived financial control. Finally, some researchers have suggested the existence of varied trajectories of effect (Wang et al., 2011), or that the effect of retirement on well-being depends on situational and personal factors (Segel-Karpas et al., 2013).

1.2. Depression and retirement

Both physical and mental health could affect the preference and ability to remain employed and the structure of opportunities in the specific job. Therefore, physical and mental health may play a meaningful role, affecting the decision to retire (Dwyer and Mitchell, 1999).

Whereas the negative effect of physical health on labor force participation is well-established (e.g. Shultz and Wang, 2007), less is known about the effects of mental health on labor force participation, in general, and retirement, in particular (Lee and Smith 2009). Depression negatively affects energy level, concentration and motivation to work, which could reduce one's ability to participate in the labor force (Conti et al., 2006). Depressed Finnish men were found to retire 1.5 years earlier than their non-depressed counterparts (Karpansalo et al., 2005). Using the second through fifth waves of the HRS (1994–2000), Conti et al. (2006) found that depression directly increased the probability of early retirement and application for disability insurance benefits. Physical illness amplified this effect. Using six waves of the Health and Retirement Study, Doshi et al. (2008) found that depression was a significant predictor of retirement for both men and women. Subthreshold depression was also predictive of retirement for women, but not for men. Focusing on women, the effect was more prevalent among those working full time (rather than part time).

Given the potential for bi-directional associations, this study aims to identify the simultaneous effects of depressive symptoms on retirement, and that of retirement on depressive symptoms. By using six new waves of the HRS, we aspire to contribute to the understanding of the complex and interactive patterns of labor force behavior in older adulthood.

2. Methods

2.1. Sample

The HRS is a US nationally representative panel survey of individuals over the age of 50 and their spouse of any age. The first wave of data was collected in 1992 from those born between 1931 and 1941 (a response rate of 81.7%). Different cohorts were later added to the survey in order to preserve the number of 50 ± year-olds in the sample. For example, in 2004 and 2010 the "early boomers" (1948–1953) and "baby boomers" (1954–1959) were added (Staff, 2008). The HRS was specifically designed to explore changes in labor force participation and health transitions.

The present study uses six waves of data collected in 2004–2014 by the HRS. *N*, response rate (2004) = 18,469, 88.9%; *N*, response rate (2006) = 17,217, 88.4%; *N*, response rate (2008) = 22,032, 81%; *N*, response rate (2010) = 20,554, 89.1%; *N*, response rate (2012) = 18,747, 87.1% (Staff, 2017). We chose to focus on later waves of data, in order to capture the most current trends in labor-force-depression associations. The sample was restricted to individuals over the age of 50, who were classified as either employed or retired on each of the waves between 2004 and 2014 ($N = 6584$). Classification as retired/working was allowed to vary across waves, but only two possible options were available throughout the study: retired or employed. Participants had to report being either retired/employed in all 6 waves in order to be included in the analytic sample.

Those who had complete data concerning employment vs. retirement status on all six waves were significantly younger (M[SE] = 62.4[0.19] vs. M[SE] = 66.3[0.22], F[1,56] = 26**4.56**, $p < .001$), had more years of education (M[SE] = 13.7[0.07] vs. M[SE] = 12.4[0.06], F[1,56] = 381.33, $p < .001$), were more likely to be men (52% vs. 45%, respectively, $\chi^2[1] = 127.4$, $p < .001$), had better functional status (M[SE] = 0.21[0.01] vs. M[SE] = 0.70[0.02], F[1,56] = 713.05, $p < .001$), reported fewer depressive symptoms in 2004 (M[SE] = 0.95 [0.03] vs. M[SE] = 1.64[0.03], F[1,56] = 290.89, $p < .001$), and were more likely to be employed (60% vs. 45%, respectively, $\chi^2[1] = 174.6$, $p < .001$) compared with those who had incomplete data concerning employment vs. retirement status on at least one of the waves ($N = 9926$). A similar pattern was evident when the sample was restricted to those individuals who had complete data concerning employment vs. retirement status and depressive symptoms on all six waves ($N = 6507$). These patterns are consistent with the general trend of those who have complete data over time to be younger, more educated, of better financial status and better health status. (Kapteyn et al., 2006).

