Is it possible to extend the working lives of Brazilians? An analysis of inequalities in work capacity by educational level

Alexandre Oliveira Ribeiro, Cedeplar/UFMG, alexandreoliv.ribeiro@gmail.com

Bernardo Lanza Queiroz, Cedeplar/UFMG, bernardo.cedeplar@gmail.com

Andreea Beatrice Rusu, Cedeplar/UFMG, andreeab.rusu@gmail.com

Abstract:

Background: Brazil is currently facing the issue of rapid population aging, which is posing significant challenges to the sustainability of its national public pension program. Despite the increase in life expectancy, the elderly population's participation in the labor market remains limited. The Pension Reform (PEC 06-2019) aimed to address this issue by aligning retirement ages with life expectancy, but it failed to take into account the differences in health and physical job requirements based on educational levels, potentially impacting the work capacity of individuals.

Objective: This investigation aims to examine whether disparities in educational attainment impact the likelihood of Brazilians approaching retirement age to prolong their career, taking into account their self-reported work capacity.

Methods: The Brazilian Longitudinal Study of Aging (ELSI) was conducted between 2015 and 2016, and again between 2019 and 2021. Data from this study were analyzed using logistic regression to examine variations in work capacity based on educational level among individuals affiliated with the General Social Security System (RGPS) in Brazil. The analysis focused on individuals near both the old and new retirement ages, and was based on contribution length or age.

Result: It has been determined that individuals with lower levels of education are less likely to possess the requisite work capacity as they near retirement age. This deficiency in work capacity is likely to create significant difficulties for those with lower educational attainment in meeting the new retirement age requirements imposed by Pension Reform.

Contribution: This study makes a significant contribution to the existing literature by examining the potential for extending the working lives of Brazilians, with a particular focus on differential work capacities based on educational levels. The study conducts a comprehensive analysis of the new retirement ages introduced by the Pension Reform and utilizes a longitudinal database, providing valuable insights into the issue. Additionally, the study underscores the importance of addressing educational disparities when discussing policies related to retirement age and work capacity.

Introduction

The global population is undergoing a rapid aging process, including in Brazil, where the elderly population is growing and placing significant strain on retirement and social security systems. The working-age population in Brazil (15-64 years) is projected to decline from 2023 onwards, leading to an increase in social security expenses. This demographic shift has prompted many countries, including those in Latin America and the Caribbean, to consider raising the retirement age to maintain fiscal stability.

However, implementing such policies requires a comprehensive understanding of the labor market dynamics and health and educational levels of older adults. In Brazil, despite improvements in income equality and health, labor force participation has declined. This trend is observed globally and is partially attributed to social security systems that encourage early retirement.

In 2019, Brazil implemented the Social Security Reform, which increased the retirement age and altered contribution requirements. However, there is limited research on the impact of educational disparities on work capacity and the extension of working lives in this context. This study aims to address this gap by examining the influence of educational level on work capacity among Brazilians nearing retirement age.

Literature Review

The literature review reveals that the topic of the increasing retirement age has been extensively researched, particularly in OECD countries, and specifically addresses changes in National Retirement Age (NRA) and alterations in social security systems, as well as shifts in labor force participation among married women and educational levels (OECD). The review also highlights the critical impact of health on labor force participation among older adults, with health being a major driver of early retirement and a significant factor in decreased employment among individuals aged 50-70. Despite improvements in health conditions, labor force participation among older adults has not correspondingly increased globally or in Brazil. Several studies from developed countries have shown a decline in labor force participation even as health conditions improved.

It is imperative to consider the disparities in health outcomes based on socioeconomic factors, as highlighted by Waldron (2007), which found that mortality rates declined in both high and low-income groups in the United States, but at a slower rate in the latter group, potentially limiting their potential working life. Additionally, studies have revealed that health differentials by educational level can lead to work capacity inequalities (Castro et al., 2018; Dudel and Myrskyla, 2017; Blundell et al., 2017). Physical demands in various occupations also play a crucial role in the ability to work, particularly as physical capacity declines with age (Leijten et al., 2014; Hasselhorn and Apt, 2015). Manual labor jobs often require more physical effort and present challenges for older workers.

