Original Article

Working Hours and Fertility: The Impact of Nonstandard Work Schedules on Childbearing in France

Anne Lambert[1] ⓘ, Mariona Segú[1,2], and Chhavi Tiwari[1] ⓘ

Abstract

The relationship between nonstandard work schedules (NSWS) and fertility assumes prominence in developed countries that have witnessed a concerning decline in fertility and an increase in NSWS. Our study investigates the effect of different types of NSWS on women's fertility in France. We use the Conditions de Travail (CT) panel dataset covering 4178 women of child-bearing age in 2013, 2016, and 2019. Using fixed effect models, we find that working a nonstandard schedule decreases the propensity of a woman to have a new child. In addition, the result is primarily attributable to the first child compared to the second child. When assessing the different types of NSWS, we find that the negative effect of NSWS is stronger for the night schedule than the weekend, evening, and morning work. Finally, the implications of these findings are discussed related to work-life policies.

Keywords

nonstandard work schedule, fertility, women, panel data, France

[1]Institut national d'études démographiques, Aubervilliers, France
[2]CY Cergy Paris Université, France

Corresponding Author:
Anne Lambert, Institut national d'études démographiques, 9 Cours des Humanités, Aubervilliers 93300, France.
Email: anne.lambert@ined.fr

Introduction

With a shift towards services-led growth and a 24/7 economy, nonstandard work schedules (NSWS), including evening, night, and weekend, have become increasingly common (Kim, 2021; Pilarz et al., 2020). As more than 1 in 3 employees (about 39%) in European countries work in NSWS (Gracia et al., 2021)[1], the question of the "timing of work" has started gaining attention among demographers and sociologists in recent years (Maume & Sebastian, 2012; Presser, 2004; Täht & Mills, 2016).

At the same time, European countries have witnessed a concerning decline in fertility rates to below replacement levels (UN 2020[2]; Murray et al., 2018) and the persistence of low fertility is increasingly debated (Murray et al., 2018). A number of theories have been advanced to explain fertility decline, including education and work characteristics (Sinyavskaya & Billingsley, 2015). Some recent studies report that women working on short term contracts and non-standard employment are likely to have fewer children (Laß, 2020; Shreffler, 2017), and they postpone maternity until they get job security (Vignoli et al., 2020). Based on data from 23 European countries, Begall and Mills (2011) find that higher perceived work control over schedule increases fertility intentions.

Although the link between paid employment and fertility is widely studied, employment is often examined by focusing on women's labor market status or number of hours (part-time vs. full-time employment), and little attention has been given to the "timing of work." The link between NSWS and family outcomes is noteworthy as they pose challenges for working parents with young children. On the one hand, NSWS may offer couples some benefits, like overlapping shifts and minimizing non-parental child care costs (Begall & Mills, 2011). On the other, NSWS can make it difficult for working parents to arrange child care, disrupt family routines, exacerbate work-family conflict (WFC) (Laß & Wooden, 2022; Presser, 2004), or deteriorate partnership quality (Täht & Mills, 2016; Taji, 2020). Increasing evidence suggests that people who work nonstandard schedules on an involuntary basis report lower partnership quality and WFC (Begall et al., 2015; Laß & Wooden, 2022; Mills & Täht, 2010). Moreover, NSWS, especially night work (Rodriguez et al., 2020) may increase stress levels (Suleiman et al., 2021) and raise health issues (Rivera et al., 2020), including reproductive health.

While very few studies have extended this literature on fertility (Begall et al., 2015; Sinyavskaya & Billingsley, 2015), the causal evidence is very limited and, at best inconclusive. In the most relevant study, Begall et al. (2015) for the Netherlands found that female partners engaged in nonstandard schedules had a lower probability of having a first child, but for the second child, the probability was higher. In contrast, Sinyavskaya and Billingsley (2015) did not find any significant effect of work schedules on women's

fertility intentions in Russia. However, none of these studies distinguishes between different types of NSWS. The relationship between NSWS and fertility might also be impacted by the nature of NSWS, that is, voluntary or involuntary. For example, Kim (2020) finds that women in the United States with young children are more likely to work in voluntary NSWS than those with no child.

France provides a unique setting to examine NSWS and fertility relationship for two main reasons. First, France has a high fertility rate (the highest in Europe) and a high female employment rate. As per the latest estimate, the total fertility rate stabilized at 1.84 children per woman in Metropolitan France in 2018, contrasting with countries in northern Europe (Pison, 2020). The employment rate of women is 68%, with a smaller proportion (26%) working part-time (Eurostat, 2020; Gromada & Richardson, 2021) due to a generous system of high-quality childcare facilities (Thévenon et al., 2014). However, work-family policies vary widely across sectors, firms, and employees (Pailhé & Solaz, 2019; Thévenon et al., 2014) and there is a lack of synchronization between the timing of work and childcare services like nursery schools, crèches, and qualified childminders (Fagnani, 2012). Secondly, the incidence of NSWS in France is close to the European average (Eurostat, 2020). But unlike in other countries, both men and women in France working non-standard hours tend to work longer on average (43 h/week for men, 36 h/week for women) than those working regular schedules (39 h/week for men and 34 h/week for women). Moreover, recent report reveals that women worked more in NSWS (36.5%) than men (34.8%) in 2019 (Lambert & Langlois, 2022).