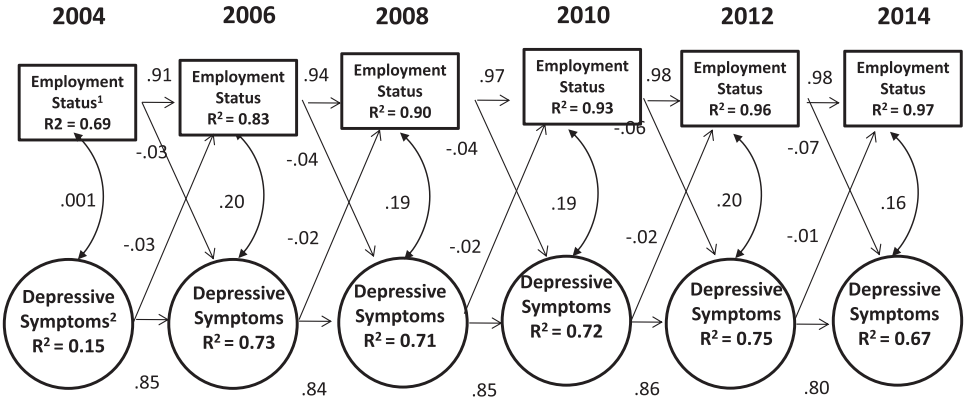
2.2. Measures

2.2.1. Depressive symptoms

The Center for Epidemiological Studies-Depression Scale (CES-D) (Radloff, 1977) was used as part of the core interview to assess eight depressive symptoms, using a yes-no response format. After reverse-coding appropriate items, a total score was calculated by summing the "yes" answers. The scale ranged between 0 and 8, with a higher score indicating more depressive symptoms ($\alpha = 0.80$).

2.2.2. Employment status

This information was gathered through the following question: "Now I'm going to ask you some questions about your current employment situation. Are you working now, temporarily laid off, unemployed and looking for work, disabled and unable to work, retired, a homemaker, or what?" Response options were: working now, unemployed and looking for a job, temporarily laid off, disabled, retired, homemaker, other, on sick or other leave, do not know, refused. The present study concerned only individuals who reported they were 1 = working now or 0 = retired on all six waves. All other response



A structural equation model of cross-lagged employment status and depressive symptoms effects with standardized parameters. The solid lines indicate paths statistically significant at $p < .05$.
R^2 represents the proportion of explained variance.
1. Employed=1, Retired=0; 2. Depressive symptoms ranged between 0-8

Fig. 1. A cross-lagged panel model of the reciprocal relations of employment status and depressive symptoms[3].

options, such as unemployed or disabled, were coded as missing for the purpose of the present study.

2.2.3. Covariates

Age, sex, years of education, race(dividedinto4groups:black,Latino, othersandwhite,whitebeingthereferencecategory), functional status (a sum of 11 activities of daily living and instrumental activities of daily living, with a higher score indicating greater impairment; range 0–11), and household income were gathered based on self-report. Household income generated by RAND (Pantoja et al., 2016) was used in the present study. The total household income variable was calculated as the sum of the respondent's and spouse's earnings, pensions and annuities, supplemental security income and social security disability payments received, social security retirement payments, unemployment and workers' compensation received, other government transfers, household capital income and other income (Pantoja et al., 2016). To account for the high variability, we divided household income by 1000.

2.3. Analysis

We first calculated descriptive statistics and correlations between variables. Next, we used Structural Equation Modeling with Mplus version 7.3 (Muthén and Muthén, 1998–2012) to evaluate the cross-lagged autoregressive model outlined in Fig. 1 (Finkel, 1995). The model allows the simultaneous evaluation of the reciprocal associations of retirement and depressive symptoms while controlling for measurement biases. The following items - age in 2004, sex, years of education, functional impairment, and household income - were included as covariates because of their known associations with depressive symptoms and employment status. Depressive symptoms were modeled as latent constructs with their items serving as indicators; age, sex, years of education, functional impairment, household income and employment status were modeled as observed variables.