Given the complexities and heterogeneous nature of the Brazilian population, it is essential to examine whether individuals with different educational levels have equal opportunities to extend their working lives, as proposed by the Social Security Reform. With the recent approval of the Social Security Reform, assessing its impact on work capacity becomes imperative. To gain insights into the current scenario and prepare for future comparisons regarding the reform's effects, this review emphasizes the importance of using data from the

Longitudinal Study of Brazilian Elderly Health (ELSI) conducted in 2015-2016 and 2019-2021. This approach enables a comprehensive analysis of work capacity across age groups and educational levels, shedding light on the potential consequences of the reform on different segments of the Brazilian population. This research contributes to the literature by offering a nuanced perspective on the impact of retirement age changes in Brazil, considering factors such as health, education, and physical demands in various occupations.

This study utilized data from the Brazilian Longitudinal Study of Aging (ELSI), a cross-sectional survey representing the non-institutionalized Brazilian population aged 50 years and older. Conducted in 2015-2016 and 2019-2021, the sample was designed to reflect the national population in this age range. Given that the General Social Security System (RGPS) accounted for 82% of pension expenses in Brazil in 2017, the study focused on analyzing the health and work capacity of workers and retirees from this system. The objective of the study was to assess the potential extension of working life for Brazilians, thus including both workers and retirees in the analysis. The focus was on workers and retirees from RGPS, excluding rural workers, as the retirement ages for these individuals differ.

Data

This study utilized data from the Brazilian Longitudinal Study of Aging (ELSI), a household-based survey that represents the non-institutionalized population aged 50 years and older in Brazil. The data were collected in 2015-2016 and 2019-2021. Given that the General Social Security System (RGPS) accounted for 82% of pension expenses in the country in 2017 and that the majority of Brazilian workers are covered by it, the study focused on the health and work capacity of workers and retirees from this social security system. The objective of the study was to assess the potential extension of working life for Brazilians, which is why both workers and retirees were included in the analysis. The focus of the analysis was on workers and retirees from RGPS, with the exception of rural workers, whose retirement ages are different. The study only analyzed private sector workers and retirees who have worked or currently work in urban areas.

Method

The purpose of this study is to examine, using a formal tone, the impact of the Social Security Reform on the potential extension of working life for Brazilians nearing retirement age. Specifically, it aims to investigate whether there are differences by educational level in self-declared work capacity among individuals who are approaching retirement age under the General Social Security System (RGPS). This research is based on the premise that decreasing work capacity with advancing age, which is strongly related to health (Pérez, Wajnman, & Oliveira, 2006; Munnel & Libby, 2007; Santos, 2012; Camarano, Kanso, & Fernandes, 2014; Munnell, Sanzenbacher, & Rutledge, 2015; Castro et al., 2018; Castro et al., 2019), could be a barrier to extending working life. Additionally, the study seeks to explore whether differences in work capacity perceived at each educational level (Blundell et al., 2017; Dudel & Myrskyla, 2017; Castro et al., 2018; Konig, Lindwall, & Johansson, 2018) could also play a role. To achieve this, the research will investigate work capacity among Brazilian women and men at both the old and new retirement ages, comparing less educated individuals (4th grade of elementary school or less) with more educated individuals (completed high

school or higher) to determine whether there are any differences according to educational level.

The hypothesis proposes that individuals with lower levels of education (4th grade or less) have a decreased capacity to work, in comparison to those with higher levels of education (high school or higher), at both the previous and new retirement ages, regardless of whether the retirement is based on age or contributions.

Logistic Regression

Logistic regression is a statistical method used to model the relationship between a binary response variable and one or more predictor variables. It is a type of classification algorithm that is used to predict the probability of an event occurring based on the values of the predictor variables.

The logit function is used to transform the probability of success of the response variable into a logarithmic form. The logit function is given by $\text{logit}(p) = \ln(p/(1-p))$, where p is the probability of success. The covariates are incorporated into the model through a linear form, given by $\text{logit}(p) = \beta X$, where β is the coefficient vector associated with the covariate vector X.

