NETWORK LISER

Discussion Paper Series

IZA DP No. 18396 February 2026

Integration or Isolation? The Impact of Retirement on Social Capital

Kadir Atalay
University of Sydney

Anita Staneva
Griffith University

Rong Zhu
Flinders University and IZA@LISER

IZA NETWORK @ LISER
ISSN: 2365-9793

IZA DP No. 18396 February 2026

Integration or Isolation? The Impact of Retirement on Social Capital*

Abstract

This paper examines the causal impact of retirement on social capital using nationally representative Australian panel data. Exploiting the eligibility age for the Age Pension, we find that retirement significantly enhances social capital by increasing social connectedness and community involvement. These gains improve physical and mental health, with effects comparable to those of physical activity. However, older individuals' perceptions of social relationships remain unchanged. Our findings highlight a key policy trade-off: while raising the retirement age may boost labor force participation, it may reduce opportunities for meaningful social engagement and, in turn, undermine the health of older adults.

JEL classification

H55, I10, I31, J26

Keywords

retirement, social capital, hHealth, public pension

Corresponding author

Rong Zhu
rong.zhu@flinders.edu.au

* We are very grateful to the Coeditor (Michael Darden) and two anonymous referees for helpful comments and suggestions. This paper uses the restricted unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either DSS or the Melbourne Institute.

1 Introduction

Social capital, broadly defined as the networks, norms, and trust that foster cooperation and mutual support within and across communities, plays an important role in shaping a wide range of economic outcomes. At the individual level, greater social capital has been linked to labor market success (Munshi, 2003; Gee et al., 2017), upward economic mobility (Chetty et al., 2022), home ownership (Glaeser et al., 2002; Bailey et al., 2018), and social distancing behaviors during the COVID-19 pandemic (Bailey et al., 2024). At the aggregate level, social capital has been shown to improve access to credit and loan repayment (Karlan, 2005), support financial development (Guiso et al., 2004), foster innovation (Knack and Keefer, 1997), enhance productivity (Bloom et al., 2012), promote long-term economic growth (Algan and Cahuc, 2010; Ponzetto and Troiano, 2025), and reduce COVID-19 cases and excess mortality (Bartscher et al., 2021). Given the significant role of social capital, it is essential to understand the factors that contribute to its formation and development.

This paper examines the impact of retirement on elderly social capital, a widely recognized indicator of successful aging (Mendes de Leon, 2005; Heather et al., 2017). Research consistently shows that social capital among older adults is built through social networks, civic engagement, and interpersonal trust, all of which contribute to enhanced quality of life in later years (Ward et al., 2021; Lu et al., 2023). Retirement represents one of the most significant transitions in life, altering not only daily routines and financial priorities but also access to, and participation in, the networks, norms, and trust that constitute social capital. Yet, the effect of retirement on social capital is theoretically ambiguous. On the one hand, retirement may diminish social capital by disrupting established workplace connections, daily routines, and community engagement previously maintained through employment (Jahoda, 1981). Reduced income following retirement can further limit individuals' ability to participate in social and cultural activities, potentially weakening social ties and restricting opportunities for mutual support (Cappellari and Jenkins, 2007). On the other hand, retirement can enhance social capital by relieving individuals of work-related time constraints and stress. With greater discretionary time, retirees may become more involved in community activities, voluntary work, or informal social networks, thereby fostering new social relationships and connections (Morrow-Howell et al., 2001).

The impact of retirement on social capital is ultimately an empirical question. However, identifying a causal relationship is challenging due to issues such as self-selection into retirement and reverse causality.[1] Much of the sociology literature has focused on documenting associations rather than establishing causal effects. For example, Sabbath et al. (2015) find that retirement is associated with increased participation in social activities and a broader circle of friendships, while van den Bogaard et al. (2014) report that retirees become more engaged in volunteering and provide greater support to their adult children. In contrast, Lim-Soh and Lee (2023) show that retirees experience a decline in the frequency of meeting friends and attending gatherings. Results from the economics literature also show mixed evidence. Some studies suggest that retirement has minimal impact on the size of individuals' social networks (Fletcher, 2014; Comi et al., 2022) and their perceived social support (Kettlewell and Lam, 2022). Others, however, report a reduction in social network size following retirement (Börsch-Supan et al., 2014; Patacchini and Engelhardt, 2016). Additionally, retirement has been found to be positively linked to certain specific forms of social participation, such as active club membership (Atalay et al., 2019; Nguyen et al., 2020) and volunteering (Zhu, 2021; Eibich et al., 2022). These studies, however, often focus on a narrow set of social capital indicators, overlooking broader and potentially more sensitive dimensions, including civic and religious participation, informal interactions, social isolation, and generalized trust (Gannon and Roberts, 2020; Durante et al., 2025). Consequently, the current understanding of how retirement affects social capital remains partial and likely depends on the specific dimensions examined.

Using nationally representative panel data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, this paper estimates the causal impact of retirement on social capital among older adults. To address the limitations of social capital measures used in the existing literature, we distinguish between the *structural* and *cognitive* dimensions of social capital (Uphoff, 1999; Geraci et al., 2022). The structural dimension reflects observable behaviors related to social engagement, while the cognitive dimension captures subjective perceptions of social relationships, such as trust, reciprocity, and shared norms. Our primary measure focuses on the structural dimension of social

[1]For example, Lancee and Radl (2012) find that social connectedness influences the timing of the transition from work to retirement.

capital and is constructed from 12 behavior-related statements that provide comprehensive information on social connectedness and civic engagement. For comparison, we also consider a secondary measure representing the cognitive dimension, which is based on an index of social trust derived from responses to seven trust-related statements.

Exploiting the eligibility age for the Australian Age Pension, our fixed effects instrumental variable (FE–IV) analysis reveals that retirement increases structural social capital by approximately 0.5 standard deviations. We also find that structural social capital plays a mediating role in the health effects of retirement–particularly in accounting for the mental health gains–with a magnitude comparable to that of physical activity, a factor widely recognized for its health benefits. Furthermore, treating retirement as a cumulative process, we find that longer retirement duration causally enhances structural social capital. By distinguishing between bonding (close ties among similar individuals) and bridging (looser ties across diverse groups) dimensions of structural social capital, our results show that retirement fosters both dimensions. It enables retirees to strengthen existing close relationships while also expanding their social networks beyond their immediate social circles. In contrast, retirement status and duration have no significant impact on social trust, a measure of the cognitive dimension of social capital. As such, retirement primarily affects the behavioral rather than the perceptual aspects of social engagement.

We make three contributions to the existing literature. First, we adopt a multi-dimensional approach to social capital by examining both its structural and cognitive dimensions. Using a quasi-experimental research design, we provide causal evidence that entering retirement significantly enhances structural social capital, but has no effect on cognitive social capital. We also find that retirement increases both the bonding and bridging dimensions of structural social capital by fostering engagement with people both within and beyond one's immediate social circle. Our study thus contributes to the growing literature on the economic determinants of social capital, which has examined factors such as unemployment (Kunze and Suppa, 2017; Pohlan, 2019), broadband internet access (Bauernschuster et al., 2014; Geraci et al., 2022), corruption (Banerjee, 2016), and war and conflict (Guriev and Melnikov, 2016; Hoch et al., 2025).

Second, while previous research on retirement and social capital has focused almost exclusively on a binary indicator of retirement status, which reflects the discrete transition into retirement, we advance the literature by also analyzing the duration of retirement. This alternative measure captures the cumulative nature of the withdrawal from the labor market that involves gradual physical, emotional, and social adjustments over time (van Solinge, 2013; Ghilarducci and Webb, 2018). This distinction provides a more comprehensive understanding of how the influence of retirement on social capital evolves throughout later adulthood.

Finally, we offer novel evidence on the mediating role of social capital in the relationship between retirement and health.[2] While prior studies have focused primarily on the impact of retirement on health-promoting behaviors such as physical activity (Kampfen and Maurer, 2016), healthcare utilization (Zhang et al., 2018; Frimmel and Pruckner, 2020), and nutritional intake (Stephens and Toohey, 2025), social capital has been discussed occasionally as a potential pathway, but rarely measured or quantified directly. Xue et al. (2020) highlight that empirical research on the relationship between social capital and health remains limited within the economics literature. Their meta-analysis of studies from other disciplines concludes that "the majority of estimates in the social capital/health literature are statistically insignificant" and that "large sample sizes with high rates of statistical insignificance are indicative of small effect sizes" (p. 15). In contrast, our analysis demonstrates that within-person increases in structural social capital–causally induced by retirement–are linked to meaningful improvements in both physical and mental health among older adults. Cognitive social capital, by comparison, appears to play only a minimal mediating role. To our knowledge, this is the first study to quantify this relationship, offering new insights into the mechanisms through which retirement affects health outcomes. Our findings also align with Durante et al. (2025), emphasizing that social capital consists of multiple, distinct dimensions that are weakly correlated.

The rest of the paper is structured as follows. Section 2 provides an overview of the Australian Age Pension system. Section 3 describes the data and presents summary statistics, while Section 4 outlines the empirical strategy. Section 5 discusses the estimation results. Finally, Section 6 concludes.

[2]See Garrouste and Perdrix (2022) for a review of the literature on retirement and health.

2 The Australian Age Pension

Australian retirees typically rely on three main sources of income (Atalay and Barrett, 2015; Oguzoglu et al., 2020): (i) the publicly funded Age Pension; (ii) compulsory employer contributions to superannuation; and (iii) voluntary private savings. Since retirement is not mandatory in Australia, the financial incentives embedded in these income sources significantly influence individuals' decisions about when to retire. In this study, we focus on the government-funded Age Pension, which offers exogenous financial incentives that affect retirement behavior.

Established in 1908, the Australian Age Pension was designed to ensure that older adults enjoy an adequate standard of living in retirement. The Age Pension is the primary income source for most Australian retirees. Approximately 70% of older Australians meet the eligibility criteria to receive pension benefits, with about two-thirds of them qualifying for the full amount. This public pension take-up rate is the second highest among OECD countries (Raloston and Feng, 2017). In the 2024–2025 financial year, the maximum fortnightly payment was AU$1,051.30 for a single person and AU$1,585.00 for a couple.[3]

There are three main eligibility criteria for the Age Pension. First, applicants must have resided in Australia as a citizen or permanent resident for a minimum of ten years. Second, although pension benefits are not based on employment history, they are subject to means testing. That is, both eligibility and payment amounts depend on the applicant's income and assets. In the 2024–2025 financial year, full pensions are available only to individuals (couples) whose private income do not exceed AU$212 (AU$372) per fortnight. Pension payments are reduced by AU$0.50 for every dollar of income above this threshold. In addition, the assets test, which considers home ownership, also affects eligibility. For homeowners, assets must be below AU$314,000 for a single person and AU$470,000 for a couple to qualify for the full pension. For non-homeowners, these thresholds are AU$566,000 and AU$722,000, respectively. Pension payments are reduced by AU$3 per fortnight for every AU$1,000 of assets above the applicable threshold.

The final eligibility criterion is age. When the Age Pension was first introduced in 1908, both

[3]Further information about the Australian Age Pension is available on the Services Australia website: https://www.servicesaustralia.gov.au/age-pension.

men and women qualified at age 65. However, this threshold was lowered to 60 for women in 1910 and remained unchanged for the next 85 years. Beginning in July 1995, the eligibility age for women gradually increased by six months every two years, reaching parity with men at age 65 in 2013. This unified threshold continued for four years. Starting in July 2017, the eligibility age for both men and women began rising again, increasing by six months every two years until it reached 67 in July 2023.[4] Because the pension amount does not depend on the age at which it is first claimed, individuals have a financial incentive to retire at around their pensionable age. In this analysis, we will exploit the cohort-specific eligibility age for the Age Pension to examine the causal effect of retirement on social capital.

3 Data

3.1 The HILDA Survey

Our analysis draws on nationally representative panel data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, which began in 2001 and tracks over 17,000 individuals across more than 7,500 households annually. The HILDA Survey collects rich information on individual well-being, labor-market experiences, and family dynamics. We use the most recent "Restricted Release 23" version of HILDA, which includes data from 2001 to 2023 (Summerfield et al., 2024). This version provides both respondents' birth dates and interview dates, enabling us to calculate their exact age at each wave and, in turn, determine their age eligibility for the Age Pension.

We analyze data from waves 2006, 2010, 2014, 2018, and 2022 of the HILDA Survey that include variables about social capital. Three additional sample restrictions are applied. First, consistent with prior studies on retirement (Heller-Sahlgren, 2017; Apouey et al., 2019), we restrict the sample to individuals aged 50 to 75 years. Second, we exclude respondents who have not lived in Australia for at least ten years, as this is a requirement for Age Pension eligibility. Third, individuals with missing data on key variables are omitted. The final sample includes 4,340 men and 4,831 women,

[4] Appendix Table A1 presents the eligibility ages by gender and birth cohort.

corresponding to 11,007 and 12,429 person–year observations, respectively.

