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How does working nonstandard hours impact psychological resources important for parental functioning? Evidence from an Australian longitudinal cohort study

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ABSTRACT

This study investigates the link between nonstandard schedules and three psychological resources salient to working parents' parental functioning (psychological distress, work-family conflict and relationship quality). Data from fathers and mothers are analysed separately, using a nationally representative sample of dual-earner parents (6190 observations from 1915 couples) drawn from the Longitudinal Study of Australian Children (LSAC). The LSAC data was collected between 2008 and 2018 (with data collected every two years). Hybrid analysis models were conducted to identify within-person changes in these psychological resources in association with moving in and out of nonstandard work schedules, as well as between-person differences between parents working standard hours and nonstandard hours. The results indicate that the connections between working nonstandard schedules and the psychological resources were patterned differently across genders. No significant differences in psychological distress were found between those working nonstandard schedules and those working standard schedules for either fathers or mothers. Fathers working nonstandard schedules had higher work-family conflict compared to fathers working standard schedules, while no such effect found for mothers. This effect for fathers was largely explained by other characteristics related to working a nonstandard schedule, rather than the schedule itself. For fathers (but not mothers), working nonstandard schedules was significantly, and potentially causally, associated with lower relationship quality (i.e. within-person effects were found). Additional supplementary analyses found the connections between work schedules and psychological resources varied somewhat across different types of schedules (i.e. evening/night shift, rotating shift and irregular shift). As one of the first nationally representative longitudinal studies to explore changes in work schedules in association with changes in parents' psychosocial resources, the impacts for fathers (particularly relationship quality) are an important line for future enquiry.

1. Introduction

The transition to a 24hrs/7 days economy has been accompanied by an increasing demand for flexibility in work routines – including a growing demand for workers working nonstandard schedules (Presser, 2003). Nonstandard work schedules generally point to all the work arrangements in which a considerable proportion of work hours fall outside the typical 9am-to-5pm, Monday-to-Friday schedule (Presser, 2003). Interestingly, such work schedules are more common among workers who have children, as they see it as a possible solution to juggle both work and family roles and responsibilities (Zhao, 2020b; Pagnan et al., 2011). However, the real impact of working nonstandard hours on parental functioning and parents' experiences of managing the work-family interface is potentially complex and very little research has examined this issue.

The impact of working nonstandard schedules on parenting is likely dependent on the extent to which psychological resources important for parental functioning are increased or reduced. This follows the 'process model of competent parental functioning' proposed by Belsky (1984), which theorises that parents' personal psychological resources are

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central to parental functioning. This model proposes that in addition to psychological resources which impact on parenting directly, contextual (or environmental) factors also interact with parents' psychological resources to impact parental functioning.

Belsky (1984) identified three main factors in the social/-environmental context relevant to parenting: paid and unpaid work, marital relationship quality and parents' social network. Working in a job with nonstandard hours, is a unique work context in terms of the mechanisms that govern the job's influence on parents outside the workplace. Work schedules shape the broader context of parenting and impact on factors such as workers' mental health, marital relationships and their experience of the work-family nexus by governing an important resource that is needed for successful parental functioning – time (Strazdins et al., 2011). Nonstandard working hours often clash with workers' family routines such as family meals, school-day timetables and/or weekend activities. This in turn may lead to more time pressure, compromising their capability in parental functioning (Arlinghaus et al., 2019).

Nonstandard work schedules are likely different from other time-based work strains, such as long work hours, in terms of the impacts on resources available for parental functioning. Whereas the potential impacts of long working hours on parenting results from a lack of non-work time, for those working nonstandard schedules, regardless of whether they work long hours, the non-work time they have available is often incongruent with those around them – this mismatch is potentially a key disrupter to family functioning. In addition, sometimes parents may self-select into nonstandard schedules as an attempt to better fulfil the family needs (Zhao, 2020b; Pagnan et al., 2011), but the trade-off may be that other deficits to family functioning are created (Presser, 2003). Overall, the unique time-based stressors and motivators specific to nonstandard schedules indicate that, firstly, the impact of nonstandard work schedules on parental functioning is likely to be complex, and secondly, that it is important for studies (and workplaces) to understand the impacts of nonstandard schedules distinct from other job characteristics such as working long hours.