The probability of success p is given by $p = P(Yi=1|X) = e\beta X/1 + e\beta X)$, where Yi is the binary response variable. The coefficients β are estimated through the maximum likelihood method, and their interpretation is given in terms of the odds ratio, which measures the relationship between the odds of success of an event given a certain condition and the odds of success of that event given another condition.

The logistic regression model used in this study can be represented by $WC = \beta0 + \beta1*PDW + \beta2*ND + \beta3*EDUC$, where WC is the work capacity, PDW represents the physical demands of the work performed in most of their lives, ND represents the number of current diseases or injuries and EDUC represents individuals' educational levels.

The response variable WC has two categories, which are "low work capacity" (responses "fair," "poor," and "very poor") and "high work capacity" (responses "good" and "very good"). The logistic regression model predicts the probability of the response variable being in the "high work capacity" category based on the values of the predictor variables.

PWC was categorized into two groups: (0) high effort — which includes jobs involving some physical effort (such as carrying heavy objects and using tools) or intense physical effort (such as carrying very heavy objects), and (1) low effort — which includes individuals who sat most of the time, stood or walked most of the time, or never worked.

EDUC includes respondents' educational level, which is categorized into two groups: (0) those who have completed up to the 4th grade and (1) those who have completed secondary education or higher.

The following diseases/injuries were considered for ND: hip or femur fracture, wrist or forearm fracture, chronic spinal problems (such as back pain, neck pain, lumbago, sciatica, vertebral or disc problems), arthritis or rheumatism, high blood pressure, angina pectoris, heart attack,

heart failure, emphysema, chronic bronchitis, or chronic obstructive pulmonary disease, asthma, depression, hearing impairment requiring a hearing aid, glaucoma, diabetic retinopathy, macular degeneration, cataracts in one or both eyes, stroke, Parkinson's disease, Alzheimer's disease, chronic kidney failure, cancer, and diabetes. These diseases were diagnosed by a physician.

Blundell et al. (2017) reported that health can be measured using both subjective and objective variables, and that subjective and objective health measures yield similar estimates if a sufficient number of objective measures are used. In this study, 22 diseases diagnosed by a doctor were used as objective measures. Additionally, the authors found that very close results were obtained even when using subjective health measures that were instrumentalized by objective measures.

EDUC includes respondents' educational level, which is categorized into two groups: (0) those who have completed up to the 4th grade and (1) those who have completed secondary education or higher.

The Pension Reform (Constitutional Amendment 103-2019) has introduced significant changes to the retirement age in Brazil. Prior to the reform, there was no minimum age for Retirement by Contribution Period (RCP). The new amendment has established a minimum RCP age of 56 for women and 61 for men. During the transition period, starting from January 1, 2020, these ages will increase by six months each year until reaching 62 years of age for women and 65 for men. These new retirement ages by contribution time are equal to the new minimum age for retirement by age for women and to the unchanged age for retirement by age for men. As a result, after the end of the progressive increase, retirement by contribution time will no longer exist, and retirement by age will be the only option. It is important to highlight that the Pension Reform also extended the minimum contribution period for age-based retirement for men from 15 to 20 years.

This study will focus on the impact of the Pension Reform on workers and retirees in Brazil. The analysis will be conducted using contributing workers and retirees from the General Social Security System (RGPS) found in the ELSI database. The study will analyze men and women separately, considering that new and old retirement ages are different for each gender. The old and new retirement ages will be used as reference points to establish the age groups chosen for the study. The study will also examine the differences in work capacity among different socioeconomic groups, using education as an indicator. Specifically, the study will compare the less educated (4th grade or lower) to the more educated (high school or higher).

The units of analysis in this study will be as follows: women aged 50 to 55, women aged 56 to 59, women aged 60 to 61, women aged 62 to 68, men aged 50 to 60, men aged 61 to 64, and men aged 65 to 68, all of whom are linked to the RGPS with education equal to or less than 4th grade of Elementary School or equal to or higher than completed High School.

Regarding Retirement by Contribution Period (RCP), changes were introduced for both sexes following the Social Security Reform. However, since there was no minimum age requirement for RCP prior to the reform, the average RCP age for the total population of each sex was adopted as a proxy for the Former Retirement Age by Contribution Period (FRACP). According to official government data (Ministry of Labor and Social Security, 2016), these averages were

53 years for women and 55.7 years for men in 2015, which is the same year as the ELSI baseline data.