Due to missing values, we used the Mplus WLSMV estimator that allows maximum likelihood estimation with robust standard errors and chi-square calculation in the presence of missing values. Weights and strata were specified in the model to account for the complex survey design. To estimate the models' goodness-of-fit, we followed the recommendations of Schreiber et al. (2006) and report, in addition to the chi-square statistic, three approximate fit indices, the Tucker–Lewis Index (TLI), the Comparative Fit Index (CFI), and the Root Mean-Square Error of Approximation (RMSEA). TLI and CFI close to or above 0.95 combined with RMSEA of 0.06 or lower indicate a reasonably good fit (Hu and Bentler, 1999). The significance level criterion for all other statistical tests was set at 0.05.

Variance resulting from specific measurement occurrences in the cross-lagged panel model was accounted for by correlating the uniquenesses within waves (Marsh and Hau, 1996). Because factorial invariance across time points is a major requirement of a valid autoregressive model (Finkel, 1995), we first tested for and assured "weak factorial invariance" (in terms of Meredith, 1993) by setting the factor loadings of the main research latent variable - depressive symptoms - as

Table 1
Baseline sample characteristics in 2004 and intercorrelations among variables ($N = 6584$)[1].

	Mean[SE]/*N*[%]	1	2	3	4	5	6	7	8	9
1. Age	62.4[0.20]									
2. Women	3319 [47.7%]	−0.04**								
3. Education	13.7[0.06]	−0.16***	−0.01							
4. Employed	3172 (59.4%)	−0.60***	0.04**	0.13***						
5. Depressive symptoms (0–8)	0.95(0.03)	0.02**	0.11***	−0.14***	−0.03***					
6. Functional impairment (0–11)	0.21(0.01)	0.13***	0.08***	−0.10***	−0.11***	0.17***				
7. Household income/1,000	86.80(2.32)	−0.22***	−0.08***	0.29***	0.23***	−0.10***	−0.08***			
8. Black	800(7.50%)	−0.03*	.08***	−0.10***	0.01	0.08***	0.04*	−0.09***		
9. Latino	389(5.00%)	−0.07***	−0.05***	−0.24***	0.06***	0.06***	0.03	−0.07***	−0.09***	
10. Other	139(2.32%)	−0.04***	−0.00	0.03*	0.02	0.03	−0.01	0.00	−0.05***	−0.04***

* < 0.05, ** < 0.01, *** < 0.001
[1] Based on pairwise correlations.

Table 2
Mean, standard error, and correlation among depressive symptoms and employment status across the six waves (N = 6584)[2].

	Mean[SD]/N[%]	1	2	3	4	5	6	7	8	9	10	11
1. Employed in 2004	3172[59.4%]											
2. Employed in 2006	2817[54.7%]	0.79***										
3. Employed in 2008	2471[47.8%]	0.70***	0.79***									
4. Employed in 2010	1996[39.6%]	0.60***	0.68***	0.77***								
5. Employed in 2012	1708[34.2%]	0.52***	0.59***	0.67***	0.86***							
6. Employed in 2014	1376[27.9%]	0.45***	0.51***	0.57***	0.78***	0.85***						
7.Depressive symptoms in 2004 (0–8)	.94[0.03]	−0.09***	−0.07***	−0.07***	−0.05***	−0.05***	−0.05***					
8. Depressive symptoms in 2006 (0–8)	.99[0.03]	−0.06***	−0.07***	−0.06***	−0.04***	−0.05***	−0.03***	0.59***				
9. Depressive symptoms in 2008 (0–8)	.94[0.02]	−0.07***	−0.07***	−0.08***	−0.06***	−0.06***	−0.05***	0.52***	0.57***			
10. Depressive symptoms in 2010 (0–8)	.90[0.02]	−0.06***	−0.07***	−0.07***	−0.04***	−0.04***	−0.01***	0.52***	0.56***	0.56***		
11. Depressive symptoms in 2012 (0–8)	.95[0.02]	−0.07***	−0.07***	−0.08***	−0.05***	−0.06***	−0.04***	0.49***	0.52***	0.53***	0.60***	
12. Depressive symptoms in 2014 (0–8)	1.00[0.02]	−0.07***	−0.06***	−0.07***	−0.05***	−0.07***	−0.08***	0.46***	0.50***	0.51***	0.56***	0.60***