For dual-earner couples (the predominant employment situation in Australian couple families with children (ABS, 2019)), it is also emerging that there are cross-over effects between the strains workers experience and their partners' wellbeing (Li et al., 2021). Successful family functioning relies not only on each individual parent's time allocation, but also on how couples jointly allocate time between work and family (Jacobs & Gerson, 2001). In couple families, each person's work hours and work schedules may have implications for their partners as they try to accommodate family routines. Relatedly, each person's family experience may result from not only their own work hours and schedules, but also their partners' (Craig & Brown, 2017; Chait Barnett et al., 2008). To acquire a thorough and adequate understanding of the interplay between people's work and family experiences, partners' work and family experiences also need to be taken into consideration (Gareis et al., 2003).

The current study examines the associations between nonstandard work schedules and three important and inter-related psychological resources salient to optimal parenting and family functioning, specifically – psychological distress, work-family conflict and relationship quality (Belsky, 1984; Cooklin et al., 2015a, 2016). There is theoretical and empirical evidence that these three psychological resources are closely correlated with one another and all three are closely related to parental functioning (Belsky, 1984). However, the three psychological resources are also different in their definitions and have their respective, irreplaceable, implications for family functioning. This warrants a thorough exploration of the similarities and dissimilarities in their roles linking nonstandard work schedules to parental functioning. The existing evidence regarding the associations between nonstandard work schedules and each of these resources - psychological distress, work-family conflict and relationship quality (with a focus on parent populations), is summarized below.

1.1. Parents' nonstandard work schedules and psychological distress (and other mental health problems)

Existing research with regard to nonstandard schedules and its association with workers' mental health has largely investigated fatigue, depression and psychological distress, with inconsistent findings (Abu Hanifah and Ismail, 2021; Zhao et al., 2019). Very few studies have examined the association between work schedules and mental health specifically among working parents. Those that have largely focused on parents of infants, again with mixed findings. For example, while Grzywacz et al. (2016) found that working a nonstandard schedule during the child's first year of life was associated with maternal depressive symptoms, research by Shepherd-Banigan et al. (2016), also focusing on mothers of infants, found no such association. Other research (Cooklin et al., 2015b) conducted among fathers of infants found that while shift work was not directly correlated with mental health, it did indirectly impact on fathers' mental health adversely via increases in work-family conflict. Very few studies have focused beyond the early parenting period or taken partners' work schedules into consideration (Zhao et al., 2019).

1.2. Parents' nonstandard work schedules and work-family conflict

A number of studies (Davis et al., 2008; Fenwick & Tausig, 2004; Staines & Pleck, 1984) have proposed that working a nonstandard schedule is associated with higher levels of work-family conflict. The potential causes include frequently missing out on family events, such as shared mealtimes and family vacations, and fatigue related to sleep deprivation (Gassman-Pines, 2011; Shen et al., 2006). These disruptions may compromise individuals' capability to fulfil family responsibilities and may lead to both time-based and strain-based work-family conflict. It is noteworthy that as mentioned above, parents, especially mothers, may utilize working nonstandard schedules as a strategy to provide care to their children while maintaining their employment (Pagnan et al., 2011; Presser, 2003). If this is the case, nonstandard schedules may in fact be protective against work-family conflict. Liu et al. (2011) argued that a positive effect of nonstandard work schedules on work and family balance was more likely when parents received more support from their partners, in other words, when couples could share/negotiate childcare responsibilities. When this was not possible, a negative impact was more apparent. The inconsistency of existing results indicates further research is needed, particularly longitudinal research following the effect of both partners work schedules.