As the ELSI sample comprises Brazilians aged 50 and over, the lower limit of the age range for FRACP in this study was set at 50 for both sexes. The upper limit was defined just below the new minimum RCP ages established by the reform — 56 for women and 61 for men. Therefore, the FRACP age ranges considered in this study were 50 to 55 for women and 50 to 60 for men. From this point onward, these age ranges will be referred to synonymously as FRACP.

In turn, the New Retirement Ages by Contribution Period (NRACP) in this study refer to the age range beginning at the new minimum RCP ages — 56 for women and 61 for men — and ending just before the Former Retirement Age based on Age (FRAA), which was 60 for women and 65 for men.

For women, the FRAA ends at 62 years, aligning with the New Retirement Age based on Age (NRAA) introduced by the reform. Since the FRAA for men remained unchanged, there is no corresponding NRAA for men.

The NRAA for women extends up to 68 years of age, which corresponds to the median age for receiving the Continuous Benefit Provision (BPC), a form of social assistance for individuals unable to retire through contributory schemes. The FRAA range for men also extends to 68 years for the same reason.

Results - descriptive data analysis

It is imperative to scrutinize the ages at which individuals commence their careers, as this can impact the age at which they retire. Between 2015 and 2016 in Brazil, data from ELSI reveals that women with less than a 4th-grade education began working earlier than those with a high school education or higher. The average age of commencement of work for the former was 13 years, while women with a high school education or higher started work at an average age of 16.1 years. A similar trend was observed among men, but at younger ages (11 years for the less educated and 13.9 years for the more educated). Significant differences in educational level were noted for both women and men. According to the second wave of the ELSI study conducted in 2019-2021, women with less than a 4th-grade education began work at an average age of 15.7, while those with a high school education or higher started work at an average age of 16.8 years. Among men, the average age of commencement of work for the less educated was 13.8 years, while for the more educated it was 14.3 years.

It has been observed that the trend in the average age of retirement/pension receipts for women between 2015-2016 was opposite to that of the average age of starting work. Women with lower levels of education tend to retire later, at an average age of 57.1 years, while those with higher levels of education tend to retire earlier, at an average age of 53.4 years. Similarly, among men, less educated individuals tend to retire at an average age of 57.2 years, while the more educated tend to retire earlier, at an average age of 52.4 years. These differences by level of education were also found to be significant. Data from the second wave, 2019-2021, showed that less educated women tend to retire at an average age of 57.8 years, while more educated women tend to retire at an average age of 58.1 years. In the case of men, less

educated individuals tend to retire at an average age of 60.1 years, while the more educated tend to retire at an average age of 59.8 years. In general, it can be observed that individuals with higher levels of education tend to start working later and retire earlier, with women tending to retire earlier than men within each level of education.

Regression results

In this section, logistic regression models were adjusted separately for women and men, with the aim of examining the impact of control variables on current work capacity, taking into account differences in retirement age by gender and the effects of other variables related to the old and new retirement ages. The covariates considered included "physical work demands experienced throughout most of life" (PDW), "number of diseases" (ND), and "educational level" (EDUC).

Tables 1, 2, 3, and 4 present the coefficients of the models for women and men, along with the standard error (SE) and estimated odds ratio (OR). The OR measures the odds of an individual having high work capacity under specific conditions defined by the covariates of interest. For example, it compares the odds of a man having high work capacity between the groups reporting PDW as "high effort" and "low effort."

Table 1 and Table 2 suggest that the variable ND was significantly related to high work capacity for women in most age groups and models analyzed, with odds ratios less than one. This indicates that as the number of diseases increases, the likelihood of women having high work capacity decreases. Notably, in the model for women aged 60 and 61 years from the first wave of the study, an increase of one unit in the number of diseases corresponded to a reduction of approximately 43.6% in the likelihood of women having high work capacity.

