Age quartile effect in determining actual and preferred working hours: Regression discontinuity design

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Abstract

It is known that age-stratified quartiles are used in numerous studies, e.g. in epidemiological studies, as an important instrument in the estimation of working life changes and health issues. The aim of this study is to investigate how achieving different age thresholds (32, 42, or 52 years) affects changes in actual and preferred working hours. The data for this study are based on the European Working Conditions Survey (EWCS) for the period from 1991 to 2015. The data for Finland contained 5,646 respondents. We use the regression discontinuity design (RDD) method to predict a categorical outcome (actual or preferred working hours per week) paired with other predictors (age quartile). We found that, on average, the number of actual working hours is 2.46 points higher and the number of preferred working hours is 4.62 points higher for employees reaching 32 years of age. On the contrary, the average number of actual working hours is lower for employees reaching 42 years (1.16 points) and for employees reaching 52 years (3.03 points). To conclude, we found higher dynamics in increasing actual and preferred working hours when achieving the cutoff age of 32 years, while in the ages of 42 and 52 years, dynamics in changes of actual and preferred working hours are lower. We suppose that the age factor is an important instrument in the overall dynamics of working hours with regard to one's whole working life.

Keywords
Age quartiles; Working hours; Regression discontinuity design; Social stratification;

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Introduction

The relationship between working hours and age is widely studied in the scientific literature. However, age is often considered to be one of the individual variables showing interaction effects among the variables selected. Thus, when examining secular changes over the period 1977 to 2007, Blundell et al. (2013) have shown the importance of macroeconomic evolutions in explaining changes in total hours with regard to the influence of age and gender.

For example, the study of Raediker et al. (2006) has shown that there is a consistent functional relationship between the number of working hours and its effects on workers' health when also considering the factor of age (Raediker et al., 2006; Guo, 2002). Another study has shown that the factor of age is important for the dynamics of working hours (e.g. younger employees had longer working hours). However, age-related differences were few: extended working hours among the oldest age group and daily working hours in the youngest and middle-aged groups were associated with increased sickness absence (Ropponen et al., 2020). Another study has shown that working hours and schedules are associated with the need for recovery from work, with different associations for men and women and different age groups (Jansen et al., 2003).

The study of Ganster et al. (2018) suggested that the effects of working long hours on employee well-being are nuanced in that they may vary considerably for different working populations based on gender, age, working conditions, and other factors. Nearly the same results are seen in the study of Bryan (2007), who has shown that workers are sorted into firms on the basis of hours. Nearly a third of the explained variation in weekly hours of work can be ascribed to firm-level differences, which are unrelated to any observed worker characteristics (e.g. based on age). Another aspect is the importance of workers' family situations and preferences for working fewer hours. The factor of age has been shown as regards parents' responsibilities and young children's care in a family (MacInnes, 2005).

Thus, the factor of age has direct and indirect effects on the dynamics of working hours over the whole course of working life. However, the question of how age as an independent factor affects the dynamics of working hours has remained open.

In the abovementioned studies, age is often considered as one of the control variables. However, numerous researchers have used age as an independent variable, e.g. in the form of age-stratified quartiles. For example, Wong et al. (2002) estimated risks for heart diseases on the basis of age/sex-stratified cut points from a large sample of asymptomatic patients. They suggested that age–sex stratification is as accurate as absolute scores for predicting risks of heart diseases in asymptomatic persons. In a similar way, Joarder and Firozzaman (2001) have shown the advantages of examples of using age quartiles for discrete data.

Bland (2015) has shown that including medians and ranges or interquartile ranges in analysis has more advantages than means and standard deviations, traditionally used for normal distributions. The extended estimates using quartiles are always superior when the data can have bias, overestimation problems, or highly skewed parent distributions. The

estimates using quartiles have the advantage of being extremely simple to carry out, and in practice, such methods will be applied to small samples. The overestimation may not be a serious problem. In most cases, if data are not normally distributed, some researchers prefer reporting median and quartiles instead (Lydersen, 2020).

The aim of this study is to investigate how different age thresholds affect changes in actual and preferred working hours. We point out three thresholds: the first quartile (Q1) is defined as the 25th percentile, where the lowest 25 per cent of data is below this point (32 years old); the second quartile (Q2) is the median of a data set – thus, 50 per cent of the data lies below this point (42 years old); and the third quartile (Q3) is the 75th percentile, where the lowest 75 per cent data is below this point (52 years old). First, we ask how actual working hours are changing at different age thresholds (32, 42, and 52 years). Second, we ask how preferred working hours are changing at different age thresholds (32, 42, and 52 years). Third, we ask if there is a mismatch between actual and preferred working hours owing to age quartiles.

Literature review

Actual and preferred working hours: An organisation effect

Mismatches between the number of hours people actually work and the hours they would prefer to work are common, and they have important consequences for individual, family, and organisational life. For example, it was shown that the well-known gap between actual and preferred working hours (i.e. overemployment) can arise from a new form of lumpiness that is related to selective attention and is created by work characteristics of 'post-Fordist' job design (Van Echtelt et al., 2006). According to this study, the increased autonomy of workers is leading to an autonomy paradox and a part-time illusion, wherein many part-time employees who were willing and allowed to reduce their working hours still end up working more hours than they prefer. Zimmert and Weber (2021) suggest that job autonomy plays a crucial role in the creation and resolution of discrepancies between actual and preferred working hours. Job change increases the probability of resolving work hour mismatches but far less than expected with the free choice of hours across jobs (Knaus & Otterbach, 2019).

