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Gender differences in the mechanism of involuntary retirement affecting loneliness through vulnerability and coping resources

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Abstract

Involuntary retirement is associated with diminished mental health. However, little is known about the mechanism that connects involuntary retirees' coping resources to their loneliness. Gender patterns in the mechanism of involuntary retirement are also unclear. This study examines gender differences in the link between involuntary retirement and loneliness through secondary stressors (material and physical vulnerability) and coping resources (social support and self-efficacy). Two-step structural equation modelling was used to examine the effects of several mediators. For both men and women, involuntary retirement was associated with increased loneliness in terms of physical vulnerability and social efficacy. We found the female involuntary retirees are facing loneliness with multiple mediating factors. The layers of experiencing loneliness among female retirees are (a) directly from involuntary retirement; (b) indirectly from involuntary retirement and secondary stressors (material vulnerability and physical vulnerability); and (c) indirectly from involuntary retirement, secondary stressors (material vulnerability and physical vulnerability) and coping resources. The specific gender differences in the complex mechanism leading to later-year loneliness among the retirees may inform the interventions and policies that mitigate the disadvantages among involuntarily retired older adults in the United States of America.

Keywords: involuntary retirement; loneliness; mechanism; phantom model; social support; self-efficacy; gender difference

Introduction

As Americans are living longer and remain healthier than they did in previous generations, more scholars are interested in their wellbeing in retirement (Mather *et al.*, 2015). While most older adults report satisfaction with improved health outcomes and lower stress levels that accompany retirement (Denier *et al.*, 2017), some studies

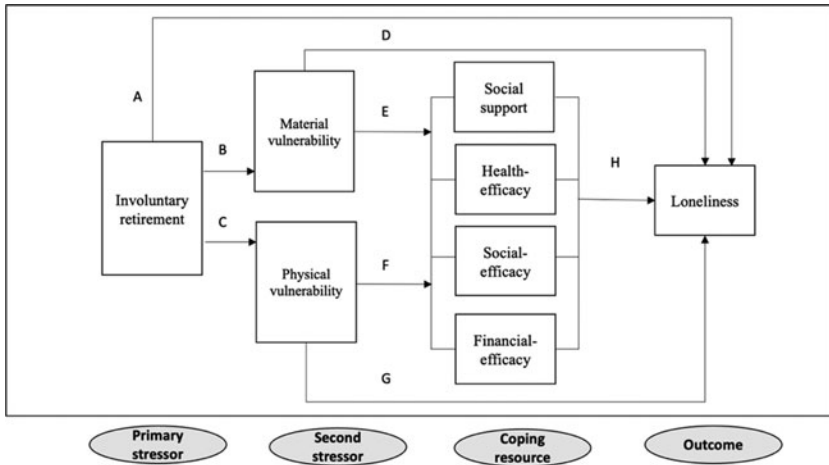


Figure 1. Theoretical framework.

Note: The letters 'A' to 'H' indicate the possible direct and indirect paths in this model.

find retirees report poorer health, higher depression and reduced wellbeing – especially among the involuntarily retired (Rhee *et al.*, 2016).

Focusing on the nature of retirement (voluntary/involuntary), this study explores complex wellbeing mechanisms among retirees. Despite the negative mental health effects of involuntary retirement, understanding of the mechanism underlying the path to low wellbeing remains unclear. Specifically, little is known about the mechanisms behind the multiple mediation of involuntary retirement and wellbeing. Considering the gendered pattern of preretirement employment histories and other life experiences, it is important to examine if and to what extent the paths to loneliness differ between men and women. Women, for example, may be more vulnerable than men to retirement and therefore to material and non-material disadvantages (Cahill *et al.*, 2013; Hershey and Henkens, 2013).

Guided by process theory, we examined links between a primary stressor (involuntary retirement), secondary stressors (material and physical vulnerability), coping resources (social support, health efficacy, social efficacy and financial efficacy) and outcome (loneliness) among male and female involuntary retirees (Figure 1). We focused on retirees' loneliness given its strong effect on late-life morbidity and mortality (Steptoe *et al.*, 2013; Holt-Lunstad *et al.*, 2015; Rico-Uribe *et al.*, 2018).

Theoretical framework

Stress process theory was adopted to guide our exploration of gender differences in the complex mechanism linking from involuntary retirement to loneliness. Stress process theory (Pearlin and Skaff, 1996) provides an interpretive framework illustrating how individuals exposed to identical stressors may be affected in different ways. Variability may emerge as some encounter primary (involuntary retirement) and secondary stressors (material and physical vulnerabilities), leading to poor mental health outcomes like loneliness. Differences also stem from variable coping

resources like social support and self-efficacy, which mitigate harmful stressor outcomes (Avison, 2016). Stress process theory postulates a potential role for secondary stressors (here, material and physical vulnerability) that reinforce adverse effects of primary stressors (involuntary retirement). It also highlights the importance of coping resources (social support, health efficacy, social efficacy and financial efficacy), which may be distributed unequally among involuntary retirees and affect levels of loneliness.

The secondary stressors of two vulnerabilities can be considered a result of the embodied social and institutional context, which has a multivalent concept and negative impact on the individual (Boni-Saenz, 2020). The concept of vulnerability explains that the degree to which an individual is vulnerable is shaped by inequalities in ageing (Schröder-Butterfill and Marianti, 2006). Although most people are at risk of reduced income with age, only some experience poverty. Those who contributed to a pension during their working life and retired voluntarily are much less exposed to a dramatic fall in their finances than those who mostly worked in part-time, insecure or informal employment and had involuntary retirement (Gunnarsson, 2002; Lambert *et al.*, 2019).