3.2 Variables and summary statistics

In the HILDA Survey, social capital is assessed through respondents' answers to 12 statements, each rated on a scale from 1 ("Never") to 6 ("Very often"). These statements are: (i) "Have telephone, email or mail contact with friends or relatives not living with you"; (ii) "Chat with your neighbours"; (iii) "Attend events that bring people together such as fetes, shows, festivals or other community events"; (iv) "Get involved in activities for a union, political party, or group that is for or against something"; (v) "Make time to attend services at a place of worship"; (vi) "Encourage others to get involved with a group that's trying to make a difference in the community"; (vii) "Talk about current affairs with friends, family or neighbours"; (viii) "Make time to keep in touch with friends"; (ix) "Volunteer your spare time to work on boards or organising committees of clubs, community groups or other non-profit organisations"; (x) "See members of your extended family (or relatives not living with you) in person"; (xi) "Get in touch with a local politician or councillor about issues that concern you"; and (xii) "Give money to charity if asked". These 12 items are behavior-related and thus primarily capture the *structural* dimension of social capital (Uphoff, 1999). We generate a composite social capital score by summing the responses to all 12 items, resulting in a total score ranging from 12 to 72, where higher scores reflect stronger structural social capital. This is also the main type of outcome variables analyzed in Bauernschuster et al. (2014), Kunze and Suppa (2017), and Geraci et al. (2022).

The HILDA Survey also provides information on the *cognitive* dimension of social capital. Unlike the structural dimension, which captures observable behaviors and social connections, cognitive social capital reflects the perceptions, beliefs, and values that shape how individuals engage within social networks and communities. In HILDA, this is measured through seven questions on social trust–a core component of cognitive social capital that is frequently used in the literature (Xue et al., 2020; Geraci et al., 2022). We present the results based on this trust-related measure in Section 5.5.

Our definition of retirement is based on the labor-force status reported in each wave of the HILDA

Survey. Following Rohwedder and Willis (2010), we define older adults who are out of the labor force as retired.[5]

Table 1 presents summary statistics broken down by gender and retirement status. The sample is nearly evenly split between men and women. Approximately 40% of male observations and 50% of female observations come from retirees. Retirees and non-retirees exhibit very similar levels of structural social capital.

The other variables shown in Table 1 will be used as control variables in this analysis. As expected, retirees tend to be older than non-retirees. About 63% of male retirees and 57% of female retirees meet the age criteria for the Age Pension, while these proportions are noticeably lower among non-retirees. On average, respondents have between 11 and 13 years of education, and most are either married or in a *de facto* relationship. The average household size ranges from two to three members, with non-retirees typically having slightly larger households. Finally, more than half of the observations are from individuals residing in major Australian cities.

4 Empirical strategy

To examine the relationship between retirement and social capital, we begin with the following fixed effects (FE) panel regression:

$$SC_{it} = Retired_{it}\beta + X'_{it}\gamma + \mu_i + \epsilon_{it}. \tag{1}$$

where SC_{it} represents the social capital of individual i at time t, and $Retired_{it}$ is a dummy variable indicating whether the individual is retired at that time. The control variables X_{it} include age, age squared, years of education, household size, and dummy variables for marital status, residence in a major city, state of residence, and wave of the HILDA Survey. The term μ_i captures the individual fixed effects, and ϵ_{it} is the error term. The inclusion of μ_i resolves any bias arising from a correlation between retirement status ($Retired_{it}$) and time-invariant unobserved heterogeneity.

[5] As a robustness check, we use an alternative definition in Section 5.6.2, classifying individuals as retired if they self-report being completely retired from paid work.

Table 1: Summary statistics

	All		Men		Women	
	Retired	Not retired	Retired	Not retired	Retired	Not retired
Structural social capital (range: 12–72)	37.44	37.21	35.93	35.95	38.50	38.57
	(8.91)	(8.49)	(8.79)	(8.47)	(8.84)	(8.31)
Age	66.05	58.13	66.71	58.38	65.58	57.86
	(6.57)	(5.60)	(6.33)	(5.71)	(6.69)	(5.46)
Age eligibility for the Age Pension	0.60	0.12	0.63	0.12	0.57	0.11
Years of education	11.60	12.72	11.88	12.68	11.40	12.76
	(2.35)	(2.33)	(2.36)	(2.26)	(2.33)	(2.41)
Marital status:						
Married or in a *de facto* relationship	0.69	0.76	0.74	0.82	0.65	0.69
Separated	0.03	0.04	0.04	0.03	0.03	0.05
Divorced	0.12	0.11	0.10	0.08	0.14	0.15
Widowed	0.10	0.03	0.04	0.01	0.13	0.05
Never married	0.06	0.06	0.08	0.06	0.05	0.07
Household size	2.08	2.53	2.12	2.63	2.04	2.41
	(1.00)	(1.19)	(1.03)	(1.25)	(0.98)	(1.12)
Living in a major city	0.55	0.61	0.53	0.60	0.56	0.62
Observations	10,634	12,802	4,377	6,630	6,257	6,172

Notes: Data from HILDA waves 2006, 2010, 2014, 2018, and 2022. Standard deviations are in parentheses.

However, the FE approach does not address endogeneity arising from reverse causality or from time-varying unobservables (ϵ_{it}) that are correlated with $Retired_{it}$. To mitigate these concerns, we employ a fixed effects instrumental variable (FE–IV) approach that exploits the discrete change in retirement probabilities at the pension eligibility age, in a way that is conceptually similar to a regression discontinuity (RD) design.[6] Our research design uses the first-pillar pension eligibility ages as instruments for retirement status: specifically, we construct indicators for the age thresholds at which economic incentives to retire increase sharply. In this framework, the discontinuities serve as instruments in a FE–IV model, with age determining the pension eligibility cutoffs. Identification relies on the assumption that SC_{it} is a continuous function of age, conditional on work status (Angrist and Pischke, 2009; Imbens and Wooldridge, 2009).[7] Mirroring the core logic of the RD estimator, our model focuses on within-individual variation over time by including individual fixed effects. While reaching these eligibility ages directly affects the probability of retirement, it is unlikely that age itself causes discontinuous changes in SC_{it} at these or other thresholds, conditional on labor-force status. Formally, we estimate the following equations:

$$Retired_{it} = Eligi_{it}\theta + X'_{it}\lambda + v_i + \varepsilon_{it}. \tag{2}$$

$$SC_{it} = \widehat{Retired}_{it}\beta + X'_{it}\gamma + \mu_i + \epsilon_{it}. \tag{3}$$

In the first-stage FE estimation of Equation (2), $Eligi_{it}$ is the instrument for retirement status ($Retired_{it}$). The instrument ($Eligi_{it}$) is a dummy variable indicating whether an individual has reached the age threshold for accessing the Age Pension: $Eligi_{it}{=}I(Age_{it}{\geq}EligiAge_{ct})$, where Age_{it} is the age of individual i at time t, $EligiAge_{ct}$ the eligibility age for birth cohort c (see Appendix Table A1), and I an indicator function.[8] In the second stage, the variable $Retired_{it}$ in Equation (3) is replaced by its

[6]Similar strategies have been used in the retirement–health literature; see, for example, Heller-Sahlgren (2017), Mazzonna and Peracchi (2017), Frimmel and Pruckner (2020), and Rose (2020). The FE–IV approach has also been employed in other HILDA-based studies including Atalay et al. (2020), Atalay and Barrett (2022), Zhu and Onur (2023), Nguyen et al. (2024), Akyol and Atalay (2025), and Cavoli et al. (2025).

[7]Appendix Figure A2 provides visual evidence supporting this assumption.

[8]Of the 4,340 men in the final sample, 1,761 (41%) were born before 01/07/1952 and thus were unaffected by the rise in pension eligibility age. The remaining 2,579 men (59%) were born later and face higher eligibility ages ranging from 65.5 to 67. Similarly, 238 (5%) of the 4,831 women were born before 01/07/1935 and were not subject to eligibility age changes; the remaining 4,593 women (95%) born on or after 01/07/1935 have higher retirement age thresholds between

predicted value $\widehat{Retired}_{it}$ from the first stage. Since $\widehat{Retired}_{it}$ is predicted using $Eligi_{it}$ and X_{it}, it is not correlated with unobserved factors in ϵ_{it}, so the estimated coefficient β in Equation (3) captures the causal effect of retirement on social capital. Standard errors are adjusted for clustering at the individual level to account for serial correlation in social capital across HILDA waves.

The FE–IV estimate of β in Equation (3) represents the local average treatment effect (LATE) for compliers, individuals whose retirement behavior is fully determined by pension-age eligibility, if $Eligi_{it}$ meets the following four conditions of (i) relevance, (ii) exclusion, (iii) independence, and (iv) monotonicity (Imbens and Angrist, 1994). Relevance requires a strong correlation between $Eligi_{it}$ and $Retired_{it}$, which is testable in the first stage of the FE–IV approach. The exclusion condition means that $Eligi_{it}$ affects social capital (SC_{it}) only through retirement status ($Retired_{it}$). Conditional on the smooth age trend, it is unlikely that retirement decisions triggered by specific pension ages shown in Appendix Table A1 coincide with other life events influencing social capital. Therefore, $Retired_{it}$ is plausibly the sole channel through which $Eligi_{it}$ causes within-person changes in SC_{it}. The independence assumption requires that the instrument be uncorrelated with potential outcomes, a condition that is plausible in our context, as $Eligi_{it}$ is determined only by birthdate and interview timing in each wave of HILDA. Finally, monotonicity requires that $Eligi_{it}$ influences $Retired_{it}$ in the same direction for all individuals; there are no defiers who retire before reaching pension age and then return to work after becoming eligible. While this assumption seems reasonable, it cannot be completely ruled out. Although the monotonicity assumption cannot be directly tested, the method of Mourifie and Wan (2017), applied in Section 5.6.5, allows for the joint testing of the exclusion, independence, and monotonicity assumptions. If all four conditions above are met, the estimate of β represents the local average treatment effect (LATE) of retirement on social capital for compliers–those who stay in the workforce until reaching pension eligibility age but retire upon becoming eligible.[9]

60.5 and 67.

[9]Because pension eligibility ages are known well in advance, individuals may adjust their labor supply or savings behavior in anticipation. Such anticipatory responses could weaken the first stage by smoothing the discontinuity at the eligibility threshold. Nevertheless, Appendix Figure A1 shows a discrete change in retirement behavior at the threshold, consistent with prior evidence (Atalay and Barrett, 2015; Geyer and Welteke, 2021). Anticipation may also threaten the exclusion restriction if expectations about future eligibility directly influence the outcome variable. We address these concerns by examining pre-trends in social capital around the eligibility age and by excluding cohorts proximate to

5 Results

This section presents the estimation results. Section 5.1 reports the estimated LATE of retirement status on structural social capital and analyzes the characteristics of the compliers for whom the LATE is identified. Section 5.2 discusses the economic implications of increased structural social capital post-retirement for the health outcomes of older adults. In Section 5.3, retirement is treated as a continuous state of workforce exit, and we examine how the duration of retirement affects social capital. Section 5.4 explores the effects of retirement on the bonding and bridging dimensions of structural social capital. In Section 5.5, we investigate the relationship between retirement and social trust, a widely used measure of the cognitive dimension of social capital. Finally, Section 5.6 presents the results from a series of robustness tests.

5.1 Retirement status and structural social capital

The FE–IV estimation results are reported in Table 2, which shows the causal impact of retirement on structural social capital.[10] For ease of interpretation, the measure of structural social capital has been standardized to have a mean of zero and a standard deviation of one. The first-stage results indicate that reaching the eligibility age for the Age Pension increases the likelihood of retirement by 14 percentage points in the full sample. Given that the average retirement rate among individuals within one year of reaching the pensionable age is 57%, this corresponds to a 25% increase in the retirement rate. When examined separately by gender, the estimated effect amounts to 16 percentage points (34% increase) for men and 12 percentage points (18% increase) for women. The F-statistics on the excluded instrument (161.73 for the full sample, 90.17 for men, and 65.65 for women) are far greater than the conventional threshold of 10 recommended by Staiger and Stock (1997). This delayed retirement response to increases in pension eligibility age is consistent with previous research on the effects of public pension policies on the labor supply of older adults (Behaghel and Blau, 2012; Atalay and Barrett, 2015; Lalive et al., 2023; Nakazawa, 2025).

reform announcements (see Section 5.6.4). Accordingly, we interpret our estimates as local effects for individuals whose retirement decisions respond to realized eligibility rather than to expectations.

[10] See full results in Appendix Table A2.

Table 2: The causal effects of retirement on structural social capital

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Retired				0.475***	0.398**	0.618***
				(0.123)	(0.159)	(0.204)
Age eligibility for the Age Pension	0.138***	0.157***	0.116***			
	(0.011)	(0.016)	(0.014)			
F-statistic on the instrument	161.73	90.17	65.65			
Observations	23,436	11,007	12,429	23,436	11,007	12,429
Individuals	9,171	4,340	4,831	9,171	4,340	4,831

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

The instrumented effects of retirement on structural social capital, shown in Table 2, are positive and statistically significant. Specifically, for the full sample, retirement results in an increase of approximately half a standard deviation in social capital.[11] For men and women, the corresponding effects are approximately 0.4 and 0.6 standard deviations, respectively. Together, these findings provide strong causal evidence that structural social capital increases in response to retirement. The magnitude aligns with prior evidence that retirement increases participation in volunteering and community organizations. For example, Eibich et al. (2022) report retirement effects on volunteering in Europe and the United States in the range of roughly 0.3–0.5 standard deviations, depending on the country and outcome margin. By contrast, adverse life events such as job loss or major health shocks generally reduce civic participation and perceived integration. For instance, Pohlan (2019) documents a decline of about 0.4 standard deviations in social integration one year after job loss. Taken together, these comparisons suggest that our estimated effect is sizeable yet plausible, reflecting gains on structural social capital for the older population we study.