* < 0.05, ** < 0.01, *** < 0.001
[2] Based on pairwise correlations.

equal across waves. Stationarity was tested for and specified by setting all path coefficients to be invariant across waves (except for the correlation between retirement and depressive symptoms at wave 1).

As women are more prone than men to experience depressive symptoms, andarealsolesslikelytoparticipateintheworkforce, in an additional sensitivity analysis, we examined whether the cross-lagged effects are moderated by sex. The grouping command and the DIFFTEST function were used. The restricted model, in which the cross-lagged effects were comparable across the two groups, was examined against a model that allowed the cross-lagged effects to differ in men and women. A significant result suggests that the cross-lagged effects significantly differ between men and women.

3. Results

Table 1 summarizes the model's baseline characteristics. As can be seen, almost 60% of the analytic sample was employed and the remaining sample self-identified as retired. The average depressive symptoms score was Mean[SE] = 0.95[0.03]. As can be seen in Table 2, there were significant negative correlations between depressive symptoms and employment status across the six waves, indicating lower levels of depressive symptoms among the employed.

As a first step of our main analyses, we tested the measurement model of the latent construct, depressive symptoms, measured over six time points, with cross-wave correlations between errors of the construct and with factor loadings constrained for equality across waves. The model and the data showed a good fit, with $\chi^2(998) = 3046.707$, $p < .001$, TLI = 0.962, CFI = 0.966, RMSEA = 0.018 (90%CI = 0.017; 0.018).

Next, we fit the hypothesized autoregressive cross-lagged model with covariates. Baseline measurements of age, gender, race, education and functional impairment were specified to affect depressive symptoms and employment status at each wave. This model fit the data well, $\chi^2(1570) = 5698.476$, $p < .001$, TLI = 0.946, CFI = 0.950, RMSEA = 0.020 (90%CI = 0.020–0.021).

Fig. 1 presents the main elements of this model (standardized paths and proportions of explained variance), with relations between controls and main research variables omitted from the Figure.

The autoregressive effects of depressive symptoms (B[SE] = 0.86[0.01], $p < .001$) and employment status (B[SE] = 1.22 [0.02], $p < .001$) were substantive and significant across the six waves, pointing to the stability of these constructs.

The lagged effect of depressive symptoms on employment status was significant (B[SE] = −0.05 [.01], $p = .001$), indicating that higher levels of depressive symptoms pose a risk for retirement. Similarly, the lagged effect of employment status on depressive symptoms was significant (B[SE] = −0.03[0.0041], $p < .001$), indicating that being retired precedes higher levels of depressive symptoms two years afterwards.

To test for possible differences in the magnitude of the effects, we compared an unrestricted model to a model where the paths between employment status to depressive symptoms were set to be equal to those between depressive symptoms to employment status. The unrestricted model did not fit the data significantly better than the restricted data, indicating that the effects are similar ($\Delta\chi^2[1] = 2.907$, $p = .088$).

We similarly tested for gender differences. The unrestricted model, which allowed the cross-lagged effects of depressive symptoms on employment status to differ between men and women, had an adequate fit ($\chi^2[3047] = 6757.610$, $p < .001$, TLI = 0.951, CFI = 0.955, RMSEA = 0.019 [90%CI = 0.019–0.020]). However, this model was non-significantly different from the restricted model ($\Delta\chi^2[1] = 1.260$, $p = .26$). Similarly, the unrestricted model, which allowed the cross-lagged effects of employment status on depressive symptoms to differ between men and women, had an adequate fit ($\chi^2[3047] = 6753.787$, $p < .001$, TLI = 0.951, CFI = 0.955, RMSEA = 0.019 [90%CI = 0.019–0.020]). This model was also non-significantly different from the restricted model ($\Delta\chi^2[1] = 2.022$, $p = .16$). Hence, there was no support for a moderating sex effect.