1.3. Parents' nonstandard work schedules and relationship quality

When one or both partners is working nonstandard hours, there are added restrictions on the time the family is able to spend together. This includes not only time with the children, but also time with partners, with potential negative impacts on couples' relationship quality. Very little quantitative research has investigated the link between work schedules and marital/relationship quality (Kalil et al., 2010). Relevant research by Presser (2000), found that couples were significantly more likely to divorce or separate when fathers or mothers were working night or rotating shifts. Presser (2000) concluded that this finding was not because people in troubled marriages were more likely to move into shift work. Presser's research was replicated and extended ten years later by Kalil et al. (2010) with further evidence of an association between mothers' nonstandard work and marriage instability. However, a study conducted by Maume & Sebastian (2012) found that nonstandard work schedules only reduce men's marital quality, whereas among women, the effects was explained by job-family spillover. The limited and contrasting findings suggests more research is required in this area.

Importantly, given relationship quality can be conceptualized as a "couple-level" variable, experienced by both partners, further research is needed to explore this issue using couple-level data (Gareis et al.,

2003). Presser (2003) found that for dual-earner couples with children under age 19, when one person (either father or mother) worked rotating shifts while the other worked day shifts, the couple had more low-quality time; and when both of them worked non-day shifts, they had more low-quality time and experienced more general marital unhappiness. The time a couple spends together is not only dependent on individuals' work hours, but also on the couples' combined work hours. Therefore, the detrimental effect of nonstandard work schedules on marital quality may not be exerted by nonstandard schedule itself, but rather, by the lack of synchronicity between the work schedule of one partner and the work schedule of the other (Muurlink et al., 2014).

2. Aims and study design

The analyses undertaken in this study aim to examine the link between working nonstandard schedules and workers' parental functioning resources using longitudinal data from a population-based sample of Australian parents. The analyses are distinct from existing research in several ways:

First, existing studies primarily make comparisons between standard work schedules and nonstandard work schedules (Bildt & Michelsen, 2002; Dockery et al., 2009), or between people who have worked nonstandard schedules for longer versus shorter periods of time (Bara & Arber, 2009; Grzywacz et al., 2016). This approach is an important starting point, but is limited in terms of providing evidence for a causal link between nonstandard schedules and the resources workers' have for parental functioning. It is possible that the associations found in these studies originate from unmeasured differences between people who work nonstandard schedules and people who work standard schedules (or who work nonstandard schedules for different periods of time), rather than from the work schedule itself (Allison, 2009). The current study adopted a hybrid analysis model introduced by Schunck (2013) and Schunck & Perales (2017) to allow exploration of both within- and between-person estimates to identify both changes in parental resources in association with moving in and out of nonstandard work schedules (*i.e. within-person, time-varying characteristics*), as well as between-person differences between people working nonstandard schedules and standard schedules (*i.e. time-invariant differences between those who work standard schedules and nonstandard schedules*).

Second, the couple-level design and the wide range of variables included in the present study allowed us to control for a greater variety of family-related and work-related factors as covariates than is commonly available. Researchers (Arlinghaus et al., 2019) have stressed the importance of understanding that the association between work schedules and family functioning interacts with other contexts experienced by the worker. For example, nonstandard work hours may have a disproportionate impact on workers working long hours over those who work short hours, and on workers with low-quality jobs over workers with high-quality jobs (Arlinghaus et al., 2019). The same is true for personal and family-related factors. For example, as stated above, the effect of work strains has the potential to cross-over from the workers themselves to their partners (Li et al., 2021). Therefore, the personal resources parents have for successful parenting depend not only on their own work characteristics, but also on the work characteristics of their partners. The current study takes all these factors into consideration to more accurately ascertain the nature of the relationship between work schedules and workers' parental functioning resources. Furthermore, considering gender differences in how paid work and caregiving responsibilities are allocated in the broader context, fathers and mothers may have different experiences regarding whether and how their work schedules impact on their personal resources for parental functioning (Zhao, 2020b). Therefore in this study, mothers and fathers were examined separately to identify potential gender differences.