Hetty van Emmerik and Sanders (2005) have studied the relationship between two types of mismatches (i.e. noncorrespondence between the preferred and actual number of hours) and affective commitment. It was argued that specific groups of employees, i.e. women and part-time employees, attach more importance to their working hours and, therefore, are less likely to show affective commitment when they experience a mismatch. Moreover, gender and full-time status were found to moderate the negative relationship between a mismatch and the affective commitment of employees who want to work less.

Lachowska et al. (2023) found that, on average, observed hours tend to be less than the preferred levels and that workers would require a 12 per cent higher wage with their current employer to be as well off as they would be after moving to an employer offering ideal hours. These findings suggest that hour constraints are an equilibrium feature of the

labour market because long-hour jobs are costly to employers and employers offer high-wage/long-hour packages to increase their overall value of employment.

Campbell and van Wanrooy (2013) revealed widespread ambivalence, linked to the fact that employees hold multiple, often conflicting ideas, in particular around the feasibility of a reduction in their working hours.

Miranti and Li (2020) found significant associations between a mismatch of working hours – that is, either working more or less than one's desired hours – and poorer mental health. The authors suggest that jobs characterised by low levels of control and high demands have a significant negative impact on reported mental health scores. Designing flexible working environments and giving workers more autonomy should be prioritised to improve the general mental health of mature-age workers.

The results of the study by Pagan (2017) indicate that all workers suffering from working time mismatch are more likely to report lower levels of job satisfaction compared to those who actually work their desired hours. In addition, all selected groups of females with disabilities prefer fewer hours of work per week compared to females without disabilities. Although overemployment is clearly more harmful in terms of job satisfaction than underemployment for all workers, its impact is even higher for females with disabilities as compared to their nondisabled counterparts.

Actual and preferred working hours: A family effect

Another study has shown that employees prefer to work a different number of hours than they actually work because of gender, age, family structure, income, opportunities for advancement, and part-time status (Reynolds, 2003). While family structures associated with work–family conflict are not associated with a desire for fewer hours, members of dual-earner couples without children and male breadwinners without children are most likely to desire fewer hours. In general, work–family conflict is more likely to produce a desire for fewer hours when employees are well off economically. Wunder and Heineck (2013) suggest that spillovers from the partner's working time mismatch are no longer significant when controlled for the partner's well-being. This suggests that well-being is contagious and that the spillover is due to caring preferences.

Numerous studies indicate that many U.S. workers would prefer to work shorter hours. For workers who are sandwiched between childcare and eldercare or who expect to be in the future, questions remain about work hour preferences. Keene and Prokos (2007) use a representative sample and distinguish between currently sandwiched workers and those who expect to be in five years. The proportion of workers who are currently sandwiched has increased from 1992 to 2002. Further, workers who expect to be sandwiched are less likely to want to reduce their workweek hours than others.

The adverse association of short and long hours with well-being is mostly attributable to mismatches in working hours. After adjusting for job quality, overemployed men and women experience a reduction in mental well-being. Authors observe a confounding role of job quality across most working-hour schedules, but the interaction effects are modest (Bartoll & Ramos, 2020).

Reynolds (2014) finds that partners often disagree about the number of hours each should work and that although men's hours reflect their own and their partner's preferences equally, women's hours are more closely tied to their own preferences. Still, changes in men's and women's actual hours are heavily influenced by factors that do not reflect their own or their partner's preferences.

Actual and preferred working hours: A macro-level institutional effect

Otterbach (2010) comes to similar results and finds that, on both macro- and microlevels, sociodemographic variables like prosperity and income, high risk of unemployment, and working conditions play an important role in determining working hour constraints. Steiber and Haas (2018) find that couples are most at risk of experiencing underemployment in the countries that were most strongly affected by the recession. The effects of children on the experience of hours mismatches are found to vary across Europe. A particularly strong association of children below school age with parental underemployment is observed.

Torre Fernández (2017) argued that the level of mismatches has increased significantly with the economic recession because of the growing number of people who wish to work more hours than they actually do. The findings show that the increase in hour mismatches has been particularly striking among workers employed under fixed-term contracts, part-time contracts, those in low-status occupations, and women.

Using two waves of panel data from Australia, Reynolds and Aletraris (2006) offer a new, dynamic picture of hour mismatches. Their analysis shows a fluid labour market in which many mismatches are created and resolved. Nevertheless, their findings also highlight market imperfections. Many mismatches (especially the desire for fewer hours) appear to persist for more than a year, and although a change of employers can resolve mismatches, it can also create them. Moreover, as seen in the findings, processes that create and resolve mismatches are more closely tied to changes in preferred hours than to changes in actual hours.

The mental well-being of women working voluntary and involuntary long hours was negatively influenced by deteriorating economic conditions. This study suggests women are more vulnerable to the effects of long working hours and working hours mismatch on mental well-being, especially during difficult economic periods (De Moortel et al., 2017)

Mismatches have become more common in the United States in the past several decades, owing in large part to the pressures on companies to be more competitive, increased skill requirements, and the growing diversity of the labour force (Kalleberg, 2008).