Table 1 - Estimates of the parameters of the models for females 2015-2016

Women	50 - 55 years (FRACP)			56 - 59 years (NRACP)		
	Estimate	SE	OR	Estimate	SE	OR
PDW (Ref. High Effort)	-0.668*	0.263	0.512	-0.420	0.321	0.656
ND	-0.434***	0.079	0.647	-0.254**	0.098	0.775
EDUC (Ref. 4th Grade)	0.512	0.313	1.670	0.774*	0.391	2.170
	60 - 61 years (FRAA)			62 - 68 years (NRAA)		
PDW (Ref. High Effort)	0.108	0.471	1.114	-0.126	0.198	0.881
ND	-0.571***	0.140	0.564	-0.250***	0.056	0.778
EDUC (Ref. 4th Grade)	1.026*	0.515	2.791	0.905***	0.239	2.472

Observation: FRACP = former retirement age based on contribution period; NRACP = new retirement age based on contribution period; FRAA = former retirement age based on age; NRAA = new retirement age based on age.
*p < 0,05. **p < 0,01. ***p < 0,001

Source: ELSI 2015-2016.

Table 2 - Estimates of the parameters of the models for females 2019-2021

Women	50 - 55 years (FRACP)	56 - 59 years (NRACP)

	Estimate	SE	OR	Estimate	SE	OR
PDW (Ref. High Effort)	1.31 *	0.607	3.704	-0.485	0.387	0.616
ND	-0.648 *	0.265	0.23	-0.419 **	0.135	0.658
EDUC (Ref. 4th Grade)	3.188 ***	0.736	24.235	1.451 **	0.451	4.27
	60 - 61 years (FRAA)			62 - 68 years (NRAA)		
PDW (Ref. High Effort)	0.189	0.515	1.208	-0.685**	0.238	0.504
ND	0.024	0.133	1.024	-0.246***	0.073	0.781
EDUC (Ref. 4th Grade)	1.748**	0.574	5.44	1.195***	0.269	3.303

Observation: FRACP = former retirement age based on contribution period; NRACP = new retirement age based on contribution period; FRAA = former retirement age based on age; NRAA = new retirement age based on age.
*p < 0,05. **p < 0,01. ***p < 0,001

Source: ELSI 2019-2021.

Table 3 - Estimates of the parameters of the models for males 2015-2016

Males	50 - 60 years (FRACP)			61 - 64 years (NRACP)			65 - 68 years (FRAA)		
	Estimate	SE	OR	Estimate	SE	OR	Estimate	SE	OR
PDW (Ref. High Effort)	-0.407**	0.153	0.664	-0.632*	0.283	0.531	0.558	0.293	1.057
ND	-0.400***	0.056	0.669	-0.494***	0.101	0.609	-0.518***	0.105	0.595
EDUC (Ref. 4th Grade)	1.573***	0.202	4.825	1.097**	0.369	2.995	1.146**	0.434	3.147

Observation: FRACP = former retirement age based on contribution period; NRACP = new retirement age based on contribution period; FRAA = former retirement age based on age.
*p < 0,05. **p < 0,01. ***p < 0,001
Source: ELSI 2015-2016.

Table 4 - Estimates of the parameters of the models for males 2019-2021

Males	50 - 60 years (FRACP)			61 - 64 years (NRACP)			65 - 68 years (FRAA)		
	Estimate	SE	OR	Estimate	SE	OR	Estimate	SE	OR
PDW (Ref. High Effort)	-0.511	0.265	0.599	-0.86**	0.329	0.423	-0.425	0.254	0.653
ND	-0.727***	0.126	0.483	-0.4**	0.127	0.666	-0.238**	0.089	0.788
EDUC (Ref. 4th Grade)	1.711***	0.347	5.538	1.536***	0.4	4.646	0.848**	0.326	2.335

Observation: FRACP = former retirement age based on contribution period; NRACP = new retirement age based on contribution period; FRAA = former retirement age based on age.
*p < 0,05. **p < 0,01. ***p < 0,001
Source: ELSI 2015-2016.

The PDW variable was only significant in one of the four age groups analyzed for women (50–55 years) in the first wave of the study. However, in the second wave (2019-2021), the PDW

variable was significant in two of the four age groups (50-55 and 62-68 years). This suggests that those who reported "low effort" regarding the physical work demands they experienced throughout most of their lives had a higher chance of having high work capacity compared to those who reported "high effort."