In summary, this study aims to investigate the association between nonstandard work schedules and parents' psychological distress, work-family conflict and couple relationship quality using a nationally representative sample of dual-earner parents. The study includes multiple (i.e. five) waves of data and measures both within-person changes during the study period and time-invariant between-person differences (by adopting within and between-effects models). The analyses focus on the broad impact of working any nonstandard schedule, but additional supplementary analyse also explored the impacts of evening shifts, rotating shifts and irregular shifts. The analyses control for a series of personal/family-related and work-related characteristics potentially associated with working nonstandard schedules to ascertain the link between nonstandard work schedules and psychological resources important for parental functioning irrespective of other potential confounding factors. In addition, to aid in teasing out the specific individual impacts on psychological distress, work-family conflict and relationship quality, when one of the three was examined, the other two were controlled for as covariates.

3. Method

3.1. Data source

The data is drawn from parents of young children (aged 4–5 to 12–13 years) who participated in at least two waves of Waves 3–7 of the Baby cohort (B) of the Longitudinal Study of Australian Children (LSAC). We took Wave 3 as our starting point because it was the first wave when the specific information on parents' work schedules was collected. LSAC is a nationally representative longitudinal study which aims to examine the interplay of factors facilitating or impeding children's development (Sanson & Johnstone, 2004; Gray & Sanson, 2005). LSAC has been approved by Australian Institute of Family Studies Ethics Committee (Gray & Sanson, 2005; Soloff et al., 2005). The LSAC study design used two-staged clustered sampling based on Australian postcodes (i.e. geographical locations) and Australia's universal health insurance database (Soloff et al., 2005). More details regarding the LSAC survey can be found elsewhere (e.g. Soloff et al., 2005). The sample in LSAC is broadly representative of all Australian families and, because LSAC includes a wide range of information about parents' labour force participation, family functioning, and parents' and children's health and wellbeing, it is a strong data source for investigating the effect of work characteristics and experiences at the family level (Sanson & Johnstone, 2004; Usback, 2018). Data has been collected biennially since 2004 (Wave 1), via face-to-face interviews (where one primary parent reported data for themselves and their partner) and self-report questionnaires. Therefore, the data used in current study was collected roughly between 2008 (Wave 3) and 2018 (Wave 7). The Wave 1 sample of the LSAC B cohort consisted of 5107 children and their families. The attrition rate, as a percentage of the Wave 1 response, was 14.1% for Wave 3, 16.9% for Wave 4, 20.0% for Wave 5, 26.3% for Wave 6, and 33.8% for Wave 7 (Usback, 2018).

3.2. Sample

To address the study aims, the sample was restricted to families where the children had two resident parents and both parents were employed at the time of the data collection. The parents were required to be in heterosexual couple and either married or de facto. Biological parents, step-parents, adopted parents, and foster parents were all included in the sample, but families were excluded where one of the parents reported he/she was an "unrelated person", "unrelated adult" or "boarder/housemate" in reference to their relationship with the child. Parents could be working full-time, part-time, or currently on maternity/paternity leave. However, multiple job holders were excluded to avoid confusion about their work hours.

Data from each wave were all pooled together. To be included in the current study, parents had to have provided responses in at least two, and up to five, waves in LSAC (3.23 on average). Data from two mothers who married twice during the survey were analysed twice. Both

participated in Waves 3 and 4 with the child's biological father, and also in Waves 6 and 7 with the child's stepfather. Data from all other couples were analysed only once. In total, the analytic sample included 6190 couple observations from 1915 couples.

3.3. Variables and measures

Nonstandard work schedules: In all Waves (3–7), the parent responding in the face-to-face interview was required to report the work schedule types they and their partners worked in their main job/business. All work schedules were then categorized into two groups: *Standard work schedules* and *Nonstandard work schedules*. A regular daytime schedule was categorized as *Standard work schedules*, while all other work schedules, including a regular evening shift, a regular night shift, a rotating shift that changed from days to evenings to nights, a split shift with two distinct periods each day, on call, an irregular schedule and others, were all categorized as *Nonstandard work schedules*. In addition to this broad binary measure, four categories of work schedules were also adopted in supplementary analyses: *Standard work schedules* (i.e. a regular daytime schedule), *Evening/night shift* (i.e. regular evening shift and regular night shift), *Rotating shift*, and *Irregular shift* (i.e. all the other work schedules). In the analyses, we took one parent's own work schedule as the independent variable, and also included the other parent's work schedules as a predictor/control.