4. Discussion

Retirement is a major transition in later life, and as such, needs to be thoroughly understood. The transition to retirement could, on the one hand, result in reduced physical and mental strain, and thus improve well-being (Adams et al., 2002). On the other hand, employment provides valued financial and social resources, and the transition to retirement could result in the loss of these resources, causing stress and distress (Thoits, 1992).

Research tapping into the effects of retirement on depression has yielded inconsistent results, and the effects of depression on retirement have not been thoroughly studied. The present study adds to the literature by examining the concurrent reciprocal effect of retirement on depressive symptoms and depressive symptoms on retirement.

Examining 10 years of data using six waves of the HRS, our results suggest that depressive symptoms increase the probability of

retirement. This is in line with previous studies noting that depression increases the risk of retirement (Conti et al., 2006; Doshi et al., 2008). Depressive symptoms can be expressed by lower energy levels and the inability to concentrate, and hence increase the perception of inability to perform a work-role (Conti et al., 2006). They could also reduce productivity at work, prompting employers to push older workers into retirement. In the case of involuntary retirement (where an employee is pushed out against his or her will), the consequences for well-being could be harsher (Dingemans and Henkens, 2014), resulting in a greater increase in depressive symptoms. Hence, the reciprocal effects between involuntary retirement and depressive symptoms should be examined in future research.

In this study, depressive symptoms were predictive of retirement. This finding is in line with previous studies, suggesting that depression leads to early retirement and disability pension (Conti et al., 2006; Doshi et al., 2008; Karpansalo et al., 2005). At the same time, we also found that retirement results in an increase in depressive symptoms. While in line with some previous studies (e.g. Butterworth et al., 2006), the results contradict other studies finding that retirement improves mental health (e.g., Kolodziej and García-Gómez, 2017). The contradiction may be the result of measurement and sample biases, or unaccounted variables that may tip the results, such as the voluntary nature of the retirement.

In contrast to some previous studies (e.g, Doshi et al., 2008), we did not find significant differences between men and women in the relationship between retirement and mental health. While, in general, women tend to report more depressive symptoms than men (Cole and Dendukuri, 2003), and are also less likely to be engaged in the workforce (retrieved: Bureau of Labor Statistics, 2018), the literature regarding the effect of sex in the context of the relationship between retirement and mental health presents a more complex picture. For example, in Vo et al.'s study, the association between retirement and mental health among older respondents (aged 65–74) was only significant for men, but not for women. Similarly, Olesen et al., (2012) report that poor mental health is related to retirement in men and, more generally, workforce exit in women. Examining the joint effect of retirement and spouse's ADL on mental well-being, Szinovacz and Davey (2004) report a negative effect for women, but not for men. Doshi et al.'s (2008) findings suggest that the gendered effect depends on the level of depression (active vs. sub-threshold) as well as on objective involvement in the workforce (partial vs. full-time employment). In other words, it is possible that the gender-related influence is not general, but rather depends on other factors that were not accounted for in this study, such as age, depression level, caregiving tasks and hours worked. As women go through gendered labor-force participation patterns, it is possible that their self-definition of employment status differs from that of men. In other words, women who experienced multiple entries and exits from the labor force might not define themselves as retired, but rather as temporarily unemployed or looking for a job, even in old age. Women who were homemakers in later adulthood could also present different self-definitions of their employment status, transitioning from homemaking to retirement when they reach a certain age. This should be further examined in a research design that specifically taps into the ways older women with varied workforce participation patterns define their employment status in later life. Future research could also examine whether the lagged effects of retirement and depressive symptoms are moderated by other factors, such as loneliness, income and the voluntariness of the transition.