The variable of educational level, which is the focus of this study, was found to be significant for almost all age groups analyzed between 2015-2016. The only exception was women aged 50–55 years (FRACP group). The estimated odds ratio for this factor was greater than one in all models, indicating that individuals with higher educational levels have a higher chance of having high work capacity than those with lower educational levels. For women aged 60 and 61 years (FRAA), the chance of a woman with a complete high school education or higher having high work capacity is almost 2.8 times the chance of a woman with education up to the 4th grade of elementary school.

Similar to women, the variable ND was found to be significant and had odds ratios lower than one for all three age groups of men analyzed, as shown in Tables 1 and 2, during both periods. Among those aged 61 to 64 (NRACP) in 2015-2016, an increase of one unit in the number of diseases corresponded to a reduction of over 39% in the chance of a man having high work capacity.

There were notable discrepancies in work capacity related to the physical demand of the work performed throughout the majority of individuals' lives, even among men of the same age, health, and education, in two out of three cases presented. The study conducted in 2015-2016 among men aged 50 to 60 (FRACP) found that those who reported high physical effort had a significantly lower likelihood of having high work capacity compared to those who reported low physical effort. Similarly, in the subsequent analysis conducted between 2019-2021, the relationship between work capacity and physical demand remained consistent with the findings from the previous period.

Education was found to be a significant determinant of work capacity in all three age groups examined for men during both periods of analysis in 2015-2016 and 2019-2021. Specifically, among those aged 50 to 60 (FRACP) during the first wave, individuals with a completed high school education or higher had a significantly higher likelihood of having high work capacity compared to those with an educational level up to the 4th grade of elementary school. The analysis of the second wave of the study further supports this finding, indicating that men with completed high school education or higher education had a significantly higher likelihood of having high work capacity compared to those with only four years of elementary school.

The results of the regression analysis show that there are significant differences in work capacity based on educational level, even when factors commonly associated with work capacity, such as PDW and ND, are controlled for. This suggests that individuals with lower levels of education are more likely to report low work capacity, even when facing similar levels of physical job demands and experiencing the same number of diseases, when compared to their more educated counterparts.

Specifically, individuals with up to a 4th-grade education have a higher likelihood of reporting low work capacity compared to those with a high school education or higher. These findings support the hypothesis that less educated individuals have lower work capacity compared to

more educated individuals, both in the old and new retirement ages, under both age and contribution-based retirement systems.

Discussion and Conclusions

The results of this study have important implications for the Pension Reform, which aims to extend the working lives of individuals. The potential challenges that less educated individuals may encounter in extending their working lives should be taken into consideration in order to ensure that the Pension Reform is implemented in a fair and equitable manner.

In light of the findings presented in this article and previous research, it is evident that higher education is a significant factor in determining the likelihood of reporting good current work capacity among individuals aged 50 years or older in Brazil. The results indicate that individuals with higher education are more likely to report good work capacity even after controlling for health and physical demands at work.

These findings are consistent with the findings of Pérez, Wajnman, and Oliveira (2006), who also found that education was a significant factor in explaining the labor supply of men and women aged 50 or older in the Brazilian state of São Paulo. Additionally, the changes in retirement age resulting from the Pension Reform impact all individuals covered by the RGPS, regardless of their educational level. This has implications for the health, employability, and overall social inequality observed in Brazil.

It is important to consider the heterogeneity of the Brazilian population when examining the potential for extending working lives. De Souza, Queiroz, and Skirbekk (2018) argued that it may be possible to extend retirement ages since improvements in the health of Brazilians, as indicated by mortality rates, have not necessarily translated into higher labor force participation rates. However, it is crucial to analyze health disparities across socioeconomic groups, as less educated and lower-income individuals tend to have poorer health than more privileged groups.

Moreover, health improvements may be slower for less educated individuals, even if overall health is on the rise, which could lead to widening health disparities and, consequently, differences in work capacity. This becomes particularly relevant since poorer health can impact an individual's ability to work, and therefore, their capacity to support themselves and their families. It is important to consider the potential impact of the Pension Reform on the health and work capacity of different socioeconomic groups in Brazil to ensure that the extension of working lives is not detrimental to the most vulnerable members of society.