This study analyzes the links between NSWS and the fertility using *Conditions de Travail* (CT) panel dataset covering active individuals in France in 2013, 2016, and 2019. Using different *frequencies* and *types* of NSWS in the analysis, our study makes three significant contributions to the emerging literature on NSWS and fertility. First, thus far, the extent of research on the employment-fertility relationship focused on work hours or work status but not on the timing of work. In this paper, we examine how the timing of work is associated with fertility. Second, we extend the literature on NSWS and fertility using longitudinal data covering a longer period and larger sample than any other study. Using panel dataset can help in dealing with causality, which is identified but not addressed in the related literature (Taji, 2020). Third, we use different indicators of NSWS to examine heterogeneity in the impact of nonstandard days vs nonstandard hours (and their combination). Finally, we look at the effects by *frequency* (usual vs occasional and night vs other schedule) and make an attempt to separately investigate the effect of voluntary versus involuntary NSWS using information about job instability and time constraints.

Theoretical Background and Hypothesis

Working a nonstandard schedule is mostly seen as undesirable and has an adverse effect on health and family outcomes. Working NSWS is found to cause acute and chronic health problems (Rivera et al., 2020; Rodriguez et al., 2020; Suleiman et al., 2021). Therefore, NSWS potentially reduces fertility by causing health problems for women (Attarchi et al., 2013; Rodriguez et al., 2020).

Furthermore, NSWS also impacts fertility through partnership quality and family outcomes. Studies have found a negative effect of NSWS on completing parental duties as it may pose multiple challenges regarding childcare (Laß & Wooden, 2022; Presser, 2004). A shift schedule may hinder the quality of time with the partner and reduce parent's physical and mental energy (Grzywacz et al., 2011). In addition, most child-care centers and preschools provide services exclusively during daytime hours. Thus, parents with NSWS encounter difficulty finding child-care providers that can accommodate their work schedule needs (Breitkreuz et al., 2021). Empirical evidence on NSWS and family outcomes also suggests negative consequences of NSWS on marital life, such as separation and divorce (Kalil et al., 2010; Presser, 2004). Based on the results of these studies, we expect that *women working in nonstandard schedules have a lower probability of having a new child between the two survey waves than the women working standard schedules (Hypothesis 1a)*. Further, the effect should be stronger for women who worked NSWS for a longer time period, as the adverse effects on health and family outcomes may worsen in the longer period. So, we expect that *the negative impact of NSWS on fertility will be higher for the women who work in NSWS for a longer time-period (Hypothesis 1b)*.

As stated before, fertility and NSWS also vary with the *frequency* and *type* of NSWS. Studies report that working a nonstandard schedule regularly has higher negative health and family impacts than working a rotating schedule or working a nonstandard schedule occasionally (Smith et al., 2013). Research also indicates that women working particularly *night* shift have more significant negative health outcomes (Chau et al., 2014; Fernandez et al., 2021) and greater negative effects on partnership quality and WFC (Davis et al., 2008; Presser, 2004). Thus, we anticipate that *Hypothesis 1 will be stronger for women working night shifts than other types of NSWS (e.g., only hours, only days, any one, or both) (Hypothesis 2a). Moreover, the intensity of the impact will be stronger for women regularly engaged in NSWS than for women engaged in NSWS on an occasional basis (Hypothesis 2b)*.

On the opposite side, some studies have documented that parents may intentionally use NSWS to accommodate their child-care needs (Kim, 2020). For example, evening and night shifts may allow parents to be at home during

the daytime so that they can take care of the children, especially young children who do not attend school. If such benefits (i.e., parental availability at home during daytime) are believed to outweigh the costs of working non-standard schedules (i.e., depletion of energy and parental unavailability during evening or nights) and the costs of working regular daytime hours, women may opt to have a new child, especially in case of the second child as they get used to parental activities and can adjust their work schedule to their fertility plans (Begall et al., 2015). If true, *we expect that the negative impact of NSWS on fertility will be higher for the first child than the second child (Hypothesis 3).*