Examining the concurrent effect of retirement on depressive symptoms and the effect of depressive symptoms on retirement furthers our understanding regarding the temporal order of the relationship between retirement and depressive symptoms, showing that both depressive symptoms encourage labor force withdrawal, and that withdrawal in the form of retirement results in an increase in depressive symptoms.

4.1. Limitations

A few study limitations bear mentioning. First, while dichotomizing employment and retirement status provides a more focused and comprehensive design, we neglected to examine other forms of non-participation in the labor force. Future research could benefit from examining other forms of non-labor force participation, such as disability leave or temporary unemployment. In addition, although we focus on self-defined retirement, future studies could compare the associations between self-defined retirement and other forms of definition, such as age-based definition,with depressive symptoms. Although focusing on those who self-defined themselves as retirees is a limitation, it is also an advantage when considering that retirement is a change in status that requires an adjustment process. In this regard, the self-definition of retirement as an important transition could be a more important predictor of psychological well-being than other definitions, based, for example, on age or the withdrawal of pension funds. Second, although using longitudinal data provides valuable information regarding the temporal and directional relationships between employment and depressive symptoms, it does not completely eliminate the concern that other factors could affect retirement or the development of depressive symptoms. For instance, it is possible that poor health is related to the decision to retire as well as to the development of depressive symptoms. The present design cannot answer this question. Third, an analysis of incomplete data reveals that those who provided complete data were more educated, less depressed, and more likely to be employed. Hence, our results may represent a stronger-healthier population than the overall sample. This indicates that the results presented here could be more moderate than the actual phenomenon. Similarly, the mean score of depressive symptoms was very low, once again indicating that the sample consists mostly of respondents with relatively good mental health. It is possible that the results would have been stronger given a wider range of depression in the sample. This proposition is supported by Doshi, Cen and Polsky's (2008) study, which found that active depression was a catalyst for retirement among men and women alike, while sub-threshold depression was associated with retirement only among women. Future studies could focus on depressed retirees, and examine whether, and under what conditions, depressive symptoms are alleviated or strengthened by retirement.

While this study focused on one form of well-being, future research could benefit from examining other forms of well-being, such as a feeling of purpose in life and self-acceptance (Ryff, 1989). Future research could also benefit from examining how different reasons for retirement or the timing of retirement (on-time vs. early) affect the reciprocal relationship between retirement and well-being. Finally, the cultural context of the transition should also be examined as a possible mechanism shaping the retirement–well-being relationships.

Theoretically, this study joins the existing body of literature, which attempts to shed light on the complex relationships between retirement and well-being. Practically, our results suggest that depressive symptoms are a risk factor for retirement and practitioners should try to identify older workers who suffer from depression before they transition into retirement. Similarly, as retirement seems to increase depressive symptoms, the transition should be perceived and accordingly treated as an important and sometimes risky transition, which requires adequate preparation.

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References

Adams, G.A., Prescher, J., Beehr, T.A., Lepisto, L., 2002. Applying work-role attachment theory to retirement decision-making. Int. J. Aging Hum. Dev. 54 (2), 125–137.

Blekesaune, M., Solem, P.E., 2005. Working conditions and early retirement a prospective study of retirement behavior. Res. Aging 27 (1), 3–30. https://doi.org/10.1177/0164027504271438.

Bureau of Labor Statistics, retrieved: https://www.dol.gov/wb/stats/stats_data.htm (August 2018).

Butterworth, P., Gill, S.C., Rodgers, B., Anstey, K.J., Villamil, E., Melzer, D., 2006. Retirement and mental health: analysis of the Australian national survey of mental health and well-being. Soc. Sci. Med. 62 (5), 1179–1191. https://doi.org/10.1016/j.socscimed.2005.07.013.

Cole, M.G., Dendukuri, N., 2003. Risk factors for depression among elderly community subjects: a systematic review and meta-analysis. Am. J. Psychiatry 160 (6), 1147–1156.