It is important to note that our FE–IV estimates capture the local average treatment effect (LATE) for compliers, whose retirement decisions are induced by reaching the Age Pension eligibility age.[12] Accordingly, compliers are not necessarily representative of all older individuals in our sample. This naturally raises the question: who are the compliers? While we cannot identify them at the individual level, we can infer their proportion from the first-stage estimates in Table 2. Specifically, 14% of older individuals in our sample (16% of men and 12% of women) are classified as compliers–those who retire upon becoming age eligible for the Age Pension.

To gain insights into the characteristics of compliers, we apply the method outlined in Angrist and Pischke (2009, Chap. 4.4.4), which uses variation in first-stage estimates across binary covariate categories. Let $Retired_{1it}$ denote the retirement status of individual i at time t when the instrument $Eligi_{it}$=1 and $Retired_{0it}$ when $Eligi_{it}$=0. The relative likelihood that compliers possess a given

[11] Appendix Table A3 presents the results of the FE estimation of Equation (1). The estimated coefficients for retirement are all positive and statistically significant at the 5% level. Specifically, entering retirement is associated with a 0.07 standard deviation increase in social capital in the full sample. However, as discussed earlier, these FE estimates are not causal in nature and may be biased by factors such as reverse causality or time-varying unobservables.

[12] Since involuntary retirees, whose retirement behaviors are driven primarily by factors such as ill health, caring responsibilities, and redundancy, are unlikely to time their retirement around pension-age eligibility, the positive effect on social capital shown in Table 2 largely reflects the impact of voluntary retirement.

characteristic (denoted by x_{1it}=1) is given by $\frac{P[x_{1it}=1|Retired_{1it}>Retired_{0it}]}{P[x_{1it}=1]}=\frac{P[Retired_{1it}>Retired_{0it}|x_{1it}=1]}{P[Retired_{1it}>Retired_{0it}]}$, which is equal to

$$\frac{E[Retired_{it}|Eligi_{it}=1,x_{1it}=1]-E[Retired_{it}|Eligi_{it}=0,x_{1it}=1]}{E[Retired_{it}|Eligi_{it}=1]-E[Retired_{it}|Eligi_{it}=0]}. \tag{4}$$

This ratio compares the first-stage estimate of the instrument $Eligi_{it}$ within the subgroup x_{1it}=1 to that in the full sample. A ratio greater (smaller) than one indicates individuals with the characteristic x_{1it}=1 are over-represented (under-represented) among compliers.

We consider the following five binary individual characteristics: (i) education ("Less than university education" *vs.* "University education"); (ii) marital status ("Married or in a *de facto* relationship" *vs.* "Never married, separated, divorced, or widowed"); (iii) migrant status ("Immigrants" *vs.* "Natives"); (iv) receipt of government income-support payments ("Ever received" *vs.* "Never received"); and (v) Long-term health conditions ("No" *vs.* "Yes"). The estimated coefficients on the instrument ($Eligi_{it}$) from Equation (2) for each of these subgroups are presented in Panel A of Table 3. Following the method of Angrist and Pischke (2009, Chap. 4.4.4), we compute the ratio of each subgroup's estimated first-stage coefficient to that of the full sample. These ratios, shown in Panel B of Table 3, indicate the relative likelihood of being a complier.

Table 3 shows that older individuals with lower levels of education have a higher likelihood of being compliers, likely because those with university degrees are less dependent on the Age Pension for basic income support in later life. Compliers are also more likely to be unmarried and to be immigrants. In addition, they more frequently receive income-support payments from the Australian Government, which are typically means-tested and targeted towards lower-income individuals from disadvantaged backgrounds. Since the Age Pension is also means-tested, recipients of income support stand to gain more generous benefits and thus face stronger incentives to retire upon eligibility compared to individuals from higher socioeconomic status. Finally, individuals with no long-term health conditions have a higher propensity to be compliers, probably because those with long-term health problems tend to exit the labor force before reaching pensionable age. Taken together, individuals with these characteristics are more likely than the average older adult in our sample to comply with

Table 3: First-stage estimates by sub-sample and the relative likelihood of being a complier

	Panel A: First-stage estimates			Panel B: Complier likelihood		
	All	Men	Women	All	Men	Women
(i) Education:						
Less than university education	0.148***	0.176***	0.119***	1.074	1.122	1.025
University education	0.096***	0.093***	0.098***	0.694	0.595	0.842
(ii) Marital status:						
Married or in a *de facto* relationship	0.126***	0.145***	0.099***	0.914	0.923	0.858
Never married, separated, divorced, or widowed	0.164***	0.198***	0.147***	1.192	1.261	1.266
(iii) Migrant status:						
Immigrants	0.185***	0.243***	0.131***	1.342	1.551	1.134
Natives	0.121***	0.124***	0.112***	0.881	0.793	0.966
(iv) Receipt of government income-support payments:						
Ever received	0.170***	0.193***	0.145***	1.232	1.231	1.253
Never received	0.037**	0.049*	0.024	0.270	0.313	0.208
(v) Long-term health conditions:						
No	0.148***	0.162***	0.131***	1.075	1.037	1.127
Yes	0.088***	0.120***	0.056**	0.635	0.763	0.486

Notes: For the sub-sample first-stage estimates reported in Panel A, the control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. *** p<0.01; ** p<0.05; * p<0.10.

the pension-age threshold and, consequently, are more likely to experience increased structural social capital through voluntary retirement.

5.2 Economic implications of increased structural social capital post-retirement for physical and mental health

The empirical analysis in Section 5.1 demonstrates a clear positive impact of retirement on structural social capital. This finding may carry important implications for health outcomes of older individuals. To explore this further, we first examine whether within-person variation in structural social capital influences health among the elderly.

Our health measures are drawn from the 36-item Short Form Health Survey (SF-36), a widely used and validated instrument for assessing health status (Ware and Sherbourne, 1992; Jenkinson, 1998). Of the 36 items, 22 correspond to four dimensions of physical health: (i) "physical functioning", (ii) "role-physical", (iii) "bodily pain", and (iv) "general health"; the remaining 14 items relate to four mental health dimensions: (v) "social functioning", (vi) "role-emotional", (vii) "vitality", and (viii) "mental health". These eight dimensions capture the following aspects, respectively: (i) limitations to daily activities, (ii) limitations in work or activities caused by physical health, (iii) pain and limitations therefrom, (iv) health perception, (v) social limitations, (vi) limitation in work or activities due to emotional health, (vii) fatigue and energy, and (viii) feelings of anxiety and depression. Each wave of HILDA provides these dimensions in standardized form on a 0–100 scale, with a higher score indicating better health. For this analysis, we construct two summary indices: one for physical health (averaging the first four dimensions) and one for mental health (averaging the last four).[13]

We standardize these two health measures (SF-36 physical and mental) to have zero mean and unit standard deviation. We then perform fixed effects (FE) panel regressions of each health measure on the standardized index of structural social capital, controlling for the same covariates and using the same sample as in Table 2.[14] The estimates in Table 4 reveal a clear positive relationship between structural

[13] Summary statistics for the unstandardized physical and mental health measures, along with their component dimensions, are provided in Appendix Table A4.

[14] We exclude 611 observations due to missing health data, and a further 33 observations due to missing information on physical activity, which will be used in Table 5. Overall, the sample size decreases by 2.7%, resulting in a final sample of

social capital and the health of older adults. Specifically, a one standard deviation increase in the social capital index is associated with increases of 0.08 and 0.16 standard deviations in physical and mental health measures, respectively. These estimates are similar for men and women, with consistently larger effects estimated for mental health compared to physical health. Overall, our findings provide strong evidence that greater social capital in the structural dimension confers significant health benefits among the elderly.[15]

Table 4: Structural social capital and health

	SF-36 physical health	SF-36 mental health
Panel A: All		
Social capital	0.083***	0.161***
	(0.010)	(0.011)
Observations	22,792	22,792
Individuals	9,043	9,043
Panel B: Men		
Social capital	0.074***	0.141***
	(0.014)	(0.016)
Observations	10,715	10,715
Individuals	4,278	4,278
Panel C: Women		
Social capital	0.091***	0.180***
	(0.014)	(0.016)
Observations	12,077	12,077
Individuals	4,765	4,765

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Tables 2 and 4 together suggest that structural social capital may mediate the relationship between retirement and health among elderly people. To examine this formally, we conduct a direct mediation analysis. We begin by estimating the causal effects of retirement on health using the same sample

22,792 observations in Tables 6 and 7.

[15]This contrasts with the meta-analysis by Xue et al. (2020), which finds most estimates in the social capital–health literature to be statistically insignificant and small in magnitude. By contrast, our results align with those of Bartscher et al. (2021), demonstrating that increased social capital leads to fewer COVID-19 cases and lower excess deaths per capita, thereby highlighting the health benefits of enhancing social capital.

as in Table 4, employing age eligibility for the Age Pension as the instrument. The FE–IV results for physical and mental health are reported in columns (i) and (iv) of Table 5, respectively. We then include structural social capital as an additional control variable, with the corresponding results shown in columns (ii) and (v). The changes in the estimated retirement coefficients between columns (i) and (ii) for physical health, and between columns (iv) and (v) for mental health, reveal the mediating role of social capital in the relationship between retirement and health.

It should be noted that structural social capital, as a mediator, may itself be endogenous. If so, the mediation analysis reported in Table 5 should be interpreted as descriptive rather than causal, consistent with prior work (e.g., Cobb-Clark et al. 2022; Doyle 2024). A causal interpretation would require strong assumptions that are difficult to fully justify in our setting. These include: (i) no measurement error in the treatment (retirement), mediator (social capital), or outcomes (physical and mental health); (ii) no unmeasured confounding of the treatment–mediator, treatment–outcome, or mediator–outcome relationships; and (iii) no treatment-induced mediator–outcome confounding (that is, no variables affected by retirement that also influence both the mediator and health) (Huber, 2021; Doyle, 2024).[16] While our FE–IV strategy addresses confounding in the treatment–mediator and treatment–outcome links, it cannot fully eliminate unobserved factors jointly influencing the mediator and health. Accordingly, the mediation results should be viewed as exploratory and interpreted with caution. Nonetheless, the findings in Table 5 provide useful insights into the potential mechanisms linking retirement and health.

Columns (i) and (iv) of Table 5 indicate that retirement has a positive and comparable effect on both physical and mental health, with sizable effect magnitudes of roughly 0.5 standard deviations. The mediating role of structural social capital is examined in columns (ii) and (v), where it is added as an additional control variable. Comparing the estimates between columns (i) and (ii) for physical health and between columns (iv) and (v) for mental health suggests that increases in social capital account for approximately 7.5% of the improvement in physical health and 15.4% of the improvement in mental health following retirement. Thus, structural social capital appears to play a larger mediating

[16]Identifying causal path effects would require additional instruments for the mediators–specifically, instruments that shift the mediators independently of the treatment–along with further structural assumptions; see Frölich and Huber (2017).

role in the relationship between retirement and mental health than in that between retirement and physical health. The mediation effects are also more pronounced among women (9.2% and 19.5%) than among men (6.1% and 11.9%).

Are the mediating roles of structural social capital (7.5% and 15.4%) large in magnitude? To aid interpretation, we compare them with those of physical activity, a factor widely recognized for its health benefits. A substantial body of evidence links physical activity to improvements in both physical and mental health (see, e.g., Reiner et al., 2013; Rebar et al., 2015). Moreover, previous studies have shown that retirement leads to increases in physical activity (Insler, 2014; Kampfen and Maurer, 2016; Zhu, 2016). Taken together, this suggests that physical activity, like structural social capital, likely serves as a mediating mechanism in the relationship between retirement and health.[17]

In each wave of the HILDA Survey, respondents report how frequently they engage in physical activity, with response options including: (i) "Not at all"; (ii) "Less than once a week"; (iii) "1 to 3 times a week"; (iv) "3 times a week"; (v) "More than 3 times a week"; and (vi) "Every day". The distribution of these responses is 13.9%, 15.6%, 21.4%, 15.5%, 21.6%, and 12.1%, respectively. We standardize this physical activity measure to have zero mean and unit standard deviation, and include it as a control in the mediation analysis in columns (iii) and (vi) of Table 5. The results indicate that physical activity mediates 14.5% and 13.0% of the effects of retirement on physical and mental health, respectively.[18] The mediating roles of physical activity are stronger among women (17.0% and 16.0%) than among men (11.4% and 9.5%). Comparing the estimates across specifications suggests that physical activity plays a more substantial role in mediating the relationship between retirement and physical health, whereas structural social capital has a relatively greater mediating role in the relationship between retirement and mental health. This pattern holds consistently for both men and women.

[17] HILDA also collects data on drinking and smoking behaviors. However, using the same sample restrictions as in Table 4, we find little evidence that retirement leads to changes in these behaviors. In contrast, retirement increases the frequency of physical activity.

[18] In Table 5, the ordinal measure of physical activity is treated as if it were cardinal. This raises a question of whether it adequately captures the variation in activity frequency. To address this, we create a set of dummy variables for the six response categories and include them in the regressions. The resulting FE–IV estimates are highly consistent with those shown in columns (iii) and (vi) of Table 5.