Methodology

Data and methods

The data for this study were based on European Working Conditions Survey Integrated Data File for the period from 1991 to 2015 (EWCS). Since its launch in 1990, the European Working Conditions Survey (EWCS) has provided an overview of working conditions in

Europe. The survey assesses and quantifies working conditions of both employees and the self-employed across Europe on a harmonized basis, analyses relationships between different aspects of working conditions, identifies groups at risk and issues of concern as well as of progress, monitors trends by providing homogeneous indicators on these issues, contributes to European policy development on quality of work and employment issues. Themes covered include employment status, working time duration and organization, work organization, learning and training, physical and psychosocial risk factors, health and safety, work-life balance, worker participation, earnings and financial security, as well as work and health. In each wave a random sample of workers (employees and self-employed) has been interviewed face to face. The survey covered the EU Member States. The data for Finland contained 5,646 respondents.

Study outcome

The first study outcome variable has been derived from the question "How many hours do you usually work per week in your main paid job?", where the response scale ranging from 1 to 168 (min=1.00, median=38.00, mean=38.27, max=168.00). The second study outcome variable has been derived from the question "How many hours per week would you prefer to work at present?", where the response scale ranging from 0 to 168 (min=0.00, median=37.00, mean=34.48, max=168.00).

Main exposure of interest

As the main exposure of interest, we used the variable, derived from the question "Starting with yourself, how old are you?", where the response scale ranging from 15 to 64 (min=15.00, 1st Qu.=32.00, median=42.00, mean=41.55, 3rd Qu.=52.00, max=64.00).

Statistical analyses

We use the regression discontinuity design (RDD) method in order to predict a categorical outcome (actual working hours per week) paired with other predictors (age). The aim of this study is to develop a model, which predicts actual working hours at a certain threshold of age and separates the observations into a treatment and control group based on the age factor. We used the sharp RDD, which allows the threshold and separates the treatment and control group exactly (32, 42 or 52 years). The advantage of the RDD approach is that some assumptions can be tested. Individuals close to the threshold are nearly identical, except for characteristics which are affected by the treatment. Prior to the treatment, the outcome should not differ between the treatment and control group. The distribution of the variable which indicates the threshold should have no jumps around this cutoff value (Carpenter & Dobkin, 2009). The R (version 4.2.3) was used for all analysis. We utilized *rddtools* library for the analysis.

Results

Table 1 shows the results from the Regression Discontinuity Design estimated by OLS. Thus Model 1 applies the same slopes on both sides of the cutoff. A threshold effect (marked as "threshold" in the model) indicates an association between a risk factor and a defined outcome above the threshold value but none below (Ulm, 1991). As it is seen from the Table 1 and Model 1, on average, the number of actual working hours comes to 36.385 for employees in the younger age (first quartile). For the second quartile (or employees in the mean age), the number of actual working hours comes to 39.012. Finally, for the third quartile (or employees in the older age), the number of actual working hours comes to 40.715. On average, the number of actual working hours are 2.46 points higher for employees in the younger age (first quartile) than it is for two other quartiles. On the contrary, the average number of actual working hours is lower for employees in the mean age (second quartile) (1.16 points) than it is for the first quartile, or in the older age (third quartile) (3.03 points) than it is for the first and for the second quartiles.

Table 1. The results from the Regression Discontinuity Design estimated for the association between actual working hours per week and age. The models estimated by OLS for same slopes, different slopes and the functional form and applied for three cutoffs: 32, 42 and 52 years

	Estimate (Std.Error)		
	Model 1	Model 2	Model 3
	Same slope	Different slopes	Modifying the functional form
cutpoint = 32			
(Intercept)	36.385*** (0.347)	41.493*** (0.614)	38.275*** (0.951)
threshold	2.467*** (0.551)	-1.953** (0.702)	-0.134 (1.065)
age	0.008 (0.019)	0.827*** (0.084)	-0.462 (0.303)
`age^2`	-	-	-0.090*** (0.020)
age_right	-	-0.867*** (0.086)	0.713* (0.312)
`age^2_right`	-	-	0.080*** (0.020)
cutpoint = 42			
(Intercept)	39.012*** (0.348)	41.322*** (0.427)	37.925*** (0.653)
threshold	-1.161* (0.590)	-1.224* (0.586)	0.960 (0.860)
age	0.117*** (0.025)	0.336*** (0.034)	-0.514*** (0.128)
`age^2`	-	-	-0.036*** (0.005)
age_right	-	-0.463*** (0.050)	0.769*** (0.182)
`age^2_right`	-	-	0.017* (0.008)
cutpoint = 52			
(Intercept)	40.715*** (0.343)	41.067*** (0.347)	37.964*** (0.529)
threshold	-3.030*** (0.527)	-0.960 (0.636)	1.897* (0.873)
age	0.155*** (0.019)	0.178*** (0.019)	-0.378*** (0.074)
`age^2`	-	-	-0.017*** (0.002)
age_right	-	-0.556*** (0.096)	0.165 (0.322)
`age^2_right`	-	-	0.001 (0.028)

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

The Model 2 (Table 1) applies different slopes on both sides of the cutoff. As it is seen from the Model 2 (Table 1), the treatment effect has an impact of the number of actual working hours. On average, the number of actual working hours are growing by 0.827 points and decreasing by 0.867 points with every additional year when before and after reaching the age 32 years. At the same time, the number of actual working hours are growing by 0.336 points and decreasing by 0.463 points with every additional year when before and after reaching the age 42 years. Finally, the number of actual working hours are growing by 0.178 points and decreasing by 0.556 points with every additional year when before and after reaching the age 52 years.