Even among those who experience income loss and involuntary retirement, not all experience poverty, as they may have coping strategies, including greater social support or self-efficacy. In this context, the vulnerability concept can explain the complexities and ambiguities found in real life, based on the different exposures, threats and coping resources of the individual (Schröder-Butterfill and Marianti, 2006). As women have fewer opportunities to gain necessary skills for success than men, they may have less self-efficacy (West *et al.*, 2002).

Involuntary retirement and loneliness

Later-life loneliness is a major risk factor for mortality and morbidity (Stephote *et al.*, 2013). In the United States of America (USA), an estimated 25–29 per cent of American adults aged 70 and older are lonely (Ong *et al.*, 2016). Being single, living alone, and having poorer physical and mental health are risk factors (Zebhauser *et al.*, 2015); while increased age and higher education are protective factors. Older adults are less distressed with the difficulty of the interpersonal relationship because they have less expectation with social relationship than young adults (Nikitin and Freund, 2018).

Involuntary retirement refers to a retirement transition with a lack of control over decision making with the transition perceived as forced rather than wanted (Szinovacz and Davey, 2005). Involuntary retirement has negative outcomes on late-life mental health, as unanticipated retirement reduces a sense of personal control (Calvo *et al.*, 2009). Evidence indicates that people who are forced to retire are at risk of long-lasting negative effects on their physical and mental health (Rhee *et al.*, 2016). Especially, involuntary retirement is known to be closely related to race/ethnicity and gender. For example, Black women were more likely than White women to view their retirement as forced, which might be due to poor health (Szinovacz and Davey, 2005).

Although a substantial amount of research has been conducted on the negative effect of involuntary retirement on physical and mental health (Van Solinge, 2007;

Dingemans and Henkens, 2014; Rhee *et al.*, 2016), little research has examined loneliness associated with involuntary retirement. One recent study (Shin, *et al.*, 2020), found that loneliness differed by the nature of retirement and that involuntary retirees reported more loneliness than voluntary retirees. However, the literature has yet to consider the role of the secondary stressor and coping resources in conditioning the relationship between involuntary retirement and loneliness.

In addition, gender is a crucial contextual aspect impacting retirement transition since women and men have distinct workplace attachments (Schulz and Binstock, 2008). In general, women have a higher proportion of irregular work and earn lower wages due to marriage or child-care duties (Moen, 1992; Blau and Winkler, 2017). Although women's participation has increased recently (Bishu and Headley, 2020), we would expect that men and women might have different experiences in terms of their mental health following involuntary retirements due to the difference in their employment history. The polarised economic condition between genders causes more mental health problems like depression with women's involuntary retirement transition (Park and Kang, 2016).

Material and physical vulnerability

Vulnerability – exposure to and difficulty coping with stress – is widely used in research and practice to understand age-related frailty (Virokannas *et al.*, 2020). Understanding later-year vulnerability may be challenging. The ageing process involves physical declines and changes in the relationship between individual factors and environmental influences in the material, physical, social and psychological domains (Grundy, 2006).

Like earlier studies (Bertoni *et al.*, 2018; Carr *et al.*, 2018), we focused on material difficulties and health problems as major later-year vulnerabilities. Retirees' material and health vulnerability is increasingly important given longer life expectancy and accompanying health-care costs correlated to increased disability in ageing and economic insecurity in retirement (Ellis *et al.*, 2014).

The abrupt, unplanned nature of involuntary retirement can cause financial difficulty and lead to poor mental and physical health (Rhee *et al.*, 2016). Since most retirees are at risk of reduced income, sufficient pre-retirement financial resources are essential to post-retirement economic security (Schröder-Butterfill and Marianti, 2006). Thus, involuntary retirees may face higher material vulnerability – unmet needs related to health-care, food and housing costs. Levy (2009) analysed the determinants of material hardships among adults aged 65 and older and found that 10 per cent of the sample reported material hardship (food or medications) at least once in 2006. Brown *et al.* (2019) explored the likely prevalence of material hardship in old age for individuals nearing retirement using a cohort analysis. Results showed that the more recent cohort is likely to have higher economic insecurity, particularly men.

Health vulnerability is key to life quality in ageing (Grundy, 2006). The number of chronic diseases, activities of daily living (ADLs) and instrumental activities of daily living (IADLs) are widely used to assess older adults' health vulnerability (Hajek and König, 2016). Although there is conflicting evidence of how retirement affects physical health (van der Heide *et al.*, 2013), involuntary retirees are more

likely to perceive post-retirement health declines compared to voluntary retirees. Involuntary retirees report poorer health conditions, more illnesses (Swan *et al.*, 1991) and more unhealthy behaviours than voluntary retirees (Henkens *et al.*, 2008).

Older adults' material and health vulnerability differs by gender. Women aged 65 and older have greater risks of material vulnerability due to lower average income and higher rates of living alone (Kang and Chung, 2017). In addition, older women are more at risk of disability in later life and live with functional limitations for longer periods (Carmel, 2019). These factors imply high risk for material and physical vulnerability among involuntarily retired females.

Coping resources

Social support

Social support, resources available within a social network, is an important determinant of later-life loneliness (Liu *et al.*, 2016). It has received significant attention for its mediating role in the relationship between life stress and mental health. Xie *et al.* (2018) found that social support mediated the relationship between ADLs and depressive symptoms among older adults in China. Blanch (2016) examined how social support mediates the relationship between perceived job control (skill utilisation and decision authority) and psychological stress among workers in Spain. Results suggest that effects of job control on working stress were fully mediated by social support from co-workers and supervisors.

Social support is more important, and higher, for women than for men (Rupert *et al.*, 2012). Furthermore, women have a stronger affiliation style than men, cultivating more attachments and wider social networks, since they require greater social support to maintain psychological health (Soman *et al.*, 2016). To date, there has been scant research identifying how involuntary retirement contributes to loneliness in older adults.