Table 5: The mediating role of structural social capital in the effects of retirement on health

	SF-36 physical health			SF-36 mental health		
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Panel A: All						
Retired	0.496***	0.459***	0.424***	0.500***	0.423***	0.435***
	(0.138)	(0.138)	(0.135)	(0.145)	(0.144)	(0.142)
Social capital		0.072***			0.152***	
		(0.011)			(0.012)	
Physical activity			0.153***			0.140***
			(0.008)			(0.009)
Observations	22,792	22,792	22,792	22,792	22,792	22,792
Individuals	9,043	9,043	9,043	9,043	9,043	9,043
Panel B: Men						
Retired	0.458**	0.430**	0.406**	0.462***	0.407**	0.418**
	(0.180)	(0.180)	(0.176)	(0.175)	(0.174)	(0.172)
Social capital		0.066***			0.133***	
		(0.015)			(0.017)	
Physical activity			0.147***			0.125***
			(0.012)			(0.013)
Observations	10,715	10,715	10,715	10,715	10,715	10,715
Individuals	4,278	4,278	4,278	4,278	4,278	4,278
Panel C: Women						
Retired	0.553**	0.502**	0.459**	0.569**	0.458*	0.478*
	(0.224)	(0.225)	(0.217)	(0.249)	(0.248)	(0.245)
Social capital		0.077***			0.167***	
		(0.016)			(0.018)	
Physical activity			0.158***			0.154***
			(0.011)			(0.013)
Observations	12,077	12,077	12,077	12,077	12,077	12,077
Individuals	4,765	4,765	4,765	4,765	4,765	4,765

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

5.3 Retirement duration and structural social capital

The preceding analysis compared retired individuals with those who remained in the workforce. However, rather than representing a discrete lifestyle change, retirement can also be considered as a gradual process involving physical, emotional, and social adjustments over time (van Solinge, 2013; Ghilarducci and Webb, 2018). In this section, we analyze the impact of retirement duration. In HILDA, retired respondents report the age at which they retired ($RetireAge_{it}$), allowing us to define retirement duration as the time elapsed since that age: $RetireDura_{it}{=}Max\{Age_{it}{-}RetireAge_{it}, 0\}$. For those who have not yet retired, retirement duration is zero. Similarly, we define the duration since reaching Age Pension eligibility age as $EligiDura_{it}{=}Max\{Age_{it}{-}EligiAge_{ct}, 0\}$, where $EligiAge_{ct}$ is the eligibility age for individuals in birth cohort c.

We estimate the relationship between retirement duration and structural social capital using the FE–IV approach, specified as follows:

$$Log(RetireDura_{it} + 1) = Log(EligiDura_{it} + 1)\theta + X'_{it}\lambda + v_i + \varepsilon_{it}. \tag{5}$$

$$SC_{it} = Log(\widehat{RetireDura_{it}} + 1)\beta + X'_{it}\gamma + \mu_i + \epsilon_{it}. \tag{6}$$

In this specification, $Log(RetireDura_{it}{+}1)$ is instrumented using $Log(EligiDura_{it}{+}1)$. The logarithmic form in Equation (6) allows for a non-linear relationship between structural social capital and retirement duration, with a diminishing marginal effect over time.

Compared with our baseline specification described in Section 4, which instruments retirement status with Age Pension eligibility, the exclusion restriction for the retirement-duration specification (Equations (5) and (6)) is more demanding. It requires that years eligible for the Age Pension affect social capital only through years spent retired, with no direct effects operating through age-related, duration-related, or other life-cycle factors, once flexible age trends are accounted for. Appendix Figures A1 and A2 show that both the retirement rate and social capital vary smoothly with age, apart from a discrete change at the pension-eligibility threshold. This pattern is consistent with the identifying variation we exploit and supports the exclusion restriction. Accordingly, the effect of retirement duration is identified from the group of compliers who retire at the Age Pension eligibility threshold.[19]

The FE–IV estimation results for Equations (5) and (6) are presented in Table 6. The instrument exhibits strong explanatory power in the first stage: a 10% increase in the duration since reaching Age Pension eligibility is associated with a 2.4% increase in the duration of voluntary retirement. The second-stage results indicate that extended time spent in retirement significantly increases structural social capital.[20] In particular, a 10% increase in retirement duration results in an increase in structural social capital of approximately 0.03 standard deviations.[21] Overall, the main message from Table 6 is very clear: longer durations of voluntary retirement lead to greater structural social capital among older adults.

5.4 The effects of retirement on the bonding and bridging dimensions of structural social capital

Putnam (2000) distinguishes between two forms of structural social capital: bonding and bridging. Bonding social capital refers to the close-knit connections among people within a group, typically those who share strong relationships or similar characteristics. In contrast, bridging social capital includes weaker, more distant ties that link individuals across diverse social groups. It involves engagement

[19]As an alternative strategy, Gorry et al. (2018) exploit multiple institutional age shocks in the U.S. (e.g., early Social Security eligibility, normal retirement age, earnings-test changes) as separate instruments for retirement status. This elegant multi-cutoff design permits over-identification and allows the authors to examine phase-of-retirement contrasts (0–4 years vs 4+ years post-retirement). By contrast, Australia has a single pension-eligibility cutoff; our duration IV therefore uses time since eligibility as a continuous first stage. Consequently, the LATE in our setting remains anchored to the same threshold-complier group as in the status design, rather than a weighted average across multiple cutoffs for the same individual.

[20]Appendix Table A5 presents the results from the FE panel estimations of Equation (6). The association between retirement duration and structural social capital is statistically indistinguishable from zero for men. In contrast, a positive and statistically significant association is observed in both the full sample and the female subsample. However, the estimated associations are small in magnitude. In the full sample, a 10% increase in retirement duration is associated with only a 0.003 standard deviation rise in social capital.

[21]The log transformation applied to the duration variables in Table 6 imposes a concave relationship. For comparison, we have re-estimated Equations (5) and (6) using the linear forms of $RetireDura_{it}$ and $EligiDura_{it}$: the F-statistics on $Elidura_{it}$ in that specification are all smaller than the corresponding ones in Table 6, and notably, $EligiDura_{it}$ is a weak instrument for $RetireDura_{it}$ in the female subsample; the second-stage results are all small and statistically insignificant. Compared to the log transformation, the linear specification (i) reveals a weaker association between the two duration variables in the first stage and (ii) fails to detect a significant effect of retirement duration on structural social capital in the second stage. Therefore, the log-transformed specification used in Table 6 provides a better fit to the HILDA data.

Table 6: The causal effects of retirement duration on structural social capital

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Log retirement duration				0.278***	0.346***	0.242**
				(0.069)	(0.099)	(0.100)
Log duration of being age eligible for the Age Pension	0.235***	0.262***	0.210***			
	(0.018)	(0.025)	(0.024)			
F-statistic on the instrument	176.89	107.60	74.10			
Observations	23,436	11,007	12,429	23,436	11,007	12,429
Individuals	9,171	4,340	4,831	9,171	4,340	4,831

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

with people outside one's immediate social circle, fostering connections across different backgrounds, communities, or networks.

As discussed in Section 3.2, our measure of structural social capital is generated based on 12 behavior-related statements, which include: (i) "Have telephone, email or mail contact with friends or relatives not living with you"; (ii) "Chat with your neighbours"; (iii) "Attend events that bring people together such as fetes, shows, festivals or other community events"; (iv) "Get involved in activities for a union, political party, or group that is for or against something"; (v) "Make time to attend services at a place of worship"; (vi) "Encourage others to get involved with a group that's trying to make a difference in the community"; (vii) "Talk about current affairs with friends, family or neighbours"; (viii) "Make time to keep in touch with friends"; (ix) "Volunteer your spare time to work on boards or organising committees of clubs, community groups or other non-profit organisations"; (x) "See members of your extended family (or relatives not living with you) in person"; (xi) "Get in touch with a local politician or councillor about issues that concern you"; and (xii) "Give money to charity if asked". Of these, items (i), (ii), (v), (vii), (viii) and (x) correspond to bonding social capital, whereas items (iii), (iv), (vi), (ix), (xi) and (xi) pertain to bridging social capital. We construct composite scores for each type by summing the responses to the relevant items, resulting in two scores ranging from 6 to 36.[22] To facilitate interpretation, both indices are normalized to have a mean of zero and a standard deviation of one. We then estimate the same FE–IV regressions as in Tables 2 and 6, using these standardized measures of bonding and bridging social capital as the dependent variables.

The FE–IV coefficients for retirement status and duration are presented in Panels A and B of Table 7, respectively.[23] Overall, retirement exerts a positive and significant influence on both types of structural social capital among older adults.[24] In Panel A, becoming retired leads to increases of approximately 0.4 to 0.5 standard deviations in both bonding and bridging social capital. Panel B reports similarly positive effects, suggesting that, all else equal, older individuals tend to accumulate

[22]The pairwise correlation coefficient between the bonding and bridging measures is 0.55.

[23]The first-stage results are identical to those in Tables 2 and 6.

[24]Items (iv) and (xi) relate to political participation, a key focus of Campante et al. (2018). By summing and standardizing responses to these two items, we find that entering retirement leads to a 0.55 standard deviation increase in the political participation index among older women. The corresponding effect for older men is positive (0.12) but not statistically significant.

Table 7: The causal effects of retirement on bonding and bridging social capital

	Bonding social capital			Bridging social capital		
	All	Men	Women	All	Men	Women
Panel A:						
Retired	0.380***	0.300*	0.482**	0.454***	0.398**	0.602*
	(0.127)	(0.169)	(0.202)	(0.134)	(0.168)	(0.227)
Observations	23,436	11,007	12,429	23,436	11,007	12,429
Individuals	9,171	4,340	4,831	9,171	4,340	4,831
Panel B:						
Log retirement duration	0.187***	0.251**	0.139	0.300***	0.355***	0.283**
	(0.071)	(0.104)	(0.100)	(0.076)	(0.102)	(0.113)
Observations	23,436	11,007	12,429	23,436	11,007	12,429
Individuals	9,171	4,340	4,831	9,171	4,340	4,831

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

greater levels of both forms of structural social capital the longer they remain in retirement. Therefore, retirees not only reinforce ties within their close social networks but also broaden their engagement beyond immediate social circles, connecting with individuals from more diverse backgrounds.[25]

5.5 The effects of retirement on cognitive social capital

As noted earlier in Section 3.2, our main measure of social capital captures the structural dimension, which relates to individuals' behaviors. However, social capital also includes a cognitive dimension concerning individuals' perceptions of social relationships, with social trust being a commonly used measure (Uphoff, 1999; Xue et al., 2020; Geraci et al., 2022; Durante et al., 2025). For comparison, we investigate this dimension in this section.

In the 2006, 2010, 2014, 2018, and 2022 waves of HILDA, respondents were asked to indicate their level of agreement with seven trust-related statements on a seven-point scale ranging from 1 ("Strongly disagree") to 7 ("Strongly agree"): (i) "Most people would try to take advantage of you if they got a chance"; (ii) "Most people you meet keep their word"; (iii) "Most people you meet succeed by stepping on other people"; (iv) "Most people you meet make agreements honestly"; (v) "Most of the time people try to be helpful"; (vi) "People mostly look out for themselves"; and (vii) "Generally speaking, most people can be trusted". We reverse-code items (i), (iii) and (vi) and sum the responses to all seven items. The resulting score, ranging from 7 to 49, has a mean of 34.12 and a standard deviation of 6.92. We then standardize the score to have zero mean and unit standard deviation.[26]

Using this index of social trust as the dependent variable, we carry out the same FE–IV estimations as in Table 2. The results, presented in Panel A of Table 8, are statistically insignificant and substantially smaller in magnitude compared to those in Table 2. Thus, there is no statistical evidence that entering retirement has an effect on social trust.[27] We further examine the effect of retirement duration on social trust using the specification from Table 6. As reported in Panel B of Table 8, these causal estimates

[25]Both bonding and bridging social capital are positively and significantly correlated with physical and mental health. These two forms of social capital mediate the relationship between retirement and health outcomes, playing a comparable role in the case of physical health. However, bonding social capital accounts for a larger share of the positive effect of retirement on mental health.

[26]The correlation coefficient between the social trust index and our measure of structural social capital is 0.36.

[27]Consistent with these negligible and insignificant effects, social trust, as a measure of cognitive social capital, plays only a minimal role in mediating the impact of retirement on the physical and mental health of older adults.

Table 8: The causal effects of retirement on social trust

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Panel A:						
Retired				0.188	0.149	0.241
				(0.137)	(0.175)	(0.226)
Age eligibility for the Age Pension	0.138***	0.156***	0.117***			
	(0.011)	(0.017)	(0.014)			
F-statistic on the instrument	158.01	87.64	65.00			
Observations	23,140	10,893	12,247	23,140	10,893	12,247
Individuals	9,118	4,314	4,804	9,118	4,314	4,804
Panel B:						
Log retirement duration				0.027	0.054	–0.007
				(0.075)	(0.101)	(0.112)
Log duration of being age eligible for the Age Pension	0.235***	0.262***	0.210***			
	(0.018)	(0.025)	(0.024)			
F-statistic on the instrument	170.85	103.62	71.68			
Observations	23,140	10,893	12,247	23,140	10,893	12,247
Individuals	9,118	4,314	4,804	9,118	4,314	4,804

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

are also small and statistically insignificant.[28]

A comparison of the results in Tables 2 and 6 with those in Panels A and B of Table 8 suggests that both retirement status and duration exert a strong positive effect on structural social capital reflected by behaviors related to social connectedness and civic engagement, but have little impact on cognitive social capital, as measured by social trust. This finding aligns with recent studies such as Geraci et al. (2022) and Clark and Zhu (2024), which indicate that trust, as a socio-emotional skill, is relatively stable and less susceptible to change through life experiences. It also supports the conclusion of Durante et al. (2025) that social capital comprises distinct dimensions that are weakly correlated with one another.