The Model 3 (Table 1) contains the specification of the functional form when applying a Regression Discontinuity Design. In this model we specified a quadratic term (which is a second order polynomial). With a scatterplot we draw the fitted line of the regression, which fits the functional form when applying a RDD (Annex 1, Figures 1, 2 and 3).

As it is seen from the Model 1 (Table 2), on average, the number of preferred working hours comes to 32.461 for employees in the younger age (first quartile). For the second quartile (or employees in the mean age), the number of preferred working hours comes to 34.017. Finally, for the third quartile (or employees in the older age), the number of preferred working hours comes to 36.832. On average, the number of preferred working hours are 4.62 points higher for employees in the younger age (first quartile) than it is for two other quartiles. On the contrary, the average number of preferred working hours is lower for employees in the older age (third quartile) (3.41 points) than it is for the first and for the second quartiles.

Table 2. The results from the Regression Discontinuity Design estimated for the association between preferred working hours per week and age. The models estimated by OLS for same slopes, different slopes and the functional form and applied for three cutoffs: 32, 42 and 52 years

	Estimate (Std.Error)		
	Model 1	Model 2	Model 3
	Same slope	Different slopes	Modifying the functional form
cutpoint = 32			
(Intercept)	32.461*** (0.547)	36.665*** (0.982)	33.410*** (1.576)
threshold	4.620*** (0.873)	0.930 (1.126)	2.065 (1.764)
age	-0.109*** (0.028)	0.587*** (0.138)	-0.764 (0.531)
`age^2`	-	-	-0.097** (0.037)
age_right	-	-0.728*** (0.141)	1.025. (0.543)
`age^2_right`	-	-	0.084* (0.037)
cutpoint = 42			
(Intercept)	34.017*** (0.557)	37.684*** (0.730)	34.588*** (1.121)
threshold	1.520 (0.961)	0.510 (0.957)	2.850* (1.441)
age	-0.049 (0.038)	0.290*** (0.058)	-0.475* (0.219)
`age^2`	-	-	-0.033*** (0.009)
age_right	-	-0.586*** (0.077)	0.389 (0.290)
`age^2_right`	-	-	0.023. (0.012)

cutpoint = 52			
(Intercept)	36.832*** (0.540)	37.516*** (0.550)	34.588*** (0.819)
threshold	-3.414*** (0.793)	-0.836 (0.913)	2.453. (1.262)
age	0.106*** (0.030)	0.151*** (0.031)	-0.405*** (0.120)
`age^2`	-	-	-0.017*** (0.003)
age_right	-	-0.668*** (0.120)	-0.332 (0.420)
`age^2_right`	-	-	0.037 (0.035)

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

The Model 2 (Table 2) applies different slopes on both sides of the cutoff. As it is seen from the Model 2 (Table 2), on average, the number of actual working hours are growing by 0.587 points and decreasing by 0.728 points with every additional year when before and after reaching the age 32 years. At the same time, the number of actual working hours are growing by 0.290 points and decreasing by 0.586 points with every additional year when before and after reaching the age 42 years. Finally, the number of actual working hours are growing by 0.151 points and decreasing by 0.668 points with every additional year when before and after reaching the age 52 years.

The Model 3 (Table2) contains the specification of the functional form when applying a Regression Discontinuity Design. In this model we specified a quadratic term (which is a second order polynomial). With a scatterplot we draw the fitted line of the regression, which fits the functional form when applying a RDD (Annex 1, Figures 4, 5 and 6).

Table 3 contains basic results as regards age thresholds and actual and preferred working hours. On average, the number of actual working hours comes to 36.385 and the number of preferred working hours comes to 32.461 for employees in the first quartile. Therefore, we find that actual working hours are 3,924 hours longer than preferred working hours. We found that, for the second quartile (or employees in the mean age), the number of actual working hours comes to 39.012 and the number of preferred working hours comes to 34.017. Therefore, we find that actual working hours are 4,995 hours longer than preferred working hours. We found that, on average, for the third quartile (or employees reaching 52 years age), the number of actual working hours comes to 40.715 and the number of preferred working hours comes to 36.832. Therefore, we find that actual working hours are 3,883 hours longer than preferred working hours. In all three cases (for all three quartiles) we find the mismatch between actual working hours and longer actual working hours in comparison to preferred working hours. Higher mismatch is seen for the second quartile (or employees in the mean age).