Finally, the association between NSWS and fertility will also depend upon the *nature* of NSWS, whether it is the employer's requirement (involuntary NSWS) or the employee's preference (voluntary NSWS). For example, Kim (2020) finds that parents with children until the age of 14 are more likely to engage in voluntary NSWS than those with no child due to family reasons. Since we do not have a direct measure of the involuntary nature of NSWS in the survey, we proxy for involuntary NSWS with job instability and time constraint in the job. Both of these variables are available in the survey. Instability in the job generates uncertainty about the future, thus discouraging employees from long-term commitment and forcing them to postpone having children (Alderotti et al., 2021; Busetta et al., 2019). Another important feature of involuntary NSWS can be the time constraint and the lack of subjective control over the work schedule. Higher autonomy and flexible work schedule are shown to positively impact work-family balance (Byron, 2005; Han et al., 2010) and, therefore, also impact fertility intentions (Begall & Mills, 2011). Thus, we consider employees having instability or time constraints in the job, are supposedly engaged in involuntary NSWS, and will have a stronger negative impact on fertility. This leads to our fourth hypothesis that *the negative impact of NSWS on fertility assumed in Hypotheses 1 will be stronger for women working NSWS with job instability and time constraint (involuntary NSWS) than women working NSWS without job instability or time constraint (voluntarily NSWS) (Hypothesis 4).*

Methodology

Data

We use data from the three waves (2013, 2016, and 2019) of the *Conditions de Travail* (CT-RPS) survey on working conditions, a nationally representative panel sample of economically active individuals in France. The original sample of 33,673 working individuals was representative of working people in 2013 in mainland France, Martinique, Guyane, and La reunion. For this paper, we focused exclusively on respondents observed in all three waves,

aged 15–49 and living in mainland France. These three selection criteria provided a total sample of 7205 individuals.

We only included women in our analysis, considering that the same control variables affect men's and women's fertility decisions differently. Further, we only selected women in the age group of 15–49 years based on the World Health Organization definition of reproductive age. Thus, our final panel sample consists of 4178 women of age 15-49. As the survey could only be re-administered for approximately 38.1% of the original sample, we first addressed the observable determinants of attrition in Supplemental Table A1. Supplemental Table A1 shows that working NSWS is not a significant factor in determining attrition.

Measures

Dependent Variable: Fertility. The outcome variable of our analysis, "fertility," is defined as the birth of a new child between the two waves of data collection. The variable would take the value "1" if the woman had any *new child* between the two survey waves. Since we were interested in an increase in fertility rather than just the first birth, we chose *new child* as the measure of fertility for the baseline result. In addition, we also check for *first* and *second* child.

Independent Variables: NSWS. Our primary explanatory variable is a dichotomous indicator of working in nonstandard schedules. The main advantage of the CT dataset is that it provides in-depth information about NSWS. We know if employees worked *occasionally* or *usually* in the evening (8 p.m.–midnight), night (midnight–5 a.m.), and early morning (5 a.m.–7 a.m.), on Saturdays and/or Sundays. This allows us to build a precise measure of NSWS that accounts for both nonstandard *hours* and nonstandard *days*.

Length of NSWS. Further, to investigate whether working in NSWS for a longer time period has a stronger negative impact on fertility, we measure the length of working in NSWS based on how many rounds women reported to be engaged in NSWS. The length of NSWS is defined as a categorical variable with four possible categories; (1) women who never worked in NSWS, (2) women who are working in NSWS only in the current round, (3) women who worked in NSWS only in the previous round, and (4) women who worked in NSWS in both the rounds (present and the previous round). The measure allows us to test whether working NSWS in two consequent rounds negatively impacts fertility more than working NSWS in only one round.

NSWS Scores. Though our primary variable of interest is dichotomous indicators of working in NSWS, we deem it important to create other measures

that account more strongly for participation in NSWS on a *regular/usual* basis and working in night shifts using higher weights for usual frequency and night schedule. We measure three different scores based on different weights:

NSWS Score1. First, we assign equal weights to morning, evening, or night shifts with higher weightage for working nonstandard schedules *usually*. This measure accounts for all the NSWS workers (both occasional and usual). The score is measured as the sum of working in the early morning, evening, night, Saturday, and Sundays. We assign a score of "0" for women who never worked in NSWS, "1" for women who worked in a nonstandard schedule occasionally, and "2" for the women who worked "usually" in NSWS. *NSWS Score1* ranges from 0 to 10.

NSWS Score2. Next, we assign a comparatively higher weight to women *usually* involved in NSWS. Now, instead, a score of "0" is set for women never worked NSWS, "1" for occasional NSWS, and "3" for women working NSWS usually. This *NSWS Score2* measure ranges from 0 to 15.

NSWS Score3. In the third measure, we assign more weight to the night shift than any other nonstandard schedule, as literature reveals specific negative outcomes of the night shift on health. In addition to *NSWS Score2*, a score of "0" is assigned to women who never worked night shift,"3" for occasionally working night shift and "5" for usually working night shift. The rest of the weights are the same as in NSWS *Score2*. The *NSWS Score3* ranges from 0 to 17.