Self-efficacy

Self-efficacy, a stable sense of personal competence to deal with stressful situations, is a strong predictor of loneliness (Fry and Debats, 2002). Since self-efficacy underlies the motivational commitment to life satisfaction, its absence may enhance perceptions of impediments as insurmountable, thereby intensifying a sense of loneliness (Bandura, 1997). Perceptions of environmental control are linked closely to perceived self-efficacy (Welch and West, 1995).

Empirical studies consistently show the mediating role of self-efficacy in the relationship between life stress and mental health. For example, in the USA, Maciejewski *et al.* (2000) found that self-efficacy mediates approximately 40 per cent of the effect of stressful life events on depression among people who had previously been depressed. Schönfeld *et al.* (2016) examined the mediating role of self-efficacy in the relationship between daily stress and mental health in Germany, Russia and China. Findings indicated that in all samples, self-efficacy mediates effects of daily stressors on mental health.

Recent discussions of the components of self-efficacy suggest that self-efficacy has both global- and domain-specific features. Global self-efficacy is the belief in one's core competence to cope with stressful or challenging demands; domain-specific self-efficacy is limited to a particular task (Grether *et al.*, 2018). Our choice

of a domain-specific self-efficacy which may contribute to loneliness in later life is based on the previous research in self-efficacy.

Health efficacy, self-assurance in caring for one's own health, is a significant mediator in ageing (Thompson *et al.*, 2017).

Social efficacy refers to the perceived capabilities to develop and maintain social relationships and to manage socially stressful conditions (Bandura *et al.*, 2003). Social efficacy is known as an important mediator on the psychosocial outcomes (Caprara *et al.*, 2002). For example, Fiori *et al.* (2006) studied general and social efficacy as mediators of the association between social relations and depressive symptom of middle-aged (35–59) and older adults (60+). The result showed social efficacy partially mediated the association between social relations and depressive symptoms only among older adults while general self-efficacy partially mediated the association only for middle-aged adults. This result implies the importance of social efficacy as a mediator for the relationship between stressor and outcomes among the older adult population.

Financial efficacy, the perceived ability to perform economic or financial tasks, influences one's ability to improve financial decisions and behaviours. Financial efficacy's mediating role shapes the relationship between objective financial knowledge and saving behaviour among low-income families in Canada (Rothwell *et al.*, 2015).

Gender differences in self-efficacy are based on social expectations and personal accomplishment (Bandura, 1997). Lack of opportunity to practise particular skills can be related to gender stereotypes pertaining to abilities and career choices (Bandura, 1997). Women would be associated with lower self-efficacy than men because they have fewer opportunities or resources for success (West *et al.*, 2002). Overall, low self-efficacy in mental and physical skills could be prevalent among women (Doba *et al.*, 2016). However, research on self-efficacy, particularly domain-specific efficacy, and gendered experience as mediator among involuntary retirees has been lacking.

In sum, studies support possible relationships between involuntary retirement and loneliness through mediating variables: vulnerabilities, external coping resources and internal coping resources. No study has investigated gender differences in the mechanism from involuntary retirement to loneliness through secondary stressors and coping resources. However, gender differences might play a role since an explanatory mechanism regarding involuntary retirement's influence on loneliness might have different effects on men and women.

The present study

Using stress process theory, this study assumed the gender differences of direct and indirect mechanisms from involuntary retirement to loneliness through vulnerabilities (material, physical), external coping resources (social support) and internal coping resources (health efficacy, social efficacy, financial efficacy). We structured our research questions as follows:

- RQ1: Is involuntary retirement directly associated with loneliness?
- Hypothesis: Based on previous empirical research, we expect involuntary retirement to be directly associated with the high level of loneliness (Mechanism A).

- RQ2: To what extent is the mechanism between involuntary retirement and loneliness mediated by vulnerability (material, physical) and coping resources (social support, health efficacy, social efficacy, financial efficacy).
- Hypothesis: We expect involuntary retirement to be associated with high levels of vulnerability (material, physical) (Mechanisms B, C) and low levels of coping resources (social support, health efficacy, social efficacy, financial efficacy) (Mechanisms E, F, H), leading to high levels of loneliness (Mechanisms D, G, H).
- RQ3: How do these mechanisms differ depending on gender (male, female)?
- Hypothesis: We expect there are differences between men and women in these mechanisms.

Method

Data

Data came from the Health and Retirement Study (HRS), which is a nationally representative longitudinal ageing study that biennially surveys more than 37,000 adults aged 50 years and older and their spouses/partners in the USA (Sonnega *et al.*, 2014). We used data samples from respondents completing the psychosocial questionnaires in 2014 (N = 7,435). We excluded proxy respondents (N = 148), those 64 or younger (N = 3,065), those whose family members did not respond (N = 1,227) and partially retired respondents (N = 908). Our final sample was composed of 2,087 individuals. We conducted multiple imputation to address missing cases of social support (N = 26) and loneliness (N = 57). Since 65 is the age of full pension eligibility in the USA, our sample drew on adults aged 65 and older following the previous literature (Kim and Waldorf, 2019). Fifty-two per cent of older adults aged 65 and older relied on Social Security benefits for at least half of their family income, and 25 per cent of adults aged 65 and older were receiving 90 per cent or more of their family income from Social Security benefits in 2014 (Dushi *et al.*, 2017).

Measurements

Loneliness

Loneliness was measured with 11 questions from the revised UCLA Loneliness Scale. Sample questions were: 'How much of the time do you feel (a) you lack companionship, (b) left out, (c) isolated from others, (d) 'in tune' with the people around you, (e) alone, (f) you have people you can talk to?' Respondents scored their answers on a three-point scale (1 = often, 2 = some of the time, 3 = hardly ever and never). Four questions were reverse-coded and the average score ranged from 1 to 3. A higher score represents more loneliness.