Table 3. Basic results for three age groups and actual and preferred working hours

	Actual working hours	Preferred working hours
cut 32 years	On average, the number of actual working hours are 2.46 points higher for employees reaching 32 years age. On average, the number of actual working hours are growing by 0.827 points and decreasing by 0.867 points	On average, the number of preferred working hours are 4.62 points higher for employees reaching 32 years age. On average, the number of actual working hours are growing by 0.587 points and decreasing by 0.728 points

	with every additional year when before and after reaching the age 32 years.	with every additional year when before and after reaching the age 32 years.
cut 42 years	The average number of actual working hours is lower for employees reaching 42 years (1.16 points). At the same time, the number of actual working hours are growing by 0.336 points and decreasing by 0.463 points with every additional year when before and after reaching the age 42 years.	At the same time, the number of actual working hours are growing by 0.290 points and decreasing by 0.586 points with every additional year when before and after reaching the age 42 years.
cut 52 years	The average number of actual working hours is lower for employees reaching 52 years (3.03 points). Finally, the number of actual working hours are growing by 0.178 points and decreasing by 0.556 points with every additional year when before and after reaching the age 52 years.	The average number of preferred working hours is lower for employees reaching 52 years (3.41 points). Finally, the number of actual working hours are growing by 0.151 points and decreasing by 0.668 points with every additional year when before and after reaching the age 52 years.

We found that, on average, the number of actual working hours are 2.46 points higher, and the number of preferred working hours are 4.62 points higher for employees reaching the first quartile (mismatch is 2.16 hours). Finally, we found that, on average, the number of actual working hours are 3.03 points lower, and the number of preferred working hours are 3.41 points lower for employees reaching the third quartile (mismatch is 0.38 hours).

Discussion

This study in Finland with comprehensive cross-sectional data on the EWCS for the period from 1991 to 2015 (n = 5,646 respondents) aimed to investigate how achieving different age thresholds affects changes in actual and preferred working hours. We point out three thresholds: the first quartile (Q1) is defined as the 25th percentile, where the lowest 25 per cent data is below this point (32 years old); the second quartile (Q2) is the median of a data set – thus, 50 per cent of the data lies below this point (42 years old); and the third quartile (Q3) is the 75th percentile, where the lowest 75 per cent data is below this point (52 years old).

First, we ask how actual working hours are changing at different age thresholds (younger age or 25 per cent of the data, mean age or 50 per cent of the data, and older age or 75 per cent of the data). In general, the results show that in the younger age, the number of actual working hours is comparatively higher than the same ones for employees who are in the mean age or in the older age. Second, we ask how preferred working hours are changing at different age thresholds (younger age or 25 per cent of the data, mean age or 50 per cent of the data, and older age or 75 per cent of the data). In general, the results show that in the younger age, the number of preferred working hours is comparatively higher than the same ones for employees who are in the mean age or in the older age.

Age is often considered a control variable among a set of other control variables. In our case, age has been considered as the main exposure of interest. Our results, therefore, are comparable with the results of other studies which have shown a clear indication of an interaction effect between age and the number of working hours (Blundell et al., 2013; Bryan, 2007; MacInnes, 2005) and especially because of health factors (Raediker et al., 2006; Ropponen et al., 2020; Ganster et al., 2018; Jansen et al., 2003; Guo, 2002).

Third, we asked if there is a mismatch between actual and preferred working hours as numerous studies have already shown. We find a mismatch between the actual number of hours worked and people's preferences about the amount of work they want. Our results are in line with those of a number of studies (Steiber & Haas, 2018; Torre Fernández, 2017; Lachowska et al., 2023; De Moortel et al., 2017; Campbell & van Wanrooy, 2013; Miranti & Li, 2020; Bartoll & Ramos, 2020; Zimmert & Weber, 2021; Knaus & Otterbach, 2019; Pagan, 2017; Heiden et al., 2023). However, age-specific factors are often not included in studies exploring these relationships. Therefore, we have difficulty comparing our results with others in relation to a mismatch between actual and preferred working hours.

In general, numerous recent research in Finland have shown that health-related factors can partly explain the differences in working-age population's work participation. National registers in Finland include numerous factors such as health, demographic factors, education, economic status and social factors in order to explain work participation. Division of population on the basis of age is typically used everywhere for describing basic trends in work participation.

According to recent findings, age perceived as major barrier to employment in Finland. A recent survey conducted by YTK Unemployment Fund reveals a significant perception among Finns that age is a major hurdle in securing employment, especially for those over 45. The study, which involved nearly 23,000 participants from various industries across Finland, highlighted that a majority of respondents aged 55 to 64 view their age as the primary obstacle to finding a job. Another meaning of age is used when talking about health and from perspectives of incapacity for work. The wider perspective, therefore, includes the meaning of health-related limitations or incapacity for work, work ability or work potential instead of simple division into age groups.

The data extracted from the EWCS for the period from 1991 to 2015 (n = 5,646 respondents) provided a comprehensive resource for this study. Hence, we utilised data that included observations from the six rounds of the EWCS for the period of 14 years. The strengths of this study included the possibility of investigating the effects of age-specific factors on actual and preferred working hours based on the usage of the European comprehensive data and a large observation period. Another strength is the usage of the statistical method, which is based on the RDD design. As it is known, this design allows to predict comprehensive strength among variables and compute an average treatment effect for all the participants. Another strength is in using quartiles, which are always superior in both bias and precision to those observations which are not normally distributed.