Conti, R.M., Berndt, E.R., Frank, R.G., 2006. Early Retirement And Public Disability Insurance Applications: Exploring The Impact Of Depression. National Bureau of Economic Research, Cambridge, pp. e12237.

Dave, D., Rashad, I., Spasojevic, J., 2008. The effects of retirement on physical and mental health outcomes. Southern Econ. J. 75 (2), 497–523.

Dingemans, E., Henkens, K., 2014. Involuntary retirement, bridge employment, and satisfaction with life: a longitudinal investigation. J. Organ. Behav. 35 (4), 575–591.

Dorfman, L.T., 2013. Leisure activities in retirement. In: Wang, M. (Ed.), The Oxford handbook of Retirement. Oxford University Press, New York, pp. 339–353.

Doshi, J.A., Cen, L., Polsky, D., 2008. Depression and retirement in late middle-aged US workers. Health Serv. Res. 43 (2), 693–713.

Drentea, P., 2002. Retirement and mental health. J. Aging Health 14 (2), 167–194.

Dwyer, D.S., Mitchell, O.S., 1999. Health problems as determinants of retirement: Are self-rated measures endogenous? J. Health Econ. 18 (2), 173–193.

Eibich, P., 2015. Understanding the effect of retirement on health: mechanisms and heterogeneity. J. Health Econ. 43, 1–12. https://doi.org/10.1016/j.jhealeco.2015.05.001.

Finkel, S.E., 1995. Causal Analysis With Panel Data Vol 105. Sage Publications, Inc., California.

Hu, L.T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct. Equation Model. 6 (1), 1–55.

Kahn, R., 1972. The Meaning of Work: Interpretation and Proposals for Measurement. In: Campbell, A., Converse, P.E. (Eds.), The Human Meaning On Social Change. RSF, New York, pp. 159–204.

Kapteyn, A., Michaud, P.C., Smith, J.P., Van Soest, A., 2006. Effects of attrition and nonresponse in the health and retirement study. RAND Working Paper WR-407. . https://ssrn.com/abstract=928369.

Karpansalo, M., Kauhanen, J., Lakka, T., Manninen, P., Kaplan, G., Salonen, J., 2005. Depression and early retirement: prospective population based study in middle aged men. J. Epidemiol. Community Health 59 (1), 70–74.

Kolodziej, I.W., García-Gómez, P., 2017. The Causal Effects of Retirement On Mental health: Looking beyond the Mean Effects. RWI - Leibniz-Institut für Wirtschaftsforschung, Essen. https://doi.org/10.4419/86788775. Ruhr Economic Papers, No. 668, ISBN 978-3-86788-775-5.

Laslett, P., 1991. A Fresh Map of life: The emergence of the Third Age. HUP, Massachusetts.

Latif, E., 2013. The impact of retirement on mental health in Canada. J. Ment. Health Policy 16 (1), 35–46.

Lee, J., Smith, J.P., 2009. Work, retirement, and depression journal of population ageing. JPA 2 (1-2), 57–71.

Mandal, B., Roe, B.E., 2008. Job loss, retirement and the mental health of older Americans retirement and the mental health of older Americans. J. Ment. Health Policy Econ. 11, 167–176.

Marsh, H.W., Hau, K.T., 1996. Assessing goodness of fit: Is parsimony always desirable? J. Exp. Educ. 64 (4), 364–390.

Mein, G., Martikainen, P., Hemingway, H., Stansfeld, S., Marmot, M., 2003. Is retirement good or bad for mental and physical health functioning? Whitehall II longitudinal study of civil servants. J. Epidemiol. Community Health 57 (1), 46–49.

Meredith, W., 1993. Measurement invariance, factor analysis and factorial invariance. Psychometrika 58 (4), 525–543.

Muthén, L.K., Muthén, B.O., 1998. Mplus User's Guide, 7th Ed. Muthén & Muthén, Los Angeles, CA.

Nathanson, C.A., 1980. Social roles and health status among women: the significance of employment. Soc. Sci. Med. Part A 14 (6), 463–471.