Nature of retirement

Respondents who self-identified as fully retired were selected for the sample. They were asked: 'Thinking back to the time you retired, was that something you wanted to do or something you felt forced into?' This question was used to categorise the sample. *Wanted* was coded *voluntary retirement*; *forced into* was coded *involuntary*

retirement. Since this question was asked only of respondents who retired in the current wave, we merged the ‘nature of retirement’ responses from earlier waves with ‘nature of retirement’ responses in 2014.

Material vulnerability

Following the literature, material vulnerability is measured with three domains of health care, housing and food vulnerability (Alley *et al.*, 2009). Health-care vulnerability was assessed in two items. First, we identified participants with a high ratio of out-of-pocket health spending to income. Those with household incomes of less than 200 per cent of the federal poverty line were underinsured if out-of-pocket expenditures exceeded 5 per cent of household income (Schoen *et al.*, 2005). Higher-income participants were underinsured if out-of-pocket expenditures exceeded 10 per cent of household income. Out-of-pocket health expenditures are not covered by insurance (*e.g.* hospital, nursing home, doctor visits, dentist, outpatient surgery, monthly prescription drugs, home health care and special facilities). We classified participants as foregoing medications if they reported taking less medication than two years ago due to cost. We summed the two items and binary coded them as 1 if the score was 1 or over and 0 if the score was 0 with material vulnerability.

Housing vulnerability was assessed with four items. Participants who identified as renters are considered materially vulnerable; the literature shows that renters have poorer health than home-owners due to inferior housing conditions and neighbourhood environment (Baker *et al.*, 2020; Sung and Qiu, 2020). Participants who reported fair or poor-quality housing conditions were identified as housing vulnerable. Participants whose housing costs 30 per cent or more of monthly household income are housing vulnerable. Participants who reported fair or poor neighbourhood safety are housing vulnerable. We summed the four items and binary coded as 1 if the score is 1 or over and 0 if there is no reported housing vulnerability. As a final step, we created the material vulnerability measure by reporting health care, food and housing vulnerability on a scale of 0–3.

Food vulnerability was assessed with two items. Participants who answered *no* to the question, ‘In the last two years, have you always had enough money to buy the food you need?’ were food insufficient. Those who reported anyone in the household received government food stamps at any time during the past two years were recipients of public welfare. We summed the two items and binary coded them as 1 if the score was 1 or over and 0 if there was 0 score with food vulnerability.

Physical vulnerability

Physical vulnerability was assessed in three domains: number of chronic diseases, ADLs and IADLs. All participants were asked whether a physician had diagnosed them with any of a series of chronic health conditions (0–8) (*e.g.* high blood pressure, diabetes, cancer, lung diseases, heart disease). We coded responses 0 for no illness, 1 for one illness, and 2 for two illnesses or more. Participants’ ADL difficulty (0–6) was assessed and binary coded as 1 if they had any difficulty and 0 if they had no difficulty. Participants’ IADL difficulty (0–5) was assessed and binary coded as 1 if they had any difficulty and 0 if they had no difficulty. We summed the score of

chronic disease, ADL and IADL, and created a measure for physical vulnerability that ranged from 0 to 3.

Social support

The HRS evaluated positive social support through a set of questions that assessed the quality of interaction with social ties (Mendes de Leon *et al.*, 2009; Kim and Kawachi, 2017). Three questions were asked: 'How much do they really understand the way you feel about things?', 'How much can you rely on them if you have a serious problem?' and 'How much can you open up to them if you need to talk about your worries?' Respondents answered using a four-point scale (1 = a lot, 2 = some, 3 = a little, 4 = not at all) regarding the support received from spouses, children, family and friends. All items were reverse-coded and the mean score was generated.

Self-efficacy

Three single items measured the three self-efficacy domains of health, social life and finances (Lachman and Weaver, 1998). To measure health efficacy we asked: 'How would you rate the amount of control you have over your health these days?' We measured social efficacy with: 'How would you rate the amount of control you have over your social life these days?' We assessed financial efficacy by asking: 'How would you rate the amount of control you have over your financial situation these days?' Respondents answered using a 0–10 scale (0 = no control at all, 10 = very much control).

Covariates

Gender was assessed with a binary variable: male (0) and female (1). Race was binary coded as 0 (White) and 1 (non-White). We merged them into the non-White group because there was no statistical significance between Blacks and other races in regression analyses (Yang and Lee, 2010).

Marital status was also binary coded as 0 (other) and 1 (married or partnered). Age and education were measured in number of years.

Analytical strategy

Preliminary analyses included descriptive analysis; normality and correlation tests of the variables were conducted to understand the distribution of the main variables. The data analysis of the study used two-step structural equation modelling (SEM).

We used the structural model to examine mechanisms from involuntary retirement to loneliness through material vulnerability, physical vulnerability, social support, health efficacy, social efficacy and finance efficacy. We used goodness-of-fit test, Tucker–Lewis index (TLI), comparative fit index (CFI) and root mean square error of approximation (RMSEA) to assess the study model's model fit. Previous literature suggests that good model fit is indicated by TLI and CFI values of 0.90 or higher and RMSEA values no higher than 0.08 (Hu and Bentler, 1999). Full analysis tested a multiple mediation path model using AMOS in a multi-group framework to estimate coefficients of possible paths simultaneously after controlling for covariates.