Psychological distress was measured across all waves using the Kessler-6 psychological distress scale, a well-validated scale for assessing and screening for mental health problems in the general population (Kessler et al., 2002). Both parents were asked in the self-report questionnaire about how often they had felt a range of psychological symptoms, such as nervousness and hopelessness, in the preceding four weeks. Each of these items was responded to using a 5-point scale (1 = *All of the time*; 5 = *None of the time*). The scores for each item were reverse coded and summed, such that higher scores indicated greater psychological distress and poorer mental health (range 6–30).

Work-family conflict was assessed across all waves using a 4-item, 5-point scale (1 = *Strongly disagree*, 5 = *Strongly agree*) (range 1–5) adapted from Marshall & Barnett (1993). Two items measured the degree to which work interfered with family (e.g. 'Because of my work responsibilities, my family time is less enjoyable and more pressured'); the other two items measured the degree to which family interfered with work (e.g. 'Because of my family responsibilities, the time I spend working is less enjoyable and more pressured'). Higher scores on the scale indicated higher work-family conflict.

Relationship quality was consistently assessed across all waves using six items adapted from the Hendrick relationship quality scale (e.g. 'How well does your partner meet your needs?') (Hendrick, 1988). Each item has 5 points, ranging from 1 = *Poorly* to 5 = *Extremely well*. Higher scores represent a higher level of relationship satisfaction.

Number of children, which was computed from parents' responses to the survey question asking the "number of siblings of the study child in the household".

Infant at home was measured by responses to the question of "whether there was a new sibling of study child born since last wave". If the parent answered *yes*, this was coded as indicating there was an infant ($\leq$2 years old) in the household. All other answers were coded as *No infant*.

Socioeconomic status was represented by a Z-score for the socioeconomic position of the family, relative to all families in the survey. This variable representing socioeconomic position was calculated based on occupational prestige, income and education (Baker et al., 2017). In the current study, the socioeconomic status of each family was grouped into two categories: *Higher than average* ($Z > 0$), or *Lower than average* ($Z \leq 0$).

Age. Both parents were asked about their age at their last birthday. Parents were then classified into two groups: 40 years and under, or above 40 years old.

Share of domestic work. Both parents were asked whether or not they thought they did their fair share of the domestic tasks (housework, home maintenance, shopping and cooking). Their answers were grouped into three categories: *I do my fair share*, *I do less than my fair share* and *I do more than my fair share*.

Work hours and partners' work hours. Both parents were asked about the average hours they worked per week. Their answers were classified into three groups: *Part-time* – working under 20 h/week, *Full-time* – working 20–40 h/week, and *Overtime* – working over 40 h/week.

Job quality was a count of four indicators - job flexibility, job security, job autonomy and leave access. Each of the four indicators was measured on a multiple-response scale consisting of a single question or a series of questions. Scale scores for each indicator were then categorized into binary variables based on the median score (as a cut-off point), such that a higher than median score for each variable was coded as 1 = *Yes,* representing jobs that were flexible, secure, with higher autonomy and leave access. On the contrary, a lower than median score for each variable was coded as 0 = *No* representing jobs that were inflexible, insecure, and had lower autonomy and leave access. Overall job quality was then calculated as the sum of the four binary *Yes/No* items (range 0–4).

Occupation was coded according to the Australian and New Zealand Standard Classification of Occupations (ANZSCO). All occupations were classified into eight categories: *Managers*, *Professionals*, *Technicians*, *Service workers*, *Clericals*, *Sales*, *Operators*, and *Labourers*.

3.4. Statistical analyses

As this study included data from multiple waves of the LSAC, analytic approaches suitable for panel data analyses were required in order to account for the non-independence between responses by the same individual in different waves. All data was stored and analysed using STATA version 15. Models were fitted separately for mothers and fathers.