5.6 Robustness checks

This section presents sensitivity analyses of our main findings on retirement and structural social capital by employing alternative measures of key variables, applying different sample restrictions, testing identifying assumptions, and estimating alternative model specifications.

5.6.1 Alternative measures of social capital

Our first sensitivity analysis examines the measurement of structural social capital. In Section 3.2, the social capital index was constructed by assigning equal weights to all 12 individual items. Here, we consider two alternative measures. The first is derived from a factor analysis of the 12 items and corresponds to the first latent factor, which is the only factor with an eigenvalue greater than one.

[28]The HILDA Survey (waves 2001–2023) includes a single-item measure of loneliness: "I often feel very lonely", rated on a seven-point scale from 1 ("Strongly disagree") to 7 ("Strongly agree"). We standardize this variable to have a mean of zero and a standard deviation of one, and use it as the dependent variable to examine the causal impact of retirement on loneliness. The FE–IV results, presented in Appendix Table A6, indicate that retirement lowers the loneliness index by 0.15 standard deviations in the full sample, a result that is statistically significant at the 10% level. The corresponding estimates are –0.11 for men and –0.23 for women, but neither is statistically significant. Overall, we find little evidence that retirement substantially affects feelings of loneliness. This may reflect the limited role of retirement in shaping social trust, our proxy for perceived social relationships. Consistent with this interpretation, previous research highlights that the quality of social connections predicts loneliness more strongly than their quantity. In a meta-analysis, Pinquart and Sorensen (2001) find that contact quality is a stronger predictor of loneliness than contact quantity. Similar findings are also reported in Cohen-Mansfield et al. (2016) and Norlin et al. (2025). Likewise, Wilson et al. (2025) find that social network size is unrelated to loneliness in older adults, whereas perceived relationship quality is. As Table 8 shows that older adults' perceptions of social relationships remain stable after retirement, their feelings of loneliness also tend to remain largely unchanged.

The second measure applies the generalized least squares index construction method proposed by Anderson (2008), which computes a standardized, inverse–covariance-weighted average of responses to all 12 items. Because highly correlated items receive less weight than uncorrelated ones, this weighting scheme maximizes the total information captured by the index. Using these two alternative measures as dependent variables, the second-stage estimates from the FE–IV regressions are reported in Appendix Table A7.[29] The findings confirm a positive causal effect of retirement on the structural social capital of older individuals.

5.6.2 An alternative measure of retirement

Here we examine the definition of retirement. In Section 3.2, individuals were classified as retired if they were not in the labor force. As an alternative, we follow Heller-Sahlgren (2017) to consider individuals to be retired if they self-report having completely retired from paid work. The FE–IV estimates in Appendix Table A8 continue to indicate that retirement increases structural social capital, with effect sizes comparable to those reported in Table 2.

5.6.3 Age range and specification

Our main analysis focuses on individuals aged 50–75. Some previous research on retirement has examined those aged 55–75 (Nguyen et al., 2020; Kettlewell and Lam, 2022) . As shown in Appendix Table A9, the results for this narrower age group are consistent with the main findings in Tables 2 and 6.

The next test concerns the specification of age. Our identification strategy relies on an age-related instrument. If the quadratic age specification in Equation (3) does not adequately capture the smooth age trend, the exclusion restriction might be violated. To alleviate this concern, we use third-order age polynomials for a more flexible modeling of the age trend. All retirement coefficients remain positive in the FE–IV estimations, though their precision decreases. In Equation (3), the inclusion of the cubic age term renders both age and age squared statistically insignificant; the cubic term itself is also not statistically significant. Therefore, the quadratic age specification appears sufficiently flexible

[29] The first-stage results are identical to those presented in Tables 2 and 6.

to capture the smooth relationship between age and structural social capital.

5.6.4 Addressing anticipation effects

As discussed in Section 3, it is plausible that older individuals begin adjusting their social participation and civic engagement even before formally entering retirement. If so, the estimated impact of retirement on structural social capital may be attenuated by anticipation effects. To examine this possibility, we analyze average social capital by normalized age (i.e., age minus eligibility age). Appendix Figure A2 shows that although social capital tends to rise as individuals become older, those one to two years from eligibility age exhibit similar levels of social capital to individuals three years away

To test this formally, we use the sample of individuals within ten years of their pension eligibility threshold and construct three binary indicators capturing whether an individual is 0–1, 1–2, or 2–3 years away from reaching pensionable age. We then regress standardized social capital on these indicators, controlling for normalized age, its square, and the additional covariates used in Table 2. By including a quadratic specification in normalized age, we account for the underlying age-related trend in social capital shown in Appendix Figure A2. If the three indicators were positive and statistically significant, this would suggest that social capital increases more than expected as individuals approach pensionable age, consistent with anticipation effects. However, the estimated coefficients are small and provide no evidence of any systematic change in social capital for individuals within 0–1, 1–2, or 2–3 years of pensionable age relative to those 3–10 years away (p-values of 0.48, 0.54, and 0.28, respectively). We also fail to reject the null hypothesis that the three coefficients are equal (p-value=0.88).[30] Overall, the evidence indicates that while social capital generally rises with age, it does not deviate from its existing trend as individuals near pension eligibility. Consequently, we find no evidence of anticipatory effects within three years of pension eligibility.

To further evaluate the robustness of these findings, we perform a sensitivity analysis by excluding from the sample those within one year of reaching pensionable age. The FE–IV estimates presented in Appendix Table A10 closely match those reported in Tables 2 and 6. Furthermore, Appendix

[30] In the test, the quadratic term in normalized age is not statistically significant and has little effect on the results. Excluding it from the specification yields p-values of 0.38, 0.59, and 0.21 for the three binary indicators, respectively. The p-value for a joint test of equality of the three coefficients is 0.87.

Table A11 demonstrates that the main conclusions remain unchanged even after excluding individuals within two years of eligibility for the pension.

5.6.5 Checking the LATE assumptions

Here we address the assumptions necessary for identifying the local average treatment effect (LATE). When the treatment and instrument (specifically, $Retired_{it}$ and $Eligi_{it}$) are both binary, the joint validity of the exclusion, independence, and monotonicity assumptions can be tested (Kitagawa, 2015; Mourifie and Wan, 2017). The implications of these LATE assumptions have been reformulated by Mourifie and Wan (2017) as two conditional moment inequalities that are testable using the intersection bounds framework developed by Chernozhukov et al. (2013, 2015). Importantly, the Mourifie and Wan (2017) method allows for the inclusion of multiple continuous covariates, which is crucial in our analysis because the validity of our age-related instrument relies on controlling for a smooth age trend. For the overall sample as well as for male and female subsamples, the Mourifie–Wan test does not reject the null hypothesis of the joint validity of the LATE assumptions at conventional significance levels (10%, 5%, and 1%). Since the relevance condition is supported by the first-stage FE–IV results, we conclude that pension-age eligibility is a valid instrumental variable for retirement.

5.6.6 Adjustment of the second-stage standard errors

Sections 5.1 and 5.3 relied on the first-stage F-statistic on the excluded instrument to assess instrument strength, using the conventional threshold of 10. However, Lee et al. (2022) demonstrate that this t-ratio-based inference generally overstates the strength of the instrument in the first stage and the precision of second-stage estimates. To address this, Lee et al. (2022) introduce the tF critical value function, which adjusts the standard errors of second-stage estimates as a smooth function of the first-stage F-statistic. Presuming worst-case endogeneity, at the 5% level of significance, an adjustment is necessary if the F-statistic on the instrument falls below 104.67. The first-stage F-statistics reported in Table 2 are 161.73 for the full sample, 90.17 for men, and 65.65 for women; those in Table 6 are 176.89, 107.60, and 74.10, respectively. Applying the tF adjustment, the standard errors of the second-stage estimates in Tables 2 and 6 increase by 0%, 1.7%, 5.4%, 0%, 0%, and 3.9%, respectively. All retirement coefficients remain statistically significant at the 5% level after the tF correction.

5.6.7 Complementary evidence from a fuzzy regression discontinuity design

As described in Section 2, we have exact information on the Age Pension eligibility ages. Attaining the eligibility age generates exogenous variation in individuals' financial incentives to retire. However, the increase in the likelihood of retiring at the eligibility age is less than 100%, as retirement is not mandatory in Australia. Here, we leverage this setting using a fuzzy regression discontinuity (RD) design. Following the notation in Section 4, we employ the following baseline RD specification suggested by Imbens and Lemieux (2008):

$$Retired_{it} = Eligi_{it}\theta + (Age_{it} - EligiAge_{ct})Eligi_{it}\delta + (Age_{it} - EligiAge_{ct})\eta + X_{it}'\lambda + v_i + \varepsilon_{it}. \quad (7)$$

$$SC_{it} = \widehat{Retired}_{it}\beta + (Age_{it} - EligiAge_{ct})Eligi_{it}\rho + (Age_{it} - EligiAge_{ct})\sigma + X_{it}'\gamma + \mu_i + \epsilon_{it}. \quad (8)$$

The treatment variable is retirement status ($Retired_{it}$), while the running variable is normalized age centered at the cohort-specific pensionable age (Age_{it}–$EligiAge_{ct}$), with the cutoff point set at zero. In Equation (7), the interaction term (Age_{it}–$EligiAge_{ct}$)$Eligi_{it}$ allows the relationship between $Retired_{it}$ and the running variable to differ on either side of the age threshold. Equation (8) models the trend of structural social capital (SC_{it}) with respect to (Age_{it}–$EligiAge_{ct}$), allowing a break in this trend at the cutoff. The covariates (X_{it}) in both equations include years of education, household size, and dummy variables for marital status, living in a major city, state of residence, and wave of the HILDA Survey.

A key parameter in RD designs is the bandwidth, which determines the range of observations around the cutoff point to be included in the analysis. Larger bandwidths include more observations, reducing variance but potentially increasing bias in the estimate, while smaller bandwidths have the opposite effect. We use the data-driven mean squared error (MSE) bandwidth selection method developed by Calonico et al. (2014, 2017), which recommends a bandwidth of 6.7 years. Equations (7) and (8) are estimated using FE–IV with standard errors adjusted for clustering at the individual level. This approach essentially implements a local linear regression with a rectangular kernel, as recommended in the literature (Imbens and Lemieux, 2008; Lee and Lemieux, 2010).

The validity of the RD strategy depends on three key assumptions. First, there must be a discontinuity in the probability of retirement at the cutoff point. Appendix Figure A1 plots the retirement rate against normalized age (Age_{it}–$EligiAge_{ct}$) and shows a discrete jump in retirement rates at the pensionable age. Second, the outcome variable is assumed to change smoothly with age around the cutoff. Since aging is a gradual process, this assumption seems reasonable. As such, any variation in structural social capital at the eligibility age is likely driven by retirement rather than age itself. Third, individuals must not be able to precisely manipulate the running variable (age). For each individual, age is calculated using exact birth and interview dates in HILDA, and there is little reason to believe that respondents systematically misreport their birth dates. According to Lee and Lemieux (2010), if this no-manipulation assumption holds, RD estimates should be robust to the inclusion of baseline covariates (X_{it}), which are expected to be balanced locally around the cutoff point. To verify this, we will compare regressions estimated with and without X_{it}.

Appendix Figure A2 presents graphical evidence on how the structural social capital of older individuals evolves with their normalized age. The figure reveals a clear discontinuous jump in structural social capital at the point when individuals become age eligible for the Age Pension.

The fuzzy RD estimates, obtained using the optimal bandwidth of 6.7 years, are presented in Panel A of Appendix Table A12. Retirement is found to increase structural social capital by 0.48 standard deviations. Furthermore, including or excluding the covariates (X_{it}) has minimal impact on the estimated retirement coefficients, thus supporting the no-manipulation assumption.[31]

[31] Appendix Table A13 presents the first-stage results of the RD estimation. Eligibility for the Age Pension increases the probability of retirement by approximately 11 percentage points, a magnitude closely aligned with the discrete jump in the retirement rate shown in Appendix Figure A1. This estimate is slightly smaller than the first-stage fixed-effects estimate of 14 percentage points reported in Table 2. Our main research design in Section 5.1 uses changes in retirement status between waves (four years apart), thereby capturing all individuals who transition into retirement at any point after crossing the eligibility threshold within that window. Because retirement responses are often gradual (e.g., phased exit, contract timing, or spouse coordination), this cumulative transition probability is naturally larger than the point-in-time discontinuity in retirement rates observed just below versus just above the eligibility cutoff. A second, related reason is that the two estimates rely on different windows and weighting schemes. The RD first stage is estimated using only observations within the MSE-optimal local bandwidth around the cutoff, whereas the FE–IV first stage is estimated using the broader analysis sample (ages 50–75). If retirement responses to eligibility are heterogeneous by age or cohort, these differences in effective windows and weights can generate modest differences in the estimated first stage.

To test the robustness of the baseline RD estimates, we also adopt an alternative RD specification suggested by Angrist and Pischke (2009, Chap. 6.2):

$$SC_{it} = Retired_{it}\beta + (Age_{it} - EligiAge_{ct})Retired_{it}\rho + (Age_{it} - EligiAge_{ct})\sigma + X'_{it}\gamma + \mu_i + \epsilon_{it}. \quad (9)$$

In this alternative specification, the slope of the relationship between SC_{it} and $Retired_{it}$ is allowed to vary on either side of the age threshold. Since both $Retired_{it}$ and $(Age_{it}–EligiAge_{ct})Retired_{it}$ are endogenous, we use $Eligi_{it}$ and $(Age_{it}–EligiAge_{ct})Eligi_{it}$ as instrumental variables. Panel B of Appendix Table A12 shows the results from this specification, using the same optimal bandwidth of 6.7 years. The positive retirement coefficients in Panels A and B of Table A12 closely resemble each other and align well with the estimate for the full sample reported in Table 2.