Table 1. Gender differences of sample characteristics

	Total	Male	Female	Significance test
N	2,086	496	1,590	
<i>Mean values (SD) or percentages</i>				
Covariates:				
Age (65–98)	74.15 (7.00)	73.37 (6.9)	74.45 (7.3)	
Education (0–17 years)	13.08 (2.6)	13.11 (3.0)	13.07 (2.5)	
Marriage:				
Married or partnered	44.71	39.93	46.53	
Others	55.29	60.07	53.47	
Race/ethnicity:				
White	87.24	86.41	87.56	
Non-White	12.76	13.59	12.44	
Independent variable:				
Involuntary retirement	31.63	66.96	31.10	
Voluntary retirement	68.37	33.04	68.90	
Mediators:				
Vulnerability:				
Material vulnerability (0–3)	0.50 (0.7)	0.51 (0.7)	0.50 (0.7)	
Physical vulnerability (0–3)	1.04 (0.8)	1.01 (0.7)	1.05 (0.8)	
Social support (1–4)	3.04 (0.5)	2.88 (0.6)	3.10 (0.5)	–6.945***
Health efficacy (0–10)	7.15 (2.3)	7.18 (2.2)	7.11 (2.4)	
Social efficacy (0–10)	7.93 (2.2)	7.68 (2.3)	8.00 (2.2)	–2.205*
Financial efficacy (0–10)	7.65 (2.4)	7.56 (2.4)	7.68 (2.4)	
Dependent variable:				
Loneliness (1–3)	1.50 (0.4)	1.62 (0.5)	1.47 (0.4)	5.558***

Notes: All estimates are weighted using person-level analysis weights. SD: standard deviation.

Significance levels: * $p < 0.05$, *** $p < 0.001$.

We used multi-group path analysis to examine statistical significance differences in the structural model by comparing a baseline model with no constraints defined and a second model where all paths were constrained to be equal. A nested chi-square test was used.

To examine significance of specific effects of multiple mediators (vulnerability, social support, self-efficacy) on the path between involuntary retirement and loneliness, we used a phantom variable approach. Although most mediation studies using SEM programs cannot examine specific mechanisms of multiple mediators, the phantom model is suitable to examine the effect of multiple mediators without changing parameters and model fit statistics (Macho and Ledermann, 2011). Phantom models provide estimates and test specific mediating effects in the SEM

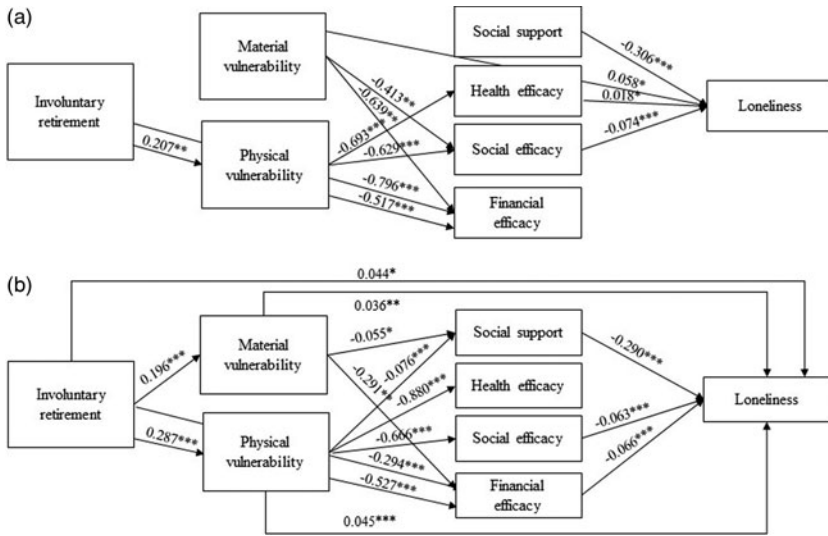


Figure 2. Structural model for (a) male retirees and (b) female retirees.
Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

program and contrast several parallel mediating paths; it examines which mediators are significant (Macho and Ledermann, 2011). With bootstrapping sampling, phantom variables were created to the original model to test the significance of indirect effects and confirm whether the mediating variables were statistically effective between involuntary retirement and loneliness. Phantom model results represent the specific effects of interest within the total effect. As the bootstrapping procedure requires no missing data, multiple imputation was used for the final analysis with IBM SPSS 24.0 and AMOS 24.0.

Results

Descriptive statistics

Table 1 presents descriptive statistics of key variables for the sample. The average sample age was 75.68 years and education was 12.54 years. Female retirees had significantly more social support (mean = 3.12) and social efficacy (mean = 7.96) than males. Loneliness was higher among male retirees (mean = 1.60) than females (mean = 1.48). No gender difference was shown across other variables.

Measurement and structural models

The exploratory model tested for the total retiree sample provided direct paths from involuntary retirement to loneliness; indirect paths from involuntary retirement to loneliness through material and physical vulnerability; and indirect paths from involuntary retirement to loneliness through material and physical vulnerability, social support and self-efficacy. The chi-square statistic, $\chi^2(5, N = 2,086) = 2.111$, $p = 0.834$, indicated that the hypothesised model statistically passed goodness-of-fit tests. Other measures indicated that the model had an acceptable fit to the data (RMSEA =

Table 2. Multiple mediator model examining the path from involuntary retirement to loneliness by gender