The analyses consisted of three stages. In the first stage, to describe and compare overall socio-demographic and work-related differences (pooled across Waves 3–7) between parents working nonstandard schedules and standard schedules, population-average models were fitted to assess the association between nonstandard work schedules and each of these variables. The coefficient estimates of population-average models report the differences in the population mean of these variables between parents working nonstandard schedules and standard schedules, whilst treating the dependency between different responses from the same individuals as noise/a nuisance (Gardiner et al., 2009; Hsiao, 2003). The population-average model is based on a linear regression model, and is therefore suitable for continuous outcomes. When the outcomes were binary variables, population-average logit models, based on logistic regression models, were fitted. Outcomes that were multi-categorical variables were recoded into dummy variables and then assessed through population-average logit models. As there was no explicit pattern for the within-person correlations across different waves, the working correlation structure of the models was specified as unstructured (Jang, 2011).

In the second stage, population-average models were fitted to assess the associations between nonstandard work schedules and each outcome variable (psychological distress, work-family conflict and relationship quality), controlling for sociodemographic and work-related variables. In this way, the analyses reported the population-level association between nonstandard schedules and workers' psychological status, after taking a series of potential confounders into consideration. However, given these models cannot determine whether associations result from work schedules, or from unmeasured differences between those working standard and nonstandard schedules, a final, third stage of analyses were conducted.

In this third stage, hybrid models were conducted to obtain both within- and between-person estimates. The within-person estimates illustrated the association between change in a persons' work schedule

status over time and the corresponding change in their outcomes, controlling for all time-invariant differences. The between-person estimates illustrated how people working standard and nonstandard schedules reported different levels of parenting resources (Schunck & Perales, 2017).

In both the second and third stages, supplementary analyses repeated the models including specific categories for nonstandard work schedules to explore any potential differences.

4. Results

4.1. The characteristics of parents working nonstandard schedules

In the total sample, of the 6190 observations of mothers and the 6190 observations of fathers, there are respectively 483 instances where mothers' work schedule status changed and 431 instances where fathers' work schedule status changed, (see Supplementary Tables S1 and S2 for more details). As shown in Table 1, compared to mothers who worked standard schedules, mothers working nonstandard schedules were relatively younger, had more children, were more likely to have an infant in their household and be in a relatively lower socioeconomic position. Work schedule was not associated with mothers' share in domestic work. Mothers working nonstandard schedules were significantly less likely to work long/overtime hours - in fact, 59% were working part-time as opposed to only 34% of mothers working standard schedules. In most of the cases (52%) where mothers were working nonstandard schedules, their partners were working over 40 h per week. The occupational areas and job characteristics of mothers working nonstandard schedules were somewhat different. Notably, jobs requiring working nonstandard hours were usually of lower quality and more often included labourers.

As shown in Table 2, there were also a number of differences between fathers working standard schedules and fathers working nonstandard schedules. These patterns were somewhat distinct from the status of mothers. Among fathers, there were no clear differences between standard-schedule and nonstandard-schedule workers in terms of age, the number of children they had, whether or not there was an infant at home, and socioeconomic status. However, fathers working nonstandard schedules were more likely to report doing more than their fair share of domestic work. At the same time, compared to fathers working standard schedules, those working nonstandard schedules were also more likely to work part-time/short hours. There were no differences in their partners' work hours. Fathers working nonstandard schedules were more likely to be in jobs of lower quality, and were less likely to be managers, professionals and clerical persons, and more likely to be service workers and operators.

Table 1
Characteristics of mothers working standard schedules and mothers working nonstandard schedules.