Lastly, we evaluate the robustness of our RD estimates obtained using the baseline specification by considering alternative bandwidths (4, 4.5, ..., 8.5, and 9 years). The corresponding RD estimates and their 95% confidence intervals are depicted in Appendix Figure A3. The estimated retirement coefficients remain stable across these alternative bandwidth choices and are consistent with both the FE–IV estimate for the full sample reported in Table 2 and the baseline RD estimate shown in Appendix Table A12.

6 Conclusion

This paper examines the empirical relationship between retirement and social capital among older adults, using nationally representative panel data from Australia. Our primary measure of social capital focuses on its structural dimension, emphasizing individuals' behaviors related to social connectedness and civic engagement. To identify the causal effects of retirement, we exploit variation in the cohort-specific eligibility age for the Australian Age Pension.

We first consider retirement as a distinct lifestyle transition. Our FE–IV estimates reveal that retirement leads to a positive and statistically significant increase in structural social capital for both older men and women. Specifically, retirement results in an increase of about half a standard deviation in social capital. Notably, this gain mediates around 7.5% and 15.4% of the positive effects of retirement on physical and mental health, respectively. Furthermore, compared to physical activity, while structural social capital plays a smaller mediating role in the relationship between retirement and physical health, it has a relatively stronger influence in explaining the mental health benefits of retirement. We subsequently treat retirement as a cumulative process, measured by the duration of labor market exit, we find that longer retirement duration causally enhances structural social capital among older adults.

Further, we distinguish between two key dimensions of structural social capital: bonding social capital, which refers to strong, close ties among individuals sharing similar characteristics, and bridging social capital, which encompasses weaker, more diffuse connections spanning diverse social groups. Our results suggest that retirement enhances both forms of social engagement: retirees strengthen close-knit relationships while also broadening their social networks by forming connections with individuals from more diverse backgrounds.

Finally, we examine social trust as a proxy for the cognitive dimension of social capital, reflecting individuals' perceptions of social relationships. We find no significant effect of either retirement status or retirement duration on social trust. This suggests that retirement primarily influences the structural dimension of social capital, which captures behavioral aspects of social engagement, whereas the cognitive dimension, representing subjective perceptions of social life, remains largely unaffected.

These findings should be interpreted within the broader context of global population aging and ongoing social security reforms in many countries. To ease fiscal pressures, many governments have increasingly raised the eligibility age for public pension benefits. While such reforms may extend working lives and improve pension system sustainability, they come with notable trade-offs. Older individuals who delay retirement in response to higher pension ages often experience declines in structural social capital. Given the strong and positive association between structural social capital and health outcomes, these policy changes, though helpful in promoting labor force participation, may have unintended adverse effects on the physical and mental health of older adults.

References

Akyol, P. and K. Atalay (2025). The intergenerational impact of pension reforms: How grandmothers' pension eligibility affects daughters' fertility. *Economics Letters 248*, 112239.

Algan, Y. and P. Cahuc (2010). Culture, institutions and the origins of trust. *Quarterly Journal of Economics 125*, 1091–1131.

Anderson, M. L. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects. *Journal of the American Statistical Association 103*, 1481–1495.

Angrist, J. and J. S. Pischke (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. New Jersey: Princeton University Press.

Apouey, B. H., C. Guven, and C. Senik (2019). Retirement and unexpected health shocks. *Economics & Human Biology 33*, 116–123.

Atalay, K. and G. F. Barrett (2015). The impact of Age Pension eligibility age on retirement and program dependence: Evidence from an Australian experiment. *Review of Economics and Statistics 97*, 71–87.

Atalay, K. and G. F. Barrett (2022). Retirement routes and the well-being of retirees. *Empirical Economics 63*, 2751–2784.

Atalay, K., G. F. Barrett, and A. Staneva (2019). The effect of retirement on elderly cognitive functioning. *Journal of Health Economics 66*, 37–53.

Atalay, K., G. F. Barrett, and A. Staneva (2020). The effect of retirement on home production: Evidence from Australia. *Review of Economics of the Household 18*, 117–139.

Bailey, M., R. Cao, T. Kuchler, and J. Stroebel (2018). The economic effects of social networks: Evidence from the housing market. *Journal of Political Economy 126*, 2224–2276.

Bailey, M., D. Johnston, M. Koenen, T. Kuchler, D. Russel, and J. Stroebel (2024). Social networks shape beliefs and behavior: Evidence from social distancing during the COVID-19 pandemic. *Journal of Political Economy Microeconomics 2*, 463–494.

Banerjee, R. (2016). Corruption, norm violation and decay in social capital. *Journal of Public Economics 137*, 14–27.

Bartscher, A. K., S. Seitz, S. Siegloch, M. Slotwinski, and N. Wehrhofer (2021). Social capital and the spread of covid-19: Insights from European countries. *Journal of Health Economics 80*, 102531.

Bauernschuster, S., O. Falck, and L. Woessmann (2014). Surfing alone? The internet and social capital: Evidence from an unforeseeable technological mistake. *Journal of Public Economics 117*, 73–89.

Behaghel, L. and D. M. Blau (2012). Framing social security reform: Behavioral responses to changes in the full retirement age. *American Economic Journal: Economic Policy 4*, 41–67.

Bloom, N., B. Eifert, A. Mahajan, D. McKenzie, and J. Roberts (2012). Does management matter? Evidence from India. *Quarterly Journal of Economics 128*, 1–51.

Börsch-Supan, A., M. Schuth, et al. (2014). Early retirement, mental health, and social networks. In D. A. Wise (Ed.), *Discoveries in the Economics of Aging*, pp. 225–250. University of Chicago Press.

Calonico, S., M. D. Cattaneo, M. H. Farrell, and R. Titiunik (2017). rdrobust: Software for regression-discontinuity designs. *Stata Journal 17*, 372–404.

Calonico, S., M. D. Cattaneo, and R. Titiunik (2014). Robust nonparametric confidence intervals for regression-discontinuity designs. *Econometrica 82*, 2295–2326.

Campante, F., R. Durante, and F. Sobbrio (2018). Politics 2.0: The multifaceted effect of broadband internet on political participation. *Journal of the European Economic Association 16*, 1094–1136.

Cappellari, L. and S. P. Jenkins (2007). Earnings and labour market volatility in Britain, with a transatlantic comparison. *Labour Economics 14*, 757–781.

Cavoli, T., R. Zhu, and I. Onur (2025). Retirement and weight stability: Panel evidence from Australia. *Economic Analysis and Policy 88*, 1670–1684.

Chernozhukov, V., W. Kim, S. Lee, and A. M. Rosen (2015). Implementing intersection bounds in Stata. *Stata Journal 15*, 21–44.

Chernozhukov, V., S. Lee, and A. M. Rosen (2013). Intersection bounds: Estimation and inference. *Econometrica 81*, 667–737.

Chetty, R., M. O. Jackson, T. Kuchler, J. Stroebel, N. Hendren, R. B. Fluegge, S. Gong, F. Gonzalez, A. Grondin, M. Jacob, D. Johnston, M. Koenen, E. Laguna-Muggenburg, F. Mudekereza, T. Rutter, N. Thor, W. Townsend, R. Zhang, M. Bailey, P. Barbera, M. Bhole, and N. Wernerfelt (2022). Social capital I: measurement and associations with economic mobility. *Nature 608*, 108–121.

Clark, A. E. and R. Zhu (2024). Taking back control? Quasi-experimental evidence on the impact of retirement on locus of control. *Economic Journal 134*, 1465–1493.

Cobb-Clark, D. A., S. C. Dahmann, and N. Kettlewell (2022). Depression, risk preferences, and risk-taking behavior. *Journal of Human Resources 57*, 1566–1604.

Cohen-Mansfield, J., H. Hazan, Y. Lerman, and V. Shalom (2016). Correlates and predictors of loneliness in older-adults: a review of quantitative results informed by qualitative insights. *International Psychogeriatrics 28*, 557–576.

Comi, S. L., E. Cottini, and C. Lucifora (2022). The effect of retirement on social relationships. *German Economic Review 23*, 275–299.

Doyle, O. (2024). Can early intervention have a sustained effect on human capital? *Journal of Human Resources 59*, 1599–1636.

Durante, R., N. Mastrorocco, L. Minale, and J. M. Snyder (2025). Unpacking social capital. *Economic Journal 135*, 773–807.

Eibich, P., A. Lorenti, and I. Mosca (2022). Does retirement affect voluntary work provision? Evidence from Europe and the U.S. *Labour Economics 76*, 102185.

Fletcher, J. M. (2014). Late life transitions and social networks: The case of retirement. *Economics Letters 125*, 459–462.

Frimmel, W. and G. J. Pruckner (2020). Retirement and healthcare utilization. *Journal of Public Economics 184*, 104146.

Frölich, M. and M. Huber (2017). Direct and indirect treatment effects: Causal chains and mediation analysis with instrumental variables. *Journal of the Royal Statistical Society: Series B (Statistical Methodology) 79*, 1645–1666.

Gannon, B. and J. Roberts (2020). Social capital: Exploring the theory and empirical divide. *Empirical Economics 58*, 899–919.

Garrouste, C. and E. Perdrix (2022). Is there a consensus on the health consequences of retirement? A literature review. *Journal of Economic Surveys 36*, 841–879.

Gee, L. K., J. Jones, and M. Burke (2017). Social networks and labor markets: How strong ties relate to job finding on Facebook's social network. *Journal of Labor Economics 35*, 485–518.

Geraci, A., M. Nardotto, T. Reggiani, and F. Sabatini (2022). Broadband internet and social capital. *Journal of Public Economics 206*, 104578.

Geyer, J. and C. Welteke (2021). Closing routes to retirement for women: How do they respond? *Journal of Human Resources 56*, 311–341.

Ghilarducci, T. and A. Webb (2018). The distribution of time in retirement: Evidence from the Health and Retirement Survey. *Work, Aging and Retirement 4*, 251–261.

Glaeser, E. L., D. Laibson, and B. Sacerdote (2002). An economic approach to social capital. *Economic Journal 112*, F437–F458.

Gorry, A., D. Gorry, and S. N. Slavov (2018). Does retirement improve health and life satisfaction? *Health Economics 27*, 2067–2086.

Guiso, L., P. Sapienza, and L. Zingales (2004). The role of social capital in financial development. *American Economic Review 94*, 526–556.

Guriev, S. and N. Melnikov (2016). War, inflation, and social capital. *American Economic Review 106*, 230–235.

Heather, D., G. Andrew, and W. Johanna (2017). Social participation as an indicator of successful aging: an overview of concepts and their associations with health. *Australian Health Review 41*, 455–462.

Heller-Sahlgren, G. (2017). Retirement blues. *Journal of Health Economics 54*, 66–78.

Hoch, G., A. Pondorfer, and V. Shkola (2025). Conflict and social capital: Evidence from the Russian War against Ukraine. *Journal of Comparative Economics 53*, 461–471.

Huber, M. (2021). Mediation analysis. In K. F. Zimmermann (Ed.), *Handbook of Labor, Human Resources and Population Economics*. Springer, Cham.

Imbens, G. W. and J. D. Angrist (1994). Identification and estimation of local average treatment effects. *Econometrica 62*, 467–475.

Imbens, G. W. and T. Lemieux (2008). Regression discontinuity designs: A guide to practice. *Journal of Econometrics 142*, 615–635.

Imbens, G. W. and J. M. Wooldridge (2009). Recent developments in the econometrics of program evaluation. *Journal of Economic Literature 47*, 5–86.

Insler, M. (2014). The health consequences of retirement. *Journal of Human Resources 49*, 195–233.

Jahoda, M. (1981). Work, employment, and unemployment: Values, theories, and approaches in social research. *American Psychologist 36*, 184–191.

Jenkinson, C. (1998). The SF-36 physical and mental health summary measures: An example of how to interpret scores. *Journal of Health Services Research & Policy 3*, 92–96.

Kampfen, F. and J. Maurer (2016). Time to burn (calories)? The impact of retirement on physical activity among mature Americans. *Journal of Health Economics 45*, 91–102.

Karlan, D. (2005). Using experimental economics to measure social capital and predict financial decisions. *American Economic Review 95*, 1688–1699.

Kettlewell, N. and J. Lam (2022). Retirement, social support and mental well-being: A couple-level analysis. *European Journal of Health Economics 23*, 511–535.

Kitagawa, T. (2015). A test for instrument validity. *Econometrica 83*, 2043–2063.

Knack, S. and P. Keefer (1997). Does social capital have an economic payoff? A cross-country investigation. *Quarterly Journal of Economics 112*, 1251–1288.

Kunze, L. and N. Suppa (2017). Bowling alone or bowling at all? The effect of unemployment on social participation. *Journal of Economic Behavior & Organization 133*, 213–235.

Lalive, R., A. Magesan, and S. Staubli (2023). How social security reform affects retirement and pension claiming. *American Economic Journal: Economic Policy 15*, 115–150.

Lancee, B. and J. Radl (2012). Social connectedness and the transition from work to retirement. *Journals of Gerontology: Series B 67*, 481–490.