Further, we exploit the richness of this data to test which type of NSWS is more strongly associated with fertility. We test three other measures of NSWS separately: (i) nonstandard working hours, (ii) nonstandard working days (weekends) and (iii) nonstandard working days and hours.

Voluntary and Involuntary NSWS. As stated before, unlike the Current Population Survey (CPS) of the United States used by several researchers, like Presser (2004) and Kim (2020), we do not have any direct measure for the involuntary nature of NSWS in the data. Thus, to distinguish between the voluntary and involuntary nature of NSWS, we use measures for job instability and time constraint.

For *job instability*, two related questions are used; *fear of losing the job (=1 if yes) and want to change the job or the qualification (=1 if yes)*. We categorize employees with an *unstable job* if they reported *yes* to any of the above two questions. For *time constraint*, six variables were chosen with binary information; *subject to schedule check by the employer either by time clock, badge, signature or in any other form by the management (=1 if yes),if often work beyond work schedule (=1 if yes), knowledge of the work schedule in*

advance (=1 if less than a month), *working part-time because no other job available (=1 if yes)*, *cannot take time off in case of a family emergency (=1 if it is not possible)*, *work time does not match with family time (=1 if not good or not very good)*[3]. We categorize women employees with time constraint if they reported "1" for any of the six questions.

Control Variables. The control variables used in this study are chosen to take into account the most relevant time-varying factors used in economic and demographic literature to explain fertility (Begall & Mills, 2011; Kim, 2020; Täht & Mills, 2016). These are women's age, square of the women's age, education levels, total weekly earnings per month, weekly hours worked, spouse activity status, and type of work contract.

Descriptive Statistics

Table 1 presents summary statistics of all the variables used in the estimation by year of the survey. The percentage of women working nonstandard schedules decreased over time (40% in 2013 to 36% and 34% in 2016 and 2019, respectively). The figures are consistent with the fact that we observe same sample over 6 years and as a woman become older over time, they work more in daytime and regular schedules (Presser & Ward, 2011). The percentage of women working in NSWS in two consequent rounds also declined from 29% in 2016 to 26% in 2019. On the contrary, the average total hours worked remained almost the same over time (34–35 hours a week). We also see that approximately 17% of the women in the sample had a new child during the first period (2013–16) and 12% during the second period (2016–19). While the percentage of women working on a permanent contract remained almost constant over time (89% in 2013 and 87% in 2016 and 2019), the same is reduced in the fixed-term contract (11% in 2013 to 4% in 2019). Between the two survey waves, the remaining women (8% in 2016 and 9% in 2019) either became unemployed or left the job market. Most of the women have bachelors' level of education (45%). Women with inactive spouses represent 8–9% of the sample.

Empirical Strategy

One of the challenges in studying the links between fertility and NSWS is the possibility of reverse causality (Kim, 2020). The relationship between fertility and NSWS can be the result of women's simultaneous choice in the two life spheres. The availability of panel data provides potential for investigating causal modeling (Kreyenfeld, 2021). In our analysis, we use individual and round fixed effect model to estimate the impact of NSWS on fertility.

Table 1. Descriptive statistics.

Variable	2013		2016		2019	
	Mean	SD	Mean	SD	Mean	SD
Work schedule						
NSWS hours or days	0.40	0.49	0.36	0.48	0.34	0.47
NSWS Score1[a]	2.59	3.09	2.37	3.04	2.25	2.92
NSWS Score2	3.57	4.54	3.27	4.45	3.07	4.26
NSWS Score3	3.85	5.01	3.52	4.92	3.31	4.70
NSWS length						
Never	-	-	0.53	0.49	0.56	0.49
Current round	-	-	0.07	0.25	0.08	0.26
Previous round	-	-	0.11	0.31	0.09	0.29
Both rounds	-	-	0.29	0.45	0.26	0.43
Total Hours worked	34.21	9.19	34.93	8.99	35.49	9.05
New Child	-	-	0.17	0.38	0.12	0.33
Number of children in 2013	1.45	1.07	1.45	1.07	1.45	1.07
Age	35.60	5.87	38.63	5.87	41.60	5.87
Education level						
<High School	0.23	0.42	0.23	0.42	0.20	0.40
High School	0.20	0.40	0.20	0.40	0.18	0.38
Bachelor	0.45	0.50	0.45	0.50	0.43	0.50
Master+	0.12	0.32	0.12	0.33	0.13	0.34
Log of monthly income	6.93	1.58	5.87	2.98	5.86	3.06
Employment type						
Permanent contract	0.89	0.31	0.87	0.34	0.87	0.21
Fixed term contract	0.11	0.31	0.05	0.23	0.04	0.33
Inactive spouse	0.09	0.42	0.08	0.40	0.08	0.40
Migration status						
Born in France	0.94	0.34	0.94	0.11	0.94	0.12
Immigrant from EU	0.01	0.11	0.01	0.20	0.01	0.20
Immigrant from other countries	0.04	0.20	0.0	0.20	0.04	0.20

[a]Notes: [a]In three NSWS scores, Score 1 includes 0 for Never worked in NSWS, 1 for Occasional NSWS, and 2 for regular NSWS. Score 2 includes 0 for Never, 2 for Occasional and 3 for regular NSWS. Score 3 includes 0 for Never, 3 for Occasional night schedules (2 for other Occasional NSWS) and 5 for regular work in night schedules (3 for other regular NSWS).