Mechanisms	Bootstrap estimate			95% CI	
	Estimate	SE	Significance	Lower	Upper
Male:					
Involuntary retirement → Physical vulnerability → Health efficacy → Loneliness (P1–P3)	−0.003	0.002	0.013	−0.008	0.000
Involuntary retirement → Physical vulnerability → Social efficacy → Loneliness (P4–P6)	0.010	0.004	0.002	0.003	0.021
Female:					
Involuntary retirement → Material vulnerability → Social support → Loneliness (P1–P3)	0.003	0.001	0.009	0.001	0.006
Involuntary retirement → Material vulnerability → Financial efficacy → Loneliness (P4–P6)	0.000	0.000	0.834	−0.001	0.001
Involuntary retirement → Material vulnerability → Loneliness (P7–P8)	0.007	0.003	0.005	0.002	0.014
Involuntary retirement → Physical vulnerability → Social support → Loneliness (P9–P11)	0.006	0.002	0.001	0.003	0.011
Involuntary retirement → Physical vulnerability → Social efficacy → Loneliness (P12–P14)	0.012	0.003	0.001	0.007	0.019
Involuntary retirement → Physical vulnerability → Financial efficacy → Loneliness (P15–P17)	0.000	0.001	0.861	−0.001	0.002
Involuntary retirement → Physical vulnerability → Loneliness (P18–P19)	0.012	0.004	0.001	0.005	0.023

Notes: P: abbreviation of each variable. CI: confidence interval. SE: standard error.

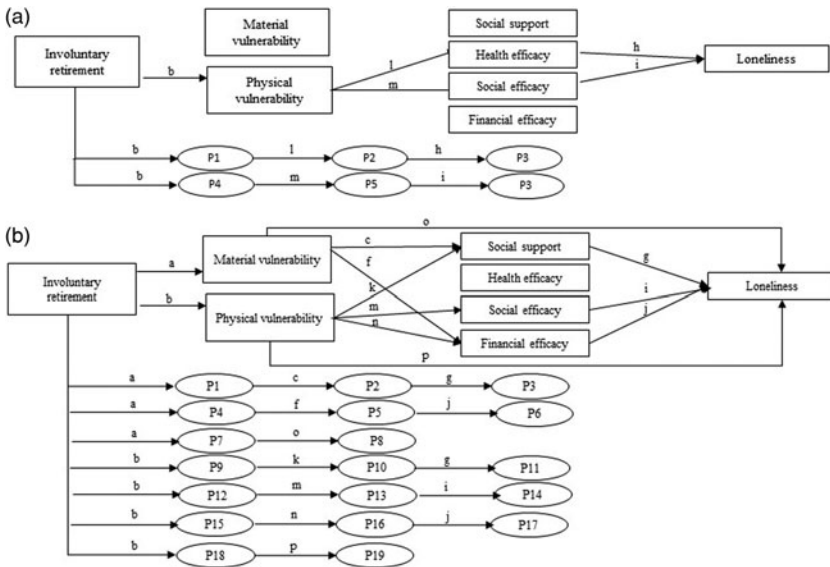


Figure 3. Phantom model for (a) male retirees and (b) female retirees.

Note: P: abbreviation of each variable. The letters 'a' to 'p' indicate the possible direct and indirect phantom paths in this model.

0.000, TLI = 1.01, CFI = 1.00). Nested model comparisons by gender suggested that the unconstrained structural model is statistically different ($\chi^2(44) = 69.011$, $p = 0.009$), supporting the hypothesis that paths (as a whole) differ across genders. Therefore, multi-group analysis was conducted separately for males and females.

Figure 2a depicts the structural model for male retirees and the significant indirect path for involuntary retirement. Involuntary retirement was significantly related to higher physical vulnerability ($b = 0.207$, $p = 0.004$), associated with low health efficacy ($b = -0.693$, $p = 0.000$) and lower loneliness ($b = 0.018$, $p = 0.037$), low social efficacy ($b = -0.629$, $p = 0.000$) and higher loneliness ($b = -0.074$, $p = 0.000$).

Among female retirees (Figure 2b), involuntary retirement was significantly directly associated with more loneliness ($b = 0.044$, $p = 0.017$). In addition, involuntary retirement was indirectly related to material vulnerability ($b = 0.196$, $p = 0.000$), which was associated with less social support ($b = -0.055$, $p = 0.004$) and more loneliness ($b = -0.290$, $p = 0.000$); less financial efficacy ($b = -0.291$, $p = 0.001$) and more loneliness ($b = -0.066$, $p = 0.000$); and high loneliness ($b = 0.036$, $p = 0.004$). Involuntary retirement among females was associated with physical vulnerability ($b = 0.287$, $p = 0.000$) which was associated with less social support ($b = -0.076$, $p = 0.000$) and more loneliness ($b = -0.290$, $p = 0.000$); low social efficacy ($b = -0.666$, $p = 0.000$) and more loneliness ($b = -0.063$, $p = 0.000$); less financial efficacy ($b = -0.527$, $p = 0.000$) and more loneliness ($b = -0.066$, $p = 0.000$); and more loneliness ($b = 0.041$, $p = 0.000$).

Specific indirect effects with phantom models

To evaluate the effects of mediation, we created a new phantom variable for each significant mediating variable in the structural model. This model assessed indirect

effects with bootstrapped confidence intervals and standard errors (Cole and Maxwell, 2003). All fit indices indicated the model had a good fit to the data (RMSEA = 0.039, TLI = 0.905, CFI = 0.938). Table 2 shows estimated effects with bootstrapped estimates, standard errors, significance and 95 per cent confidence intervals. Phantom analysis results proposed the path from involuntary retirement