The main limitation of this study is the limited number of variables used in the analysis. Therefore, we cannot exclude potential (measured or unmeasured) bias related

to the measures of this study or other confounding factors available in this study (e.g. gender, education, industry). The study was restricted to Finland, and we lacked details on employees' education and skill level, gender, and marital status. Thus, further studies are needed to replicate our findings in other settings while adding a stricter evaluation of the data. However, our results should be more likely under- than overestimated and at least indicate that these types of data can be used for these purposes.

Based on the results of the research, recommendations can be developed for organisations regarding the use of part-time work and the factors related to part-time work, taking into account the broader factors regarding workplaces and organisations mentioned above. The research produces strategic information for the actors in the field who are responsible for the development of organisations and the sustainability of health and welfare services as well as the spread of social innovations.

Organisations in the social and health sector are undergoing major changes, which is why it is important to gather more detailed information about the connection between part-time work and employee well-being in connection with two structural factors: organisational change and the individual's life stage in the care sector. By examining this entity, this research produces strategic information for both employees and employers as well as decision-makers and opens up possibilities for organisational development. The Social Security reform is one of the biggest changes in the social and health sector, with employees, managers, and developers of services provided by organisations having a decisive role. Evidence-based policies have become the 'a' and 'o' of everything.

Conclusions

To conclude, we found that age is a significant factor which affects changes in actual and preferred working hours during working life. Age-specific factors are often not included in studies exploring these relationships. We have found that age has a significant impact on working hours. In this regard, our study is an innovative one because we show a similar approach to using age quartiles for changes in working hours similar to medical and health studies. Hence, the data provide feasible possibilities to investigate the effects of age on changes in working hours and well-being at work.

Actual and preferred working hours and mismatch between them has been an urgent topic for numerous studies during last decades. As numerous studies have shown actual and preferred working hours are strongly associated with individual, organisational, family and macro-institutional factors. Finland has own specific trends in dynamics of working hours. Finland is one of the European countries, where the overall proportion of part-time workers is relatively small (around 14%) as Eurostat statistics and recent studies show. However, working overtime is more common in Finland than in the EU.

In our study, we deepen into analysis of factors, which potentially affect these dynamics. One of these factors is age, which has been already shown to be a significant moderator for working hours in the world. Society is living in a time of great change, and it especially concerns politics and social science research. As a result of the aging of the population, the pandemic, the war in Ukraine and the energy crisis, the labour market has

also experienced an unprecedented change. In working life, nothing is the same, especially when it comes to the mobility of the workforce, the forms of work organization and the employees' influence and well-being. Taking these factors into account, this study has a clear goal of reforming working life to produce new information about the well-being of employees and the needs for developing working conditions.

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Annex 1

Figure 1. A scatterplot based on the specification of a Regression Discontinuity Design and estimated for the association between actual working hours per week and age. The models estimated by OLS for the functional form and applied for the cutoff of 32 years
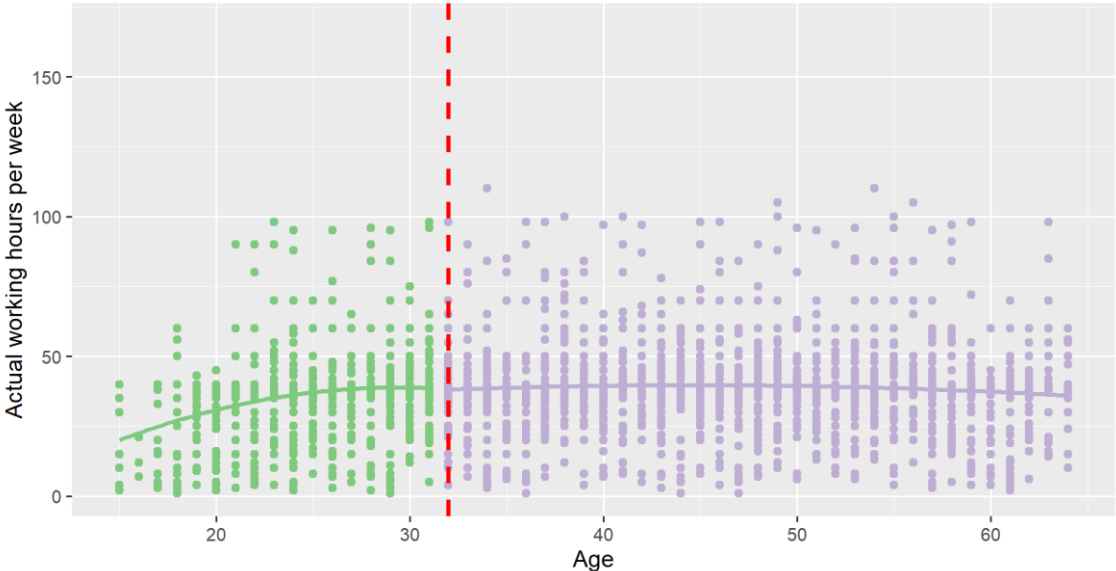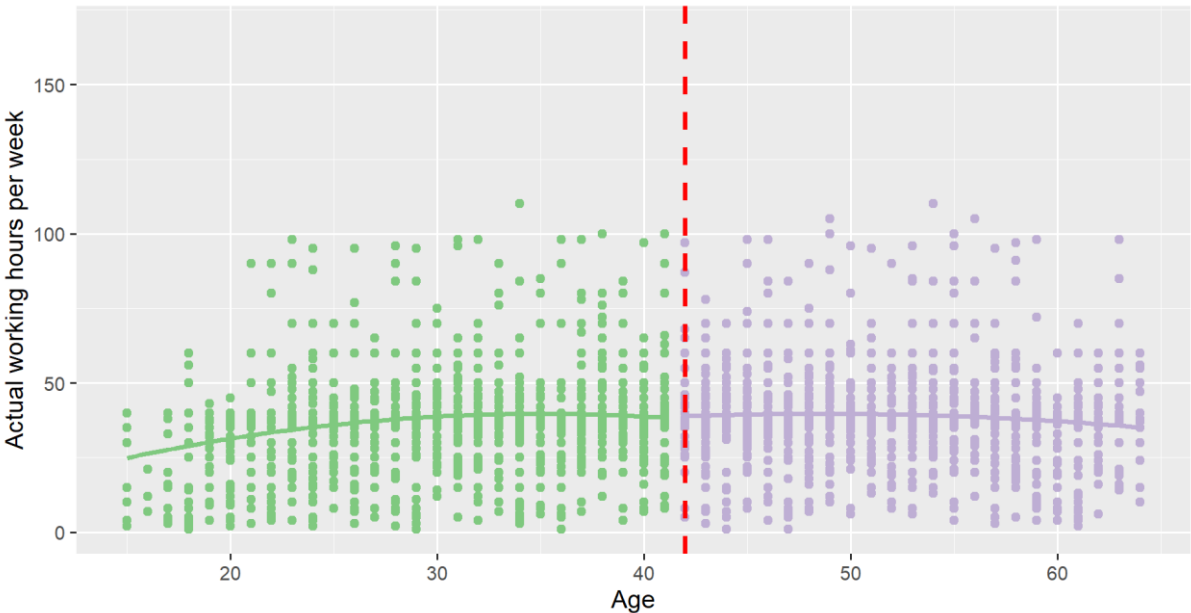