Including individual fixed effects allows us to account for any time-invariant idiosyncrasy related to desired fertility.

The specification of the estimated equation is as

$$NewChild_{it} = \alpha_i + \tau_t + \gamma_1 NSWS_{it} + \partial_1 X'_{it} + \varepsilon_{it} \tag{1}$$

where $NewChild_t$ is a dichotomous variable "1" if the women i reported to have any additional child in wave $t = 2016, 2019$. NSWS refers to the different measures of NSWS including binary measures, length of NSWS and NSWS scores. X_{it}' is a vector of other time-varying control variables (age, education, type of employment, total hours worked, monthly earnings, and spouse's employment status), α_i is the individual fixed effects and τ_t is a survey round indicator. γ_1 (coefficient of $NSWS_{it}$) is related with our first hypothesis (H1a) and we expect a negative effect of working in NSWS on fertility.

Further, to test for the length of NSWS (H1b), we replace binary indicator with the length of NSWS in our model and expect a stronger negative effect for women who worked NSWS in two consequent rounds. We also estimate both the present and the lagged effect of working nonstandard schedules on fertility. Further, we extend our analysis for *types-night* vs *other time* (H2a) and usual versus occasional NSWS (H2b). In separate models, equation (1) is also used with other dependent variables for *first* and *second* child (H3).

Results

Impact of NSWS on Fertility

Table 2 reports the estimation results from the model specified in equation (1) showing the influence of working nonstandard schedules on fertility. The first column of Table 2 reports the fixed effects estimation using only contemporaneous values of NSWS. We note that when women work in NSWS, they report 4% less probability of having a new child than when they do not work in NSWS. The results support our first hypothesis that working in NSWS decreases the probability of having children (H1a). Column 2 in Table 2 shows the results after including the lagged value of NSWS with no significant change in the result.

Further, we include length of NSWS in col. 3. We find that only women who worked NSWS in two consequent rounds have less probability (6%) to have a new child while women who worked only in one round (current or previous) do not face any significant effect of NSWS on fertility. Thus, the length of working in NSWS appears to be more important for fertility decisions than merely the participation in NSWS in one round. These findings provide evidence for our next hypothesis (H1b). At this juncture, it is worthwhile to mention that since we find significant results only for women who have been engaged in NSWS for a longer time, it raises the question of endogeneity. Women who always chose to work in NSWS can be systematically different in terms of their preference towards having children than the women who do not chose to work in NSWS.

To deal with this issue, in the next three columns (col. 4–6), we re-estimate the results for women employees only in the health sector. The reason behind

Table 2. Impact of nonstandard work schedules (NSWS) on fertility (Dependent variable = New Child) - fixed effect model.

	All Sample			Only Health Sector		
	Without lag	With lag	Length of NSWS	Without lag	With lag	Length of NSWS
	(1)	(2)	(3)	(4)	(5)	(6)
NSWS	−0.042**	−0.048**		−0.071**	−0.082**	
	(0.019)	(0.021)		(0.032)	(0.03)	
Lag of NSWS		−0.014			−0.028	
		(0.020)			(0.033)	
Current round			−0.045			−0.051
			(0.027)			(0.049)
Previous round			−0.012			−0.003
			(0.026)			(0.043)
Both rounds			−0.062*			−0.104*
			(0.034)			(0.056)
Age	0.002	0.002	0.002	0.033	0.033	0.032
	(0.025)	(0.025)	(0.025)	(0.042)	(0.042)	(0.042)
Age^2	0.0005**	0.0005**	0.0005**	0.0003	0.0003	0.0004
	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0004)	(0.0004)
High School	0.034	0.035	0.035	−0.013	−0.006	−0.005
	(0.12)	(0.115)	(0.115)	(0.279)	(0.279)	(0.279)
Bachelor	0.079	0.080	0.081	0.159	0.167	0.170
	(0.11)	(0.113)	(0.113)	(0.269)	(0.270)	(0.270)
Master+	0.080	0.078	0.078	−0.091	−0.094	−0.084
	(0.126)	(0.126)	(0.127)	(0.275)	(0.275)	(0.276)

Table 2. (continued)