Table 3. Direct effect, indirect effect and total effect of mechanisms by gender

Mechanisms	Unstandardised regression		
	Direct effect	Indirect effect	Total effect
Male:			
Involuntary retirement → Physical vulnerability	0.207	0.010	0.070
Physical vulnerability → Social efficacy	-0.629		
Social efficacy → Loneliness	-0.080		
Involuntary retirement → Physical vulnerability	0.207	-0.003	
Physical vulnerability → Health efficacy	-0.693		
Health efficacy → Loneliness	0.018		
Female:			
Involuntary retirement → Material vulnerability	0.196	0.003	0.101
Material vulnerability → Social support	-0.215		
Social support → Loneliness	0.041		
Involuntary retirement → Material vulnerability	0.196	0.007	
Material vulnerability → Loneliness	0.036		
Involuntary retirement → Physical vulnerability	0.287	0.006	
Physical vulnerability → Social support	-0.338		
Social support → Loneliness	-0.049		
Involuntary retirement → Physical vulnerability	0.287	0.012	
Physical vulnerability → Social efficacy	-0.666		
Social efficacy → Loneliness	-0.066		
Involuntary retirement → Physical vulnerability	0.287	0.012	
Physical vulnerability → Loneliness	0.042		
Involuntary retirement → Loneliness	0.044	0.057	

to loneliness mediated by physical vulnerability and social efficacy showed the largest indirect effect for male retirees (Figure 3a). For female retirees, the path from involuntary retirement to loneliness mediated by physical vulnerability and social efficacy and the path through material vulnerability showed the largest indirect effects. The path through material vulnerability showed the second largest effect in terms of indirect effect on loneliness (Figure 3b).

To summarise path coefficient and phantom analysis results, involuntary retirement does not directly affect loneliness among male retirees. However, involuntary retirement was significantly associated with higher loneliness mediated through physical vulnerability, health efficacy and social efficacy. For female retirees, involuntary retirement was directly associated with loneliness and also indirectly associated through internal and external coping resources. Involuntary retirement was associated with more loneliness through material vulnerability with low social support; material vulnerability; physical vulnerability with low social support; physical vulnerability with low social efficacy; and physical vulnerability (Table 3).

Discussion

Using the stress process theory and multi-group analysis in SEM approach, we investigated direct associations from involuntary retirement to loneliness and indirect associations through the secondary stressors (material and physical vulnerabilities) and coping resources (social support, health, social and financial efficacy) by gender. The empirical findings on the positive role of coping resources such as social support and social efficacy in reducing loneliness provide important evidence for the development of interventions to mitigate the adverse effects of involuntary retirement.

In RQ1, we expected to find an association between involuntary retirement and high loneliness. However, involuntary retirement directly affects loneliness only among female retirees. Despite higher overall loneliness scores among males in descriptive analysis results, the effects of involuntary retirement are significant only among female retirees. Retirement generally has stronger negative mental health outcomes for men, because men perceive work as their central life role and tend to have more continuous employment than women (Noh *et al.*, 2019). However, results showed that women's involuntary retirement is directly associated with loneliness given the combined risk of underpreparation for post-retirement living (Flippen and Tienda, 2000; Cahill *et al.*, 2013) and psychological characteristics that make women more vulnerable to negative life events and stress than men (Craig, 1996; Sheppard and Wallace, 2018). Results align with previous studies demonstrating that psychological stress from unexpected job loss causes female retirees more late-life disadvantage (Henkens *et al.*, 2008).

In RQ2, we expected to find that involuntary retirement is associated with high vulnerability (material and physical) and low coping resources (social support, health efficacy, social efficacy, financial efficacy), leading to high loneliness. Involuntary retirement was connected, in both genders, by the path of high physical vulnerability, low social efficacy and high loneliness. This result is supported by previous literature on involuntary retirement, health and social efficacy. Involuntary retirees report more physical problems than voluntary retirees (Herzog *et al.*, 1991; König *et al.*, 2019). Involuntary retirees with physical health

problems had greater loneliness due to the mediating role of social efficacy between stressful experience and reduced psychological wellbeing.

This result highlights the mediating roles of physical vulnerability and social efficacy by examining the holistic mechanism structures of multiple mediators in one research model. In the mechanism from involuntary retirement to physical vulnerability, low social efficacy and high loneliness are supported by literature studying the mediating role of self-efficacy. Our result contributes to better understanding of the mechanism which is associated with involuntary retirement and loneliness by providing the empirical role of specific domains in self-efficacy.

Diverse mechanisms to loneliness found in the female group suggest that female involuntary retirees are more vulnerable because they are materially and physically vulnerable. Females reported lack of pension benefits and elevated post-retirement poverty risk because of disadvantaged employment – including interrupted work histories, lower average incomes, and concentration in industries and occupations that tend to have lower pension benefits (Flippen and Tienda, 2000). We found that involuntary female retirees were more likely to report higher financial difficulty and declining health, and a lack of financial preparation for retirement. In addition, mechanisms from involuntary retirement to physical vulnerability are supported by previous findings that involuntary retirees are more likely to perceive post-retirement declines in health than voluntary retirees with more illnesses and unhealthy behaviours (König *et al.*, 2019).

There were notable gender differences in the indirect mechanisms from involuntary retirement to loneliness. The differences in the female model can be summarised in two categories: (a) the indirect paths from involuntary retirement to loneliness through secondary stressors (material and physical vulnerability) and (b) the indirect paths from involuntary retirement to loneliness through both secondary stressors (material vulnerability/physical vulnerability) and coping resources (social support/financial efficacy). The indirect paths from involuntary retirement to loneliness through the secondary stressors (material and physical vulnerability) were significant in the female model but not in the male model. The mechanisms can be understood by the fact that women's higher risk of financial insecurity in retirement was attributable to their pre-retirement work experiences, including disparities in earning, years of employment and Social Security earnings records (Hartmann and English, 2009). Qualitative research into the combined difficulty of involuntary retirement and secondary stressors should be considered in the future.