Figure 2. A scatterplot based on the specification of a Regression Discontinuity Design and estimated for the association between actual working hours per week and age. The models estimated by OLS for the functional form and applied for the cutoff of 42 years

Figure 3. A scatterplot based on the specification of a Regression Discontinuity Design and estimated for the association between actual working hours per week and age. The models estimated by OLS for the functional form and applied for the cutoff of 52 years
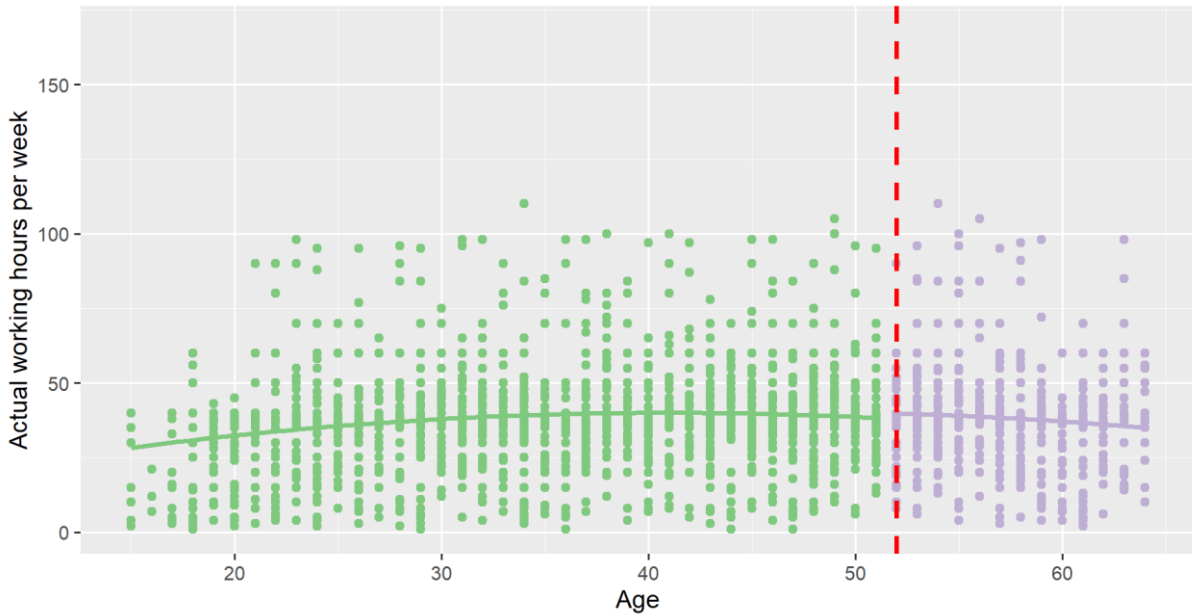