	All Sample			Only Health Sector		
	Without lag	With lag	Length of NSWS	Without lag	With lag	Length of NSWS
	(1)	(2)	(3)	(4)	(5)	(6)
Log of monthly income	0.001	0.001	0.001	0.003	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.005)
Fixed term contract	−0.049**	−0.049**	−0.049**	−0.097**	−0.096**	−0.098**
	(0.022)	(0.022)	(0.022)	(0.045)	(0.045)	(0.045)
Permanent contract	0.089	0.089	0.089	0.070	0.072	0.072
	(0.058)	(0.058)	(0.057)	(0.101)	(0.101)	(0.101)
Total Hours worked	−0.005***	−0.005***	−0.005***	−0.007***	−0.007***	−0.007***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Inactive spouse	−0.001	−0.001	−0.0009	0.032	0.033	0.032
	(0.017)	(0.017)	(0.017)	(0.031)	(0.031)	(0.031)
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,758	7,758	7,758	2,825	2,825	2,825

Notes: Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Individual and time fixed effect models. The reference category for the length of NSWS in columns 3 and 6 is *Never*. The reference category for the education level is *<High School*. The reference category for the employment contract type is *Independent*.

choosing health sector as a check is that this sector in general requires more participation in NSWS (Maume & Sebastian, 2012; Presser et al., 2008) due to the organization of the work itself, rather than employee's choice. Also, people who choose to work in the health sector are more driven by the social value of work (care) than by the scheduling of work. In our sample, around 54% of women employees in health sector reported to be engaged in NSWS. In col. 4–6, we notice same results as compared to col. 1–3. Only now the size of the effect has further increased from 4% to 7% on account of more participation in NSWS in this particular sector. Thus, our results for the negative impact of NSWS on fertility hold.

Turning to the control variables, interestingly, total number of hours worked has significant and negative impact on fertility indicating that women who work for a greater number of hours may decide to postpone childbearing or limit the number of children. We also find a negative and significant effect of fixed term contract on fertility. As previous literature has shown (Rica & Iza, 2005), the uncertainty created by fixed term contract may encourage postponing childbirth.

Heterogeneity in Effects of Different Types and Intensity of NSWS. Next, we examine possible heterogeneity in the impact of NSWS by different types (only hours, only days, hours and days) and intensity. In Table 3, the first three columns (col. 1–3) include binary indicators of different types of NSWS. Results show that while working only nonstandard hours does not affect fertility significantly, the effect of working on nonstandard days and working both nonstandard days and hours has negative and statistically significant on fertility. Though, working both nonstandard days and hours has a stronger effect.

Further, in col. 4–6, we show the effect of different types of NSWS scores. To explain the effect of NSWS scores, we use standardized coefficients[4] as the explanatory variable has no natural metric or scale. From col. 4, we observe that a 1-point increase in standard deviation of NSWS *Score1* (with equal weights), decreases the probability that the woman will have a new child by 5% ((0.0065*2.93)/0.38). After using higher weights for *usual (Score2)* and *night schedules (Score3)* in col. 5 and 6, respectively, the effect changes to 6.5% (more weights to *usual* schedule) and 6.7% (more weights to *night* schedule). This suggests that among the NSWS measures, working in night shift has the highest negative impact on fertility keeping in line with other studies (Chau et al., 2014; Fernandez et al., 2021). Thus, these results provide support for our second hypothesis that women working the *night shift (H2a)* and NSWS on *usual (H2b)* basis report stronger negative effect of NSWS than women working other NSWS.

Table 3. Impact of Types and Intensity of NSWS on Fertility (Dependent Variable = New Child)—Fixed Effect Model.

| | NSWS Binary Indicators | | | NSWS Score | | |
| | Only Hours | Only days | Hours and Days | Socre1 | Score2 | Score3 |
	(1)	(2)	(3)	(4)	(5)	(6)
NSWS	0.032	−0.036*	−0.044*	−0.006*	−0.006*	−0.005**
	(0.028)	(0.023)	(0.023)	(0.004)	(0.002)	(0.002)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,758	7,758	7,758	7,758	7,758	7,758
Mean and SD of score	-	-	-	2.45 (2.93)	3.27 (4.25)	3.62 (4.78)

Notes: Individual and time fixed effect models with all the controls as in Table 2. Score 1 includes 0 for Never worked in NSWS, 1 for Occasional NSWS, and 2 for regular NSWS. Score 2 includes 0 for Never, 2 for Occasional and 3 for regular NSWS. Score 3 includes 0 for Never, 3 for Occasional night schedules (2 for other Occasional NSWS) and 5 for regular work in night schedules (3 for other regular NSWS). Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 4. Heterogeneous Analysis by Number of Children (Dependent Variable = First Child or Second Child)—Fixed Effect Model.