		Mothers		
		Standard schedules	*Nonstandard schedules*	Total
Total number of observations		4983 (80.50%)	1207 (19.50%)	6190 (100%)
Age#**	*≤ 40 years of age*	2438 (48.93%)	677 (56.09%)	3115 (50.32%)
	> 40 years of age	2545 (51.07%)	530 (43.91%)	3075 (49.68%)
Number of children‡***		2.41 (±.80)	2.58 (±.93)	2.45 (±.83)
Infant at home#***	*No*	4672 (93.76%)	1084 (89.81%)	5756 (92.99%)
	Yes	311 (6.24%)	123 (10.19%)	434 (7.01%)
Social economic status#*	*Lower than average*	1739 (34.90%)	506 (41.92%)	2245 (36.27%)
	Higher than average	3244 (65.10%)	701 (58.08%)	3945 (63.73%)
Share of domestic work#	*I do my fair share*	2249 (45.18%)	528 (43.78%)	2777 (44.91%)
	I do less than my fair share	126 (2.53%)	35 (2.90%)	161 (2.60%)
	I do more than my fair share	2603 (52.29%)	643 (53.32%)	3246 (52.49%)
Work hours#	*Part-time****	1688 (33.88%)	708 (58.66%)	2396 (38.71%)
	Full-time	2748 (55.15%)	413 (34.22%)	3161 (51.07%)
	*Overtime***	547 (10.98%)	86 (7.13%)	633 (10.23%)
Partner's work hours#	*Part-time*	136 (2.73%)	35 (2.90%)	171 (2.76%)
	Full-time	2441 (48.99%)	543 (44.99%)	2984 (48.21%)
	*Overtime***	2406 (48.28%)	629 (52.11%)	3035 (49.03%)
Job quality‡***		3.10 (±.91)	2.73 (±.95)	3.03 (±.93)
Occupation#	*Managers*†	676 (13.58%)	134 (11.13%)	810 (13.10%)
	Professionals	1908 (38.32%)	447 (37.13%)	2355 (38.09%)
	Technicians	150 (3.01%)	47 (3.90%)	197 (3.19%)
	Service Workers	519 (10.42%)	187 (15.53%)	706 (11.42%)
	Clericals†	1296 (26.03%)	234 (19.44%)	1530 (24.75%)
	Sales Workers	264 (5.30%)	77 (6.40%)	341 (5.52%)
	Operators ^	31 (0.62%)	18 (1.50%)	49 (0.79%)
	*Labourers***	135 (2.71%)	60 (4.98%)	195 (3.15%)

Number of observations (% within the column) ‡ Mean (±*SD*) of all observations †$p < 0.1$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. ^ No results as too few cases.

4.2. Population-average models for the association between work schedules and psychological resources for parental functioning

Table 3 illustrates the population-level estimates for the association between nonstandard schedules and workers' psychological distress, work-family conflict and relationship quality for mothers and fathers. In general, there were no significant differences between the reported outcomes of workers in standard schedules and workers in nonstandard schedules. Fathers working nonstandard schedules were found to have higher work-family conflict (in model 1–4), but after accounting for psychological distress and relationship quality, the effect dropped to a non-significant level (*Coeff* = 0.04, $p < 0.10$). Supplementary analyses showed (Table S9), that mothers and fathers working rotating shifts showed some differences compared to all other workers – mothers working rotating shifts had less psychological distress but also lower relationship quality, and fathers working rotating shifts had higher work-family conflict.

4.3. Hybrid model (within- and between-person effects) for work schedules and resources for parental functioning

Table 4 shows the estimates of the between- and within-person effects of nonstandard schedules in association with the parental functioning resources obtained from the hybrid models (see supplementary files for the effects of the covariates). As all variables in the models were time-varying, each variable had both a time-invariant between-person effect and time-varying within-person effect. Overall, there was no effect of nonstandard schedules in association with *psychological distress* – neither when individuals changed their work schedules status (i.e. within-person effects), nor between those working standard schedules and nonstandard schedules (i.e. between-person effects). However,

Table 2
Characteristics of fathers working standard schedules and fathers working nonstandard schedules.