Olesen, S.C., Butterworth, P., Rodgers, B., 2012. Is poor mental health a risk factor for retirement? Findings from a longitudinal population survey. Soc. Psych. Psych. Epidemiol. 47 (5), 735–744.

Pantoja, P., Bugliari, D., Campbell, N., Chan, C., Hayden, O., Hurd, M., ... St. Clair, P., 2016. RAND HRS income and wealth imputations, Version O. RAND Center for the Study of Aging, Labor & Population Program. Retrieved: https://www.rand.org/content/dam/rand/www/external/labor/aging/dataprod/randiwo.pdf.

Radloff, L.S., 1977. The CES-D scale: a self-report depression scale for research in the general population. Appl. Psych. Meas. 1 (3), 385–401.

Rhee, M.K., Mor Barak, M.E., Gallo, W.T., 2016. Mechanisms of the effect of involuntary retirement on older adults' self-rated health and mental health. J. Gerontol. Soc. Work 59 (1), 35–55.

Ryff, C.D., 1989. Happiness is everything, or is it? Explorations on the meaning of psychological well-being. J. Pers. Soc. Psychol. 57 (6), 1069–1081.

Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A., King, J., 2006. Reporting structural equation modeling and confirmatory factor analysis results: a review. J. Educ. Res. 99 (6), 323–338.

Segel-Karpas, D., 2015. Number of illnesses, self-perceived health, and depressive symptoms: the moderating role of employment in older adulthood and old age. Work Aging Retirement 1 (4), 382–392. https://doi.org/10.1093/workar/wav009.

Segel-Karpas, D., Ayalon, L., Lachman, M.E., 2016. Loneliness and depressive symptoms: the moderating role of the transition into retirement. Aging Ment. Health 22 (1), 135–140. https://doi.org/10.1080/13607863.2016.1226770.

Segel-Karpas, D., Bamberger, P.A., Bacharach, S.B., 2013. Income decline and retiree well-being: the moderating role of attachment. Psychol. Aging 28 (4), 1098–1107. https://doi.org/10.1037/a0034672.

Shultz, K.S., Wang, M., 2007. The influence of specific physical health conditions on retirement decisions. Int. J. Aging Hum. Dev. 65 (2), 149–161.

Staff, H., 2008. HRS Design History. Survey Research Center, Institute for Social Research. University of Michigan, Ann Arbor, MI.

Staff, H., 2017. Sample Sizes and Response Rates. Survey Research Center, Institute for Social Research. University of Michigan, Ann Arbor, MI.

in:n:Stryker, S., Statham, A., 1985. Symbolic interaction and role theory. In: Gardner, L., Aronson, E. (Eds.), Handbook of Social Psychology 1. Random House, New York, pp. 311–378.

Szinovacz, M.E., Davey, A., 2004. Retirement transitions and spouse disability: effects on depressive symptoms. J. Gerontol. B-Psychol. 59 (6), S333–S342. https://doi.org/10.1093/geronb/59.6.S333.

Thoits, P.A., 1992. Identity structures and psychological well-being: gender and marital status comparisons. Soc. Psychol. Quart. 55 (3), 236–256.

Vo, K., Forder, P.M., Tavener, M., Rodgers, B., Banks, E., Bauman, A., Byles, J.E., 2015. Retirement, age, gender and mental health: findings from the 45 and up study. Aging Ment. Health 19 (7), 647–657.

Wang, M., Henkens, C., Van Solinge, H., 2011. Retirement adjustment: a review of theoretical and empirical advancements. Am. Psychol. 66 (3), 204–213.

Westerlund, H., Vahtera, J., Ferrie, J.E., Singh-Manoux, A., Pentti, J., Melchior, M., Leineweber, C., Jokela, M., Siegrist, J., Goldberg, M., Zins, M., Kivimäki, M., 2010. Effect of retirement on major chronic conditions and fatigue: French GAZEL occupational cohort study. BMJ 341, c6149. https://doi.org/10.1136/bmj.c6149.