	First Child		Second Child	
	(1)	(2)	(3)	(4)
NSWS	−0.139***	−0.109**	−0.052	−0.079
	(0.0499)	(0.0538)	(0.051)	(0.054)
Lag of NSWS		0.0853		−0.074
		(0.0558)		(0.055)
Controls	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	1,869	1,868	1,710	1,710
% of women in NSWS	37.2%		36.9%	

Notes: Individual and time fixed effect models with all the controls as in Table 2. Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 5. Impact of NSWS on Fertility by Job Instability and Time Constraint. (Dependent Variable = New Child), Fixed Effect Model.

	Stable Job	Unstable Job	Without Time Constraint	With Time Constraint
	(1)	(2)	(3)	(4)
NSWS	−0.003	−0.098**	−0.262***	−0.040*
	(0.027)	(0.045)	(0.065)	(0.024)
Controls	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	4,965	2,793	2,033	5,725
% of women in NSWS	36.2%	37.02%	24.06%	40.06%

Notes: Individual and time fixed effect models with all the controls as in Table 2. Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Individual and time fixed effect models.

Heterogeneous Analysis by Number of Children

Table 4 reports the results of the effect of NSWS by number of children. We find that while our results (as reported in Table 2) remains true for first child, we do not find any significant effect of NSWS on the probability of having second child. Our result complies with the results of Begall et al. (2015).

Table 6. Heterogeneous analysis by sector.

	Industry and Construction	Commerce, Transport and Accommodation	Communication, Finance, Management, Legal, Scientific and Technical Activities	Administration	Education	Health	Other Tertiary
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
NSWS	−0.061	−0.191**	−0.239**	−0.056	0.047	−0.071**	0.059
	(0.092)	(0.089)	(0.114)	(0.071)	(0.041)	(0.032)	(0.184)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	659	859	678	1,069	1,134	2,825	361
% of women in NSWS	26.2%	55.79%	20.1%	14.9%	26.1%	53.9%	35.01%

Notes: Individual and time fixed effect models with all the controls as in Table 2. Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Impact of Voluntary Versus Involuntary Nature of Work Schedules on Fertility

In Table 5, we report results for employees with stable (col. 1) and unstable job (col. 2) and employees without time constraint (col. 3) and with time constraint (col. 4) separately. Results indicate the women who work in NSWS with instability in the job, are less likely to have children while women with stable job report no significant effect of NSWS on fertility. For time constraint, we find that women with and without time constraint both have negative impact on fertility when they work in NSWS. Though, the effect is stronger for women without time constraint, mainly because of the less participation of women in this category with NSWS (24.1%). Thus, it is the job instability component of involuntary NSWS that decreases fertility more. It does not matter if they face time constraint or not but being in a stable job negates the impact of NSWS on fertility.

Robustness Checks

We also perform two additional analyses to check the robustness of our results. First, instead of educational level, we control for occupational ranks of the employees. In Supplemental Table A2, we reproduce our results of Table 2 (col. 1–3) after controlling for occupational categories (Managers, intermediate profession, qualified employees, non-qualified employees, skilled workers, and unskilled workers). Supplemental Table A2 shows similar results as before.

In Table 6, we perform a sector-wise analysis. The sector-wise analysis shows that except for communication, finance etc. (col. 3), the effect of NSWS is strongest and significant only in the healthcare, Commerce and Transport sectors where the participation in NSWS was highest.

Discussion and Conclusion

Using a large-scale panel survey in France, this paper investigates the effect of NSWS on fertility among women, employing a fixed effect model. While existing research (Taji, 2020) considered different mechanisms (health, partnership quality, and WFC) in relation to fertility, we rather address the question how the "timing of work" influences fertility by considering various measures of NSWS (only NSWS hours, only NSWS days, both NSWS hours and days, and nights). We also tested for the *frequency* of NSWS (higher weights for usual and nights) and a proxy for voluntary or involuntary *nature* of NSWS that uses stability and time constraint in the job.

Based on the literature, we expected a negative effect of NSWS on having a new child between the two survey waves and we find a negative and

significant effect in support of our first hypothesis in line with Begall et al. (2015). Further, we expected that women who work nonstandard schedules for a longer time period will have stronger negative impact on fertility. From our results, we find the support of this hypothesis. We find a negative and stronger impact of NSWS for women who worked NSWS in two consequent rounds.

In the second hypothesis, expanding our measures of NSWS, we investigated whether there is evidence that *night* shift or *usual* NSWS has a stronger impact than other types of NSWS. From our findings, we also get support for this hypothesis. The impact of night shift work was specifically greater for women having a new child during the two survey periods. The effect of night shift work appeared in line with the existing literature.