In addition, the indirect mechanisms from involuntary retirement to loneliness through secondary stressors (material vulnerability/physical vulnerability) and coping resources (social support/financial efficacy) among female retirees highlight the importance of the research findings. Previous literature found that loneliness is associated with the increased numbers of chronic stressors and fewer coping resources in times of stress (Hawkley *et al.*, 2008). Financial hardship among older adults is known to reduce the social support and relationship (Burris *et al.*, 2021). Our finding provides empirical evidence of the consecutive mechanisms between involuntary retirement and loneliness through material/physical vulnerability and social support/financial efficacy. Especially, when we consider both paths of (a) physical vulnerability and social efficacy and (b) the path with material

vulnerability had the largest indirect effect on loneliness, we can understand experiencing physical vulnerability and having a reduced social efficacy is similarly harmful to feeling lonely as experiencing material vulnerability for the female involuntary retirees. This might reflect the unique circumstance of involuntary female retirees that female retirees have fewer assets and investments for post-retirement compared to male counterparts (Kang and Chung, 2017) and older women have a high risk of having a disability and functional limitations in later life and live with functional limitations for longer periods (Carmel, 2019).

Among male retirees, the mechanism from involuntary retirement to loneliness mediated by physical vulnerability and social efficacy showed the relatively largest indirect effect for male retirees. Similar with female retirees, we found that the accumulated stresses of involuntary retirement and physical vulnerable decrease the social efficacy which increases the feeling of loneliness among male retirees.

In addition, the mechanism from involuntary retirement to loneliness mediated by physical vulnerability and health efficacy was significant. Specifically, males were associated with physical vulnerability, low health efficacy and low loneliness. Low health efficacy and low loneliness for males can be interpreted with the match condition between the real self and the ideal self. For example, physically vulnerable involuntary retirees with high health efficacy (high ideal self) may perceive gaps between their current condition and self – a condition creating emotional stress. Conversely, congruence between the actual (physically vulnerable) and ideal self (low health efficacy) should be associated with positive outcomes (low loneliness). Previous literature has shown that the condition of match between the real self and the ideal self is more important to males (Higgins, 1987), especially with job-related issues (Pietilä *et al.*, 2020). Furthermore, when we consider that physical vulnerability was the only significant secondary stressor connected to coping resources and loneliness for males, future interventions to reduce the physical vulnerability such as monitoring services and temporary treatment services for male retirees can be considered.

The findings of our study provide an important theoretical direction for future research. A large body of literature on stress has consistently shown that resources have a buffering effect (Lakey and Orehek, 2011) when adapting to adverse life events and transitions. By focusing on involuntary retirement, we empirically illuminated the theoretical proposal postulated in stress process theory with the complex association among the main effect between involuntary retirement as a primary stressor, material and physical vulnerability as a secondary stressor, and multiple factors as coping resources in the mechanism leading to loneliness. Further, the gender-specific findings of our study suggest an important direction for future research on a long-term mechanism to loneliness among retirees.

Many studies have found that later-year health and wellbeing is a dynamic and heterogeneous process that develops over the lifecourse and is embedded in the institution and culture within which older adults live (Elder and Shanahan, 2006). The mechanisms we found in the female involuntary retirees reiterate the disadvantages of women's work histories. Results align with previous literature for understanding women's cumulative disadvantages. Involuntary retirement and vulnerability (physical and material) highlight women's labour market adversity, which is perpetuated and magnified over the lifecourse (Crystal *et al.*, 1992).

Coping resources are known to be unevenly distributed by socio-economic status (George, 2011) and the influence of earlier life experiences accumulated over a life-course may lead to diverging trends of later-year health and wellbeing (Pearlin, 2010). These theoretical proposals point to important future research that can look into the mechanism linking from earlier life experiences leading up to the involuntary retirement and vulnerabilities in post-retirement to loneliness with an explicit focus on various coping resources.

This study may also inform the gender-specified interventions and policies that mitigate combined disadvantages with material/physical vulnerability and reduced coping resources among involuntarily retired older adults in the USA. In general, workplace policies encouraging companies to reduce involuntary retirement and involving workers in retirement planning may decrease involuntary retirement and consequent post-retirement loneliness. More specific workplace interventions should prevent involuntary retirement among those at risk of it (*e.g.* older adults who have less education, low income and health problems). Our findings point to the importance of social support for female involuntary retirees. Although previous literature suggests that older females have stronger social support and networks than their male counterparts in general (Pillemer and Holtzer, 2016), our results showed that female involuntary retirees with material and physical vulnerability had less social support. When we consider that social support has a huge influence on the quality of life of older adults (Umberson and Karas Montez, 2010), we can consider developing social support intervention programmes in the local community for involuntary retirees in the future. Besides the current retirement support programme of financial support through Social Security, we can consider an integrated support programme for involuntary retirees with the comprehensive format of financial support, physical health management services, social work programmes including social support, and financial education and counselling in post-retirement years. Especially, we can consider using the group programme with the combined types of networking programme and social support and financial efficacy for female retirees in the community.

Our study has several limitations. This study could not identify the reason for retirement since there was a lack of data on reasons for involuntary retirement. Future studies using the reason for retirement are needed to understand involuntary retirement better. In addition, while dichotomising retirement status into a parsimonious indicator (voluntary/involuntary), a refined examination could benefit from examining alternative forms of retirement and employment. Finally, the period after retirement was not considered in the study. Future studies which count the diverse retirement status and stage need to be conducted. Although previous employment history was not counted in this study, in general men and women have different employment trajectories over the course of a lifetime. For example, women are more likely to work part-time or take a break to care for their families than men (Tang and Burr, 2015; Lu *et al.*, 2017). As a result, this different previous employment history may impact on our outcomes for men and women in the current investigation. Future studies which count the diverse retirement status and period after retirement need to be conducted.

Limitations notwithstanding, our findings add to the growing literature on involuntary retirement by focusing on the gender-specific mechanism in the association between involuntary retirement and loneliness.

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