Lee, D. S. and T. Lemieux (2010). Regression discontinuity designs in economics. *Journal of Economic Literature 48*, 281–355.

Lee, D. S., J. McCrary, M. J. Moreira, and J. Porter (2022). Valid t-ratio inference for IV. *American Economic Review 112*, 3260–3290.

Lim-Soh, J. W. and Y. Lee (2023). Social participation through the retirement transition: Differences by gender and employment status. *Research on Aging 45*, 47–59.

Lu, S., C. Chui, and T. Lum (2023). Promoting social capital for healthy aging: Towards an integrative framework. *The Gerontologist 63*, 628–636.

Mazzonna, F. and F. Peracchi (2017). Unhealthy retirement? *Journal of Human Resources 52*, 128–151.

Mendes de Leon, C. F. (2005). Social engagement and successful aging. *European Journal of Ageing 2*, 64–66.

Morrow-Howell, N., J. Hinterlong, M. Sherraden, and P. Rozario (2001). *Productive Aging: Concepts and Challenges*. Baltimore, MD: John Hopkins University Press.

Mourifie, I. and Y. Wan (2017). Testing local average treatment effect assumptions. *Review of Economics and Statistics 99*, 305–313.

Munshi, K. (2003). Networks in the modern economy: Mexican migrants in the U. S. labor market. *Quarterly Journal of Economics 118*, 549–599.

Nakazawa, N. (2025). The effects of increasing the eligibility age for public pension on individual labor supply: Evidence from Japan. *Journal of Human Resources 60*, 102–128.

Nguyen, H., F. Mitrou, C. Taylor, and S. Zubrick (2020). Does retirement lead to life satisfaction? Causal evidence from fixed effect instrumental variable models. Life Course Centre Working Paper No. 2020-10.

Nguyen, H. T., F. Mitrou, and S. R. Zubrick (2024). Retirement, housing mobility, downsizing and neighbourhood quality - a causal investigation. *Journal of Housing Economics 63*, 101977.

Norlin, J., K. J. McKee, C. Lennartsson, and L. Dahlberg (2025). Quantity and quality of social relationships and their associations with loneliness in older adults. *Aging & Mental Health 29*, 1198–1208.

Oguzoglu, U., C. Polidano, and H. Vu (2020). Impacts from delaying access to retirement benefits on welfare receipt and expenditure: Evidence from a natural experiment. *Economic Record 96*, 65–86.

Patacchini, E. and G. V. Engelhardt (2016). Work, retirement, and social networks at older ages. Center for Retirement Research (CRR) WP 2016-15, Boston College.

Pinquart, M. and S. Sorensen (2001). Influences on loneliness in older adults: A meta-analysis. *Basic and Applied Social Psychology 23*, 245–266.

Pohlan, L. (2019). Unemployment and social exclusion. *Journal of Economic Behavior & Organization 164*, 273–299.

Ponzetto, G. A. M. and U. A. Troiano (2025). Social capital, government expenditures, and growth. *Journal of the European Economic Association 23*, 632–681.

Putnam, R. (2000). *Bowling Alone: The Collapse and Revival of American Community*. Simon and Schuster, New York, NY.

Raloston, D. and J. Feng (2017). Towards a self-funded retirement: Will superannuation substitute for the Age Pension? *Australian Tax Forum 32*, 607–628.

Rebar, A. L., R. Stanton, D. Geard, C. Short, M. J. Duncan, and C. Vandelanotte (2015). A meta-meta-analysis of the effect of physical activity on depression and anxiety in non-clinical adult populations. *Health Psychology Review 9*, 366–378.

Reiner, M., C. Niermann, D. Jekauc, and A. Woll (2013). Long-term health benefits of physical activity – a systematic review of longitudinal studies. *BMC Public Health 13*, 813.

Rohwedder, S. and R. J. Willis (2010). Mental retirement. *Journal of Economic Perspectives 24*, 119–138.

Rose, L. (2020). Retirement and health: Evidence from England. *Journal of Health Economics 73*, 102352.

Sabbath, E. L., J. Lubben, M. Goldberg, M. Zins, and L. F. Berkman (2015). Social engagement across the retirement transition among 'young-old' adults in the French GAZEL cohort. *European Journal of Ageing 12*, 311–320.

Schwab, B., S. Janzen, N. P. Magnan, and W. M. Thompson (2020). Constructing a summary index using the standardized inverse-covariance weighted average of indicators. *Stata Journal 20*, 952–964.

Staiger, D. and J. H. Stock (1997). Instrumental variables regression with weak instruments. *Econometrica 65*, 557–586.

Stephens, Melvin, J. and D. Toohey (2025). Changes in nutrient intake at retirement. *American Economic Journal: Applied Economics 17*, 501–526.

Summerfield, M., B. Garrard, R. Kamath, N. Macalalad, M. Nesa, N. Watson, R. Wilkins, and M. Wooden (2024). *HILDA User Manual – Release 23*. Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

Uphoff, N. (1999). Understanding social capital: Learning from the analysis and experience of participation. In P. Dasgupta and I. Serageldin (Eds.), *Social Capital: A Multifaceted Perspective*. Oxford University Press.

van den Bogaard, L., K. Henkens, and M. Kalmijn (2014). So now what? Effects of retirement on civic engagement. *Ageing & Society 34*, 1170–1192.

van Solinge, H. (2013). Adjustment to retirement. In M. Wang (Ed.), *The Oxford Handbook of Retirement*, pp. 311–324. Oxford: Oxford University Press.

Ward, M., C. A. McGarrigle, D. Carey, and R. A. Kenny (2021). Social capital and quality of life among urban and rural older adults. quantitative findings from the Irish Longitudinal Study on Ageing. *Applied Research in Quality of Life 16*, 1399–1415.

Ware, J. E. and C. D. Sherbourne (1992). The MOS 36-Item Short-Form Health Survey (SF-36): I. conceptual framework and item selection. *Medical Care 30*, 473–483.

Wilson, S. V., S. Peng, and A. C. Krendl (2025). Perceived social support and relationship quality predict loneliness in older adults: a social network approach. *Aging & Mental Health 29*, 1632–1640.

Xue, X., W. R. Reed, and A. Menclova (2020). Social capital and health: a meta-analysis. *Journal of Health Economics 72*, 102317.

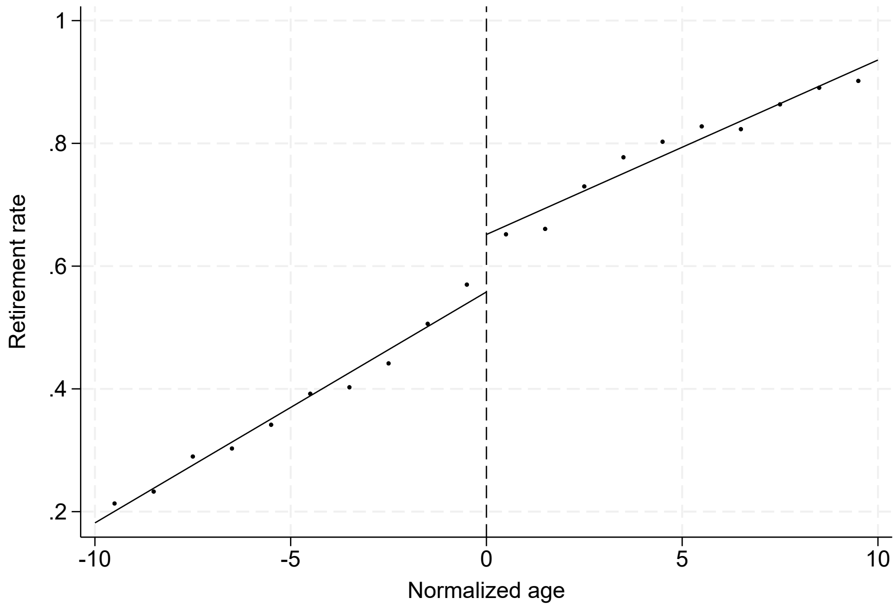
Zhang, Y., M. Salm, and A. van Soest (2018). The effect of retirement on healthcare utilization: Evidence from China. *Journal of Health Economics 62*, 165–177.

Zhu, R. (2016). Retirement and its consequences for women's health in Australia. *Social Science & Medicine 163*, 117–125.

Zhu, R. (2021). Retirement and voluntary work provision: Evidence from the Australian Age Pension reform. *Journal of Economic Behavior & Organization 190*, 674–690.

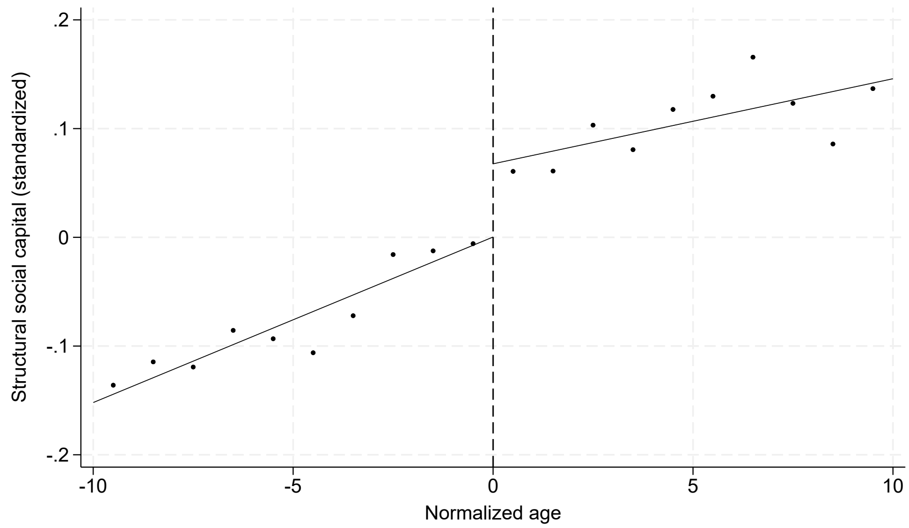
Zhu, R. and I. Onur (2023). Does retirement (really) increase informal caregiving? Quasi-experimental evidence from Australia. *Journal of Health Economics 87*, 102713.

Appendix



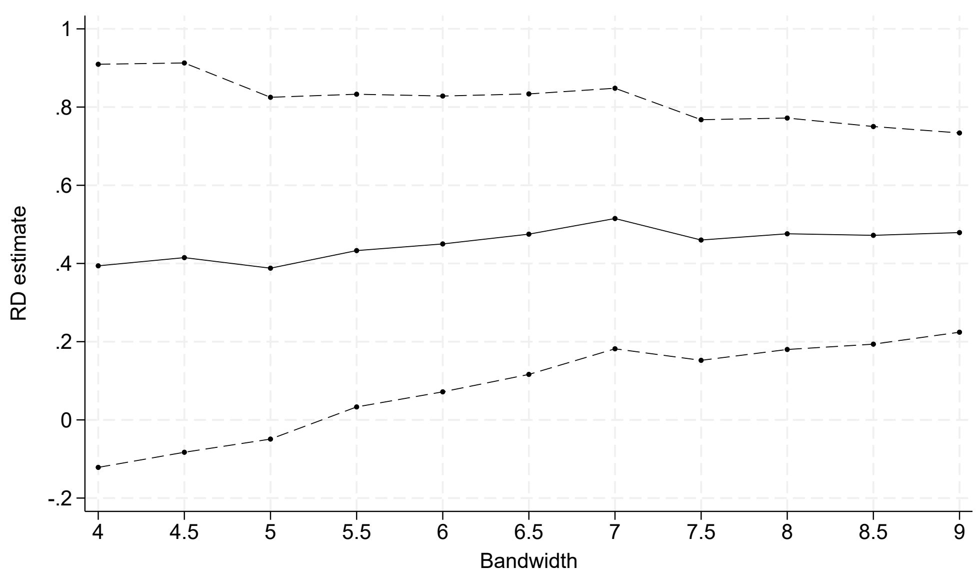
Notes: This figure shows the discrete change in the retirement rate before and after reaching eligibility for the Age Pension. As the eligibility age differs across birth cohorts, the running variable is normalized age, defined as the respondent's age (in days) minus the Age Pension eligibility age for the respondent's birth cohort (so that 0 denotes eligibility). The sample is restricted to respondents with normalized age in the interval [–10, +10]. Each point represents the mean retirement rate within one-year bins of normalized age. Solid lines are local linear RD fits estimated separately on each side of the cutoff. The figure is produced using the Stata command *rdplot* by Calonico et al. (2014).

Figure A1: Retirement rate by normalized age (centered at Age Pension eligibility age)



Notes: This figure shows the discrete change in structural social capital before and after reaching eligibility for the Age Pension. As the eligibility age differs across birth cohorts, the running variable is normalized age, defined as the respondent's age (in days) minus the Age Pension eligibility age for the respondent's birth cohort (so that 0 denotes eligibility). The sample is restricted to respondents with normalized age in the interval [–10, +10]. Each point represents the mean standardized social capital within one-year bins of normalized age. Solid lines are local linear RD fits estimated separately on each side of the cutoff. The figure is produced using the Stata command *rdplot* by Calonico et al. (2014).

Figure A2: Structural social capital by normalized age (centered at Age Pension eligibility age)



Notes: This figure presents RD estimates and their corresponding 95% confidence intervals across bandwidths ranging from 4 to 9 years (in 0.5-year increments). The estimates are obtained using the baseline specification in Equations (7) and (8).