Thirdly, we also tested for the effect of first versus second child following Begall et al. (2015) and we find that while the negative effect of NSWS remains true for first child, it does not have any significant effect on having second child. A reason for this behavior can be the flexibility of scheduling and tag-team parenting among partners working NSWS that may reduce the need for other formal childcare services, according to their preference for the personal care of their children (Begall et al., 2015). Employment in NSWS may thus facilitate women to remain in the labor market and at the same time take care of the children. However, time is needed to set up a domestic organization that fits with both female and male work schedules and to get accustomed to it. This is the reason why women who already had one child and have experience in childbearing, they might utilize the positive aspects of NSWS for tag-team parenting. Finally, considering the voluntary and involuntary nature of NSWS using stability of the job and time constraint, our findings reveal that the impact of NSWS on fertility is only true for women working nonstandard schedules with unstable job while both women with and without time constraint report to have negative impact of NSWS on fertility.

Despite the documented evidence of the negative effect of NSWS on health (Rivera et al., 2020; Rodriguez et al., 2020) and family outcomes (Laß & Wooden, 2022; Presser, 2004; Täht & Mills, 2016; Taji, 2020), women are found to be consistently participating in NSWS due to the flexibility it offers to manage paid work and family duties or because of specific constraints on the labor market. The negative effect on fertility is indicative of "out of sync" work/family policies where childcare facilities run according to the "standard" schedule. In the absence of child-care in nonstandard times, women working nonstandard schedules are more likely to be forced rather than a choice to arrange childcare. Along with the Nordic countries, France leads the European Union in public childcare provision and benefits aimed at reducing child care costs for families (Fagnani, 2012). In the recent decade, however, policy makers have been confronted with new tensions due to the growth of the

service economy and work-on-demand, and working-time deregulations that have led to the rise of NSWS, especially for women who are overrepresented in the service industry (retail, health, etc.) and in low-paid jobs (Lambert & Langlois, 2022). Whereas the involvement of state in "care policies" is focused on very young children, but also on weekdays and office hours (Thévenon et al., 2014), a policy highlighting the need for access to child care in non-standard hours will unleash the greater effect on women's employment and fertility decisions.

Moreover, in France, work/family policies among employers are limited and have only been generalized in some sectors and big companies (Brochard & Letablier, 2017). However, family-supportive organization policies (such as services and child care facilities), and supervisor and coworkers support, have been recognized as playing a key role in employees' ability to balance work and family responsibilities (French et al., 2018; Haar et al., 2019). Access to childcare services and support to work-family reconciliation are essential for economic recovery, gender equality, and child and family well-being (Richardson et al., 2021). Such steps are much needed to support fertility decision of women.

Consequences of NSWS can be reduced when worked on a voluntarily basis. Additionally, if NSWS are predictable and do not change frequently, it may actually help women to better synchronize their work and family times, and reduce parental stress. Consequently, employers could play an important role by informing their workers about the challenges related to NSWS, and by improving scheduling practices. Some steps (minimizing changes to assigned schedules, or helping workers shiftswapping when changes are necessary) likely protect workers against the "unhealthy" effect of the schedules (Taht & Mills, 2016). Further, support for schedule predictability can also prevent negative impact on fertility. Moreover, a stronger regulation of NSWS may be needed to avoid a concentration of time constraints into already disadvantaged labor market segments such as retail, hospitality and service-related jobs where schedules unpredictability is more frequent as shown by other studies (Henly & Lambert, 2014; Swanberg et al., 2014).

Although the findings of this study are interesting, there are some notable limitations. Most importantly, in measuring involuntary nature of NSWS, we do not have a direct question for the reason of working NSWS in the survey. This limits us significantly in our implications for the impact of working NSWS on voluntary or on an involuntary basis. In addition, the dataset does not provide any information about the work schedule of the spouse, which not only predicts the amount of time that women spend at work but also when they work (Begall & Mills, 2011). Some recent research also found that one partner's schedules have an impact on the perception of WFC by the other spouse (Laß & Wooden, 2022). Information about partners' schedules would thus be helpful in exploring how

NSWS may help balancing work and childcare among couples and impact fertility. Finally, our dataset does not provide any information on fertility intentions, as compared to observed fertility (Sinyavskaya & Billingsley, 2015). In order to improve our understanding of fertility behavior in a 24/7 economy, future research can be extended using fertility intentions to capture how NSWS shapes the decisions of couples to have children.

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ORCID iDs

Anne Lambert https://orcid.org/0000-0003-2035-9961
Chhavi Tiwari https://orcid.org/0000-0003-2694-6702

Supplemental Material

Supplemental material for this article is available online.

Notes

1. In comparison, in the United States, almost 31% of employed persons were working on an average Saturday, Sunday or public holiday in 2018 (Bureau of labour statistics, 2019).
2. United Nations Department of Economic and Social Affairs, Population Division (2020). World Fertility and Family Planning 2020: Highlights (ST/ESA/SER.A/ 440).
3. See Supplemental Appendix A3 for the original questions asked in the survey.
4. Standardized coefficients can be computed as $b_1 \frac{S_{x1}}{S_{y1}}$, where b_1 = regression coefficient and S_{x1} and S_{y1} are the standard deviation of the explanatory variable and the outcome variable, respectively.

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