It has been observed that Brazilian literature indicates that individuals with lower levels of education and income tend to have poorer health than more privileged groups (Carvalho and Wood, 1977; Pérez and Turra, 2008; Ribeiro, Antigo, and Noronha, 2016; Silva et al., 2016; Nunes et al., 2018; Pereira, Queiroz, and Freire, 2018). According to Waldron (2007), health is improving for all groups in Brazil, albeit at a slower pace for less educated individuals, which has resulted in a widening of health differentials and a decrease in work capacity. This suggests that individuals with lower levels of education may struggle to meet the new retirement age limits imposed by the Pension Reform.

It is imperative to analyze the evolution of morbidity across different socioeconomic groups over time, as people may live longer but in poorer health. De Souza et al. (2018) discovered that in Brazil, mortality improved yet the workforce participation levels by disability status remained constant from 1990 to 2010.

The work capacity of individuals is influenced by physical job demands, with higher demands associated with lower capacity closer to retirement age (Wajnman et al., 2004; Sala & Oliveira, 2013). As individuals age, their functional and work capacity tend to decline, and those with lower levels of education are more likely to be employed in manual jobs with greater physical demands (Wajnman et al., 2004; Sala & Oliveira, 2013). In light of the trend towards longer working lives, what is the employability of these individuals? It is possible that employers may be less likely to hire them for physically demanding jobs. Even if they are able to secure employment, they may be pushing their physical limits, as observed by Konig, Lindwall, and Johansson (2018) in Sweden. This scenario may also be applicable in Brazil. Additionally, the higher proportion of disability pensions among individuals with lower levels of education may indicate the impact of physical job demands on their health and well-being over the long term.

Education investment results in an accumulation of knowledge and skills that are highly valued in the labor market, leading to an increased likelihood of employment among the educated population, relative to their less educated counterparts, regardless of age, health, and job demands. This phenomenon can be attributed to the higher opportunity cost of education versus employment faced by lower-income individuals in Brazil (Leme and Málaga, 2001; Kassouf, 2002).

Furthermore, lower levels of education can hinder the acquisition of skills that are desirable in the workforce, in addition to work experience. Kassouf (2007) highlights that earlier entry into the labor market, lower salaries, lower levels of education, and poorer health in adulthood can significantly impact an individual's work capacity. Conversely, Castro et al. (2018) found that starting work later in life can lead to increased work capacity. Therefore, investing in education is crucial for ensuring a competitive advantage in the job market and improving overall employability.

The study revealed that individuals with lower levels of education tended to commence employment at an earlier age and retire at a later age. Literature studies and data indicate that this phenomenon is primarily attributed to difficulties in entering the labor market. Camarano (2017) found that age-related retirements (RA) had shorter contribution periods than contribution-based retirements (RCP), which is likely due to discontinuous employment trajectories, hindering Social Security contributions and leading to AI. Furthermore, even with a longer minimum contribution period for RCP, those who retired under it tended to do so earlier (Costanzi et al., 2018). It is worth noting that most individuals who retired early in Brazil were in the top four deciles of household income (Caetano et al., 2016).

The Reform's progressive stance in addressing inequalities is demonstrated by the eradication of RCP, as more educated individuals are retiring earlier and in better health. However, those who already struggled to retire under the old system may face further challenges with the implementation of new retirement ages and periods, particularly with the increase in the minimum retirement age for women and the contribution period for men.

This study has a notable constraint in that the ELSI questionnaire is incapable of excluding rural workers, as it only queries an individual's place of residence and not their place of employment. It is possible for someone to reside in an urban area but work in a rural area, or vice versa. The filters utilized to select urban residents did not resolve this issue. Future research should focus on addressing gender-related work capacity differences, including the impact of children, marital status, and household responsibilities; employing life course approaches to examine how educational and occupational trajectories influence the transition to retirement; and evaluating the influence of changes in the work environment and technological advancements on work capacity and the extension of working life for individuals nearing retirement age.

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