Figure A3: RD estimates with corresponding 95% confidence intervals across varying bandwidths

Table A1: Eligibility age for the Age Pension

Birth cohort	Men		Women	
	Eligibility age	Date of change	Eligibility age	Date of change
Before 01/07/1935	65.0	10/06/1908	60.0	18/11/1910
01/07/1935–31/12/1936	65.0	10/06/1908	60.5	01/07/1995
01/01/1937–30/06/1938	65.0	10/06/1908	61.0	01/07/1997
01/07/1938–31/12/1939	65.0	10/06/1908	61.5	01/07/1999
01/01/1940–30/06/1941	65.0	10/06/1908	62.0	01/07/2001
01/07/1941–31/12/1942	65.0	10/06/1908	62.5	01/07/2003
01/01/1943–30/06/1944	65.0	10/06/1908	63.0	01/07/2005
01/07/1944–31/12/1945	65.0	10/06/1908	63.5	01/07/2007
01/01/1946–30/06/1947	65.0	10/06/1908	64.0	01/07/2009
01/07/1947–31/12/1948	65.0	10/06/1908	64.5	01/07/2011
01/01/1949–30/06/1952	65.0	10/06/1908	65.0	01/07/2013
01/07/1952–31/12/1953	65.5	01/07/2017	65.5	01/07/2017
01/01/1954–30/06/1955	66.0	01/07/2019	66.0	01/07/2019
01/07/1955–31/12/1956	66.5	01/07/2021	66.5	01/07/2021
01/01/1957 onwards	67.0	01/07/2023	67.0	01/07/2023

Table A2: Full results of Table 2

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Retired				0.475***	0.398**	0.618***
				(0.123)	(0.159)	(0.204)
Age eligibility for the Age Pension	0.138***	0.157***	0.116***			
	(0.011)	(0.016)	(0.014)			
Age	–0.033	–0.120**	0.039	–0.008	–0.016	–0.014
	(0.043)	(0.059)	(0.061)	(0.074)	(0.120)	(0.096)
Age squared/100	0.020***	0.050***	–0.007	–0.035***	–0.061***	–0.009
	(0.006)	(0.009)	(0.008)	(0.011)	(0.020)	(0.014)
Years of education	–0.008	0.006	–0.015	0.027	0.065**	0.009
	(0.014)	(0.025)	(0.016)	(0.021)	(0.031)	(0.030)
Marital status (reference: Never married):						
Married or in a *de facto* relationship	0.011	0.042	–0.019	0.179*	0.072	0.306***
	(0.048)	(0.065)	(0.075)	(0.101)	(0.154)	(0.117)
Separated	–0.004	0.094	–0.107	0.163	0.009	0.361***
	(0.054)	(0.072)	(0.082)	(0.111)	(0.167)	(0.134)
Divorced	–0.049	0.038	–0.118	0.122	–0.083	0.334**
	(0.054)	(0.075)	(0.081)	(0.109)	(0.166)	(0.130)
Widowed	–0.033	0.068	–0.072	0.178	0.084	0.310**
	(0.053)	(0.080)	(0.079)	(0.111)	(0.185)	(0.128)
Household size	0.002	–0.002	0.009	–0.038***	–0.033***	–0.046***
	(0.005)	(0.006)	(0.007)	(0.008)	(0.012)	(0.012)
Living in a major city	–0.066***	–0.066**	–0.061**	–0.033	–0.022	–0.045
	(0.018)	(0.026)	(0.026)	(0.032)	(0.048)	(0.044)
Dummies for state of residence	Yes	Yes	Yes	Yes	Yes	Yes
Dummies for wave of the HILDA Survey	Yes	Yes	Yes	Yes	Yes	Yes
F-statistic on the instrument	161.73	90.17	65.65			
Observations	23,436	11,007	12,429	23,436	11,007	12,429
Individuals	9,171	4,340	4,831	9,171	4,340	4,831

Notes: Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Table A3: Retirement and structural social capital

	All	Men	Women
Retired	0.067***	0.057**	0.081***
	(0.015)	(0.023)	(0.019)
Observations	23,436	11,007	12,429
Individuals	9,171	4,340	4,831

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Table A4: Summary statistics of SF-36 physical and mental health

	All		Men		Women	
	Retired	Not retired	Retired	Not retired	Retired	Not retired
SF-36 physical health (range: 0–100)	61.01	76.35	60.62	77.18	61.29	75.44
	(26.12)	(18.80)	(26.13)	(17.93)	(26.11)	(19.67)
Physical functioning (PF)	68.36	84.13	69.33	85.63	67.69	82.52
	(26.32)	(18.74)	(26.54)	(18.22)	(26.15)	(19.17)
Role-physical (RP)	58.25	81.27	57.08	82.75	59.06	79.68
	(44.24)	(33.32)	(44.24)	(32.05)	(44.22)	(34.57)
Bodily pain (BP)	59.30	71.52	60.01	72.67	58.80	70.28
	(26.34)	(21.66)	(26.22)	(21.21)	(26.42)	(22.07)
General health (GH)	58.14	68.46	56.06	67.69	60.60	69.29
	(23.69)	(19.27)	(23.63)	(18.68)	(23.62)	(19.85)
SF-36 mental health (range: 0–100)	69.67	78.03	70.14	79.51	69.34	76.43
	(23.63)	(17.17)	(23.83)	(16.26)	(23.49)	(17.96)
Social functioning (SF)	74.25	85.36	74.41	86.69	74.15	83.91
	(28.23)	(20.78)	(28.34)	(19.95)	(28.16)	(21.55)
Role-emotional (RE)	73.82	87.94	73.71	89.37	73.90	86.40
	(40.05)	(27.80)	(40.38)	(26.27)	(39.82)	(29.28)
Vitality (VT)	57.12	62.03	58.02	64.02	56.49	59.88
	(22.18)	(19.07)	(22.16)	(18.21)	(22.18)	(19.74)
Mental health (MH)	73.49	76.80	74.44	77.95	72.82	75.56
	(18.94)	(15.71)	(18.94)	(15.20)	(18.92)	(16.14)
Observations	10,243	12,549	4,207	6,508	6,036	6,041

Notes: Data from HILDA waves 2006, 2010, 2014, 2018, and 2022. Standard deviations are in parentheses.

Table A5: Retirement duration and structural social capital

	All	Men	Women
Log retirement duration	0.026***	–0.004	0.048***
	(0.010)	(0.015)	(0.012)
Observations	23,436	11,007	12,429
Individuals	9,171	4,340	4,831

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Table A6: The causal impact of retirement on loneliness

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Panel A:						
Retired				–0.147*	–0.108	–0.227
				(0.083)	(0.101)	(0.142)
Age eligibility for the Age Pension	0.144***	0.162***	0.121***			
	(0.007)	(0.011)	(0.010)			
F-statistic on the instrument	408.63	231.82	160.08			
Observations	104,852	49,377	55,475	104,852	49,377	55,475
Individuals	11,348	5,429	5,919	11,348	5,429	5,919
Panel B:						
Log retirement duration				–0.031	–0.039	–0.040
				(0.051)	(0.070)	(0.075)
Log duration of being age eligible for the Age Pension	0.232***	0.245***	0.214***			
	(0.013)	(0.018)	(0.019)			
F-statistic on the instrument	303.84	179.15	129.22			
Observations	104,852	49,377	55,475	104,852	49,377	55,475
Individuals	11,348	5,429	5,919	11,348	5,429	5,919

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city,state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Table A7: Alternative measures of structural social capital

	Latent-factor measure			Anderson (2008) summary index		
	All	Men	Women	All	Men	Women
Panel A:						
Retired	0.469***	0.364**	0.644***	0.465***	0.420***	0.570***
	(0.127)	(0.163)	(0.212)	(0.124)	(0.163)	(0.200)
Observations	23,436	11,007	12,429	23,436	11,007	12,429
Individuals	9,171	4,340	4,831	9,171	4,340	4,831
Panel B:						
Log retirement duration	0.295***	0.355***	0.268***	0.234***	0.321***	0.177*
	(0.072)	(0.102)	(0.103)	(0.070)	(0.101)	(0.099)
Observations	23,436	11,007	12,429	23,436	11,007	12,429
Individuals	9,171	4,340	4,831	9,171	4,340	4,831

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. The Anderson (2008) summary index is calculated using the Stata command *swindex* by Schwab et al. (2020). *** $p<0.01$; ** $p<0.05$; * $p<0.10$.

Table A8: Retirees as those who self-report having completely retired from paid work

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Retired completely (self-reported)				0.429***	0.377**	0.531***
				(0.111)	(0.151)	(0.174)
Age eligibility for the Age Pension	0.153***	0.165***	0.135***			
	(0.011)	(0.017)	(0.015)			
F-statistic on the instrument	191.08	99.77	82.91			
Observations	23,436	11,007	12,429	23,436	11,007	12,429
Individuals	9,171	4,340	4,831	9,171	4,340	4,831

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** $p<0.01$; ** $p<0.05$; * $p<0.10$.

Table A9: A narrowed age group of 55–75

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Panel A:						
Retired				0.479***	0.404**	0.643**
				(0.146)	(0.184)	(0.253)
Age eligibility for the Age Pension	0.120***	0.139***	0.097***			
	(0.011)	(0.017)	(0.015)			
F-statistic on the instrument	109.29	67.86	37.32			
Observations	18,111	8,494	9,617	18,111	8,494	9,617
Individuals	7,599	3,604	3,995	7,599	3,604	3,995
Panel B:						
Log retirement duration				0.285***	0.380***	0.237**
				(0.067)	(0.101)	(0.095)
Log duration of being age eligible for the Age Pension	0.247***	0.268***	0.223***			
	(0.018)	(0.026)	(0.024)			
F-statistic on the instrument	194.21	103.66	85.43			
Observations	18,111	8,494	9,617	18,111	8,494	9,617
Individuals	7,599	3,604	3,995	7,599	3,604	3,995

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** $p<0.01$; ** $p<0.05$; * $p<0.10$.

Table A10: Excluding individuals who are within one year of reaching pensionable age

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Panel A:						
Retired				0.456***	0.347**	0.616***
				(0.116)	(0.157)	(0.180)
Age eligibility for the Age Pension	0.157***	0.169***	0.142***			
	(0.012)	(0.017)	(0.016)			
F-statistic on the instrument	184.97	94.07	83.41			
Observations	22,613	10,634	11,979	22,613	10,634	11,979
Individuals	9,141	4,326	4,815	9,141	4,326	4,815
Panel B:						
Log retirement duration				0.307***	0.385***	0.278***
				(0.072)	(0.117)	(0.093)
Log duration of being age eligible for the Age Pension	0.263***	0.262***	0.261***			
	(0.020)	(0.029)	(0.028)			
F-statistic on the instrument	172.12	82.95	87.66			
Observations	22,613	10,634	11,979	22,613	10,634	11,979
Individuals	9,141	4,326	4,815	9,141	4,326	4,815

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Table A11: Excluding individuals who are within two years of reaching pensionable age

	First stage			Second stage		
	All	Men	Women	All	Men	Women
Panel A:						
Retired				0.422***	0.351**	0.541***
				(0.110)	(0.146)	(0.174)
Age eligibility for the Age Pension	0.176***	0.196***	0.154***			
	(0.013)	(0.019)	(0.017)			
F-statistic on the instrument	198.36	107.63	85.09			
Observations	21,864	10,247	11,617	21,864	10,247	11,617
Individuals	9,105	4,307	4,798	9,105	4,307	4,798
Panel B:						
Log retirement duration				0.312***	0.428***	0.255***
				(0.073)	(0.115)	(0.098)
Log duration of being age eligible for the Age Pension	0.288***	0.304***	0.273***			
	(0.023)	(0.033)	(0.031)			
F-statistic on the instrument	172.12	82.95	87.66			
Observations	21,864	10,247	11,617	21,864	10,247	11,617
Individuals	9,105	4,307	4,798	9,105	4,307	4,798

Notes: The control variables include age, age squared, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Table A12: Second-stage RD results (Equations (8) and (9))

	Panel A: Baseline specification		Panel B: Alternative specification	
	Including X_{it}	Excluding X_{it}	Including X_{it}	Excluding X_{it}
Retired	0.479***	0.481***	0.483***	0.467***
	(0.176)	(0.174)	(0.176)	(0.174)
Observations	16,030	16,030	16,030	16,030
Individuals	5,799	5,799	5,799	5,799

Notes: The bandwidth used is 6.7 years, selected using the data-driven bandwidth selection method developed by Calonico et al. (2014, 2017). The regressions in Panel A control for $(Age_{it}–EligiAge_{ct})$ and $(Age_{it}–EligiAge_{ct})Eligi_{it}$, and those in Panel B control for $(Age_{it}–EligiAge_{ct})$ and $(Age_{it}–EligiAge_{ct})Retired_{it}$. The baseline covariates (X_{it}) include years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.

Table A13: First-stage RD results (Equation (7))

	Including X_{it}	Excluding X_{it}
Age eligibility for the Age Pension	0.106***	0.108***
	(0.012)	(0.012)
F-statistic on the instrument	82.18	85.13
Observations	16,030	16,030
Individuals	5,799	5,799

Notes: The bandwidth used is 6.7 years, the same as in Appendix Table A12. The regressions control for (Age_{it}–$EligiAge_{ct}$), (Age_{it}–$EligiAge_{ct}$)$Retired_{it}$, years of education, household size, and dummies for marital status, living in a major city, state of residence, and wave of the HILDA Survey. Standard errors clustered at the individual level are reported in parentheses. *** p<0.01; ** p<0.05; * p<0.10.