Figure 4. A scatterplot based on the specification of a Regression Discontinuity Design and estimated for the association between preferred working hours per week and age. The models estimated by OLS for the functional form and applied for the cutoff of 32 years
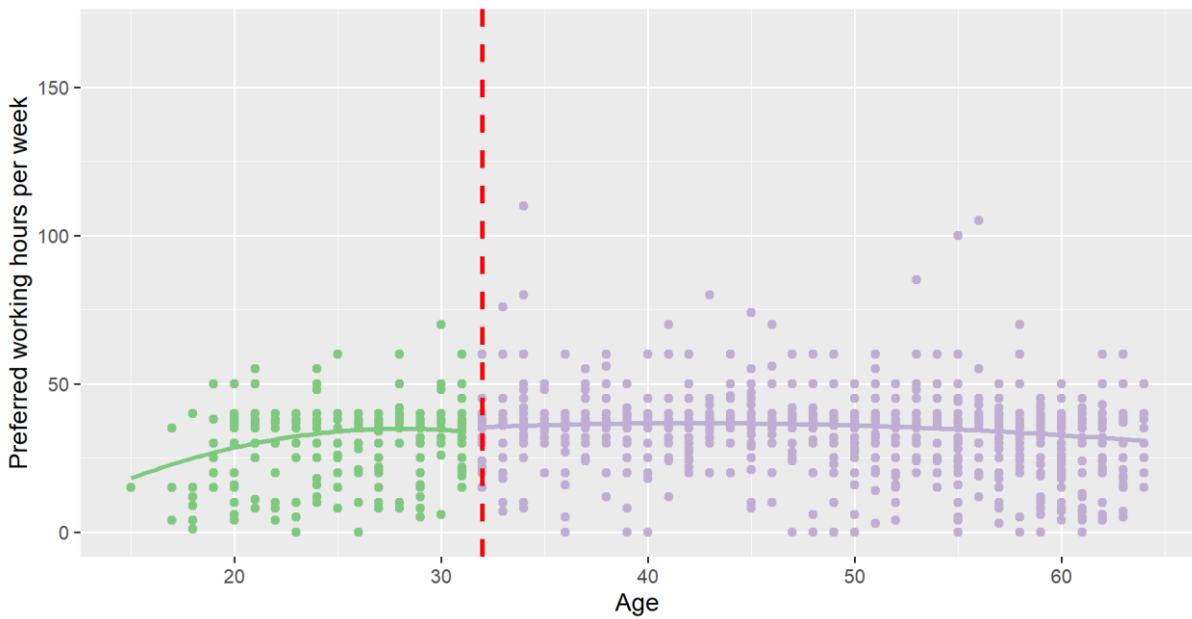
Figure 5. A scatterplot based on the specification of a Regression Discontinuity Design and estimated for the association between preferred working hours per week and age. The models estimated by OLS for the functional form and applied for the cutoff of 42 years
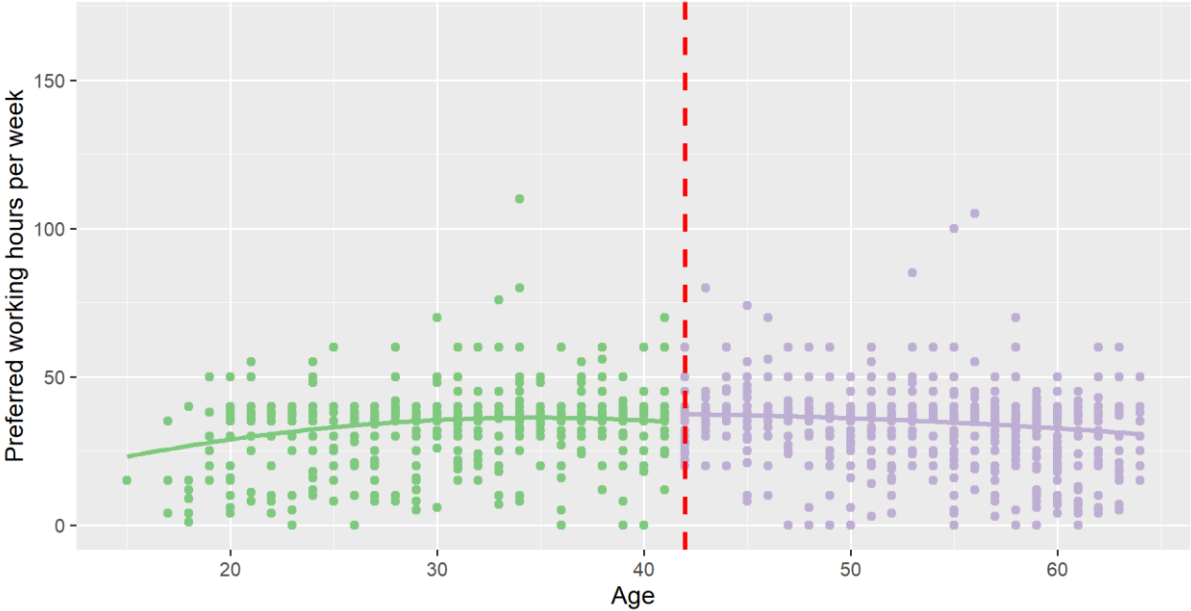

Figure 6. A scatterplot based on the specification of a Regression Discontinuity Design and estimated for the association between preferred working hours per week and age. The models estimated by OLS for the functional form and applied for the cutoff of 52 years