		Fathers		
		Standard schedules	*Nonstandard schedules*	Total
Total number of observations		5075 (81.99%)	1115 (18.01%)	6190 (100.0%)
Age[#]	*≤ 40 years of age*	1844 (36.36%)	431 (38.65%)	2275 (36.77%)
	> 40 years of age	3228 (63.64%)	684 (61.35%)	3912 (63.23%)
Number of children[‡]		2.44 (±.81)	2.47 (±.89)	2.45 (±.83)
Infant at home[#]	*No*	4728 (93.16%)	1028 (92.20%)	5756 (92.99%)
	Yes	347 (6.84%)	87 (7.80%)	434 (7.01%)
Social economic status [#†]	*Lower than average*	1734 (34.17%)	511 (45.83%)	2245 (36.27%)
	Higher than average	3341 (65.83%)	604 (54.17%)	3945 (63.73%)
Share of domestic work[#]	*I do my fair share*	3133 (62.35%)	683 (61.75%)	3816 (62.24%)
	I do less than my fair share	1399 (27.84%)	294 (26.58%)	1693 (27.61%)
	*I do more than my fair share**	493 (9.81%)	129 (11.66%)	622 (10.15%)
Work hours[#]	*Part-time****	94 (1.85%)	77 (6.91%)	171 (2.76%)
	Full-time	2501 (49.28%)	483 (43.32%)	2984 (48.21%)
	Over time	2480 (48.87%)	555 (49.78%)	3035 (49.03%)
Partner's work hours[#]	*Part-time*	1975 (38.92%)	421 (37.76%)	2396 (38.71%)
	Full-time	2584 (50.92%)	577 (51.75%)	3161 (51.07%)
	Over time	516 (10.17%)	117 (10.49%)	633 (10.23%)
Job quality[‡***]		3.19 (±.83)	2.78 (±.93)	3.12 (±.86)
Occupation[#]	*Managers***	1429 (28.20%)	197 (17.68%)	1626 (26.30%)
	*Professionals***	1477 (29.14%)	197 (17.68%)	1674 (27.08%)
	Technicians†	1014 (20.01%)	196 (17.59%)	1210 (19.57%)
	*Service Workers****	94 (1.85%)	233 (20.92%)	327 (5.29%)
	*Clericals****	369 (7.28%)	20 (1.80%)	389 (6.29%)
	Sales Workers	214 (4.22%)	39 (3.50%)	253 (4.09%)
	*Operators****	239 (4.72%)	162 (14.54%)	401 (6.49%)
	Labourers	232 (4.58%)	70 (6.28%)	302 (4.89%)

[#] Number of observations (% within the column) [‡] Mean (±*SD*) of all observations †$p < 0.1$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

supplementary analyses suggest (Table S10), fathers had higher psychological distress when working evening or night shifts (within-person effect: $Coeff = 0.46$, $SE = 0.22$, $p < 0.05$).

In terms of *work-family conflict for mothers*, the results of the hybrid model in Table 4 showed no significant within- or between-person effect when all covariates were controlled for. That being said, mothers were found to have higher work-family conflict when they worked rotating shifts compared to other standard or nonstandard schedules (within-person effect: $Coeff = 0.13$, $SE = 0.06$, $p < 0.05$) (see Supplementary Table S10) In terms of *work-family conflict for fathers*, no significant within-person effect were found (i.e. no significant changes resulting from moving between standard and nonstandard schedules). The between-person effect for fathers were significant after controlling for all covariates – fathers working nonstandard schedules had higher work-family conflict, but this was not due to nonstandard schedules. Instead, it was because of other unmeasured differences between fathers working standard and nonstandard schedules. The results were slightly different when the work schedules were examined more specifically. As shown in Supplementary Table S10, for fathers working rotating shifts, the within- and between-person effect on work-family conflict were both significant (within-person effect: $Coeff = 0.10$, $SE = 0.05$, $p < 0.05$; between-person effect: $Coeff = 0.24$, $SE = 0.07$, $p < 0.01$), while no significant within- or between-person effect for either night shift workers or irregular shift workers.

The within- and between-person effects of nonstandard schedules on *relationship quality* were quite different for mothers and fathers. The within-person effect on mothers' relationship quality was significant in early models, but not after controlling for covariates. In contrast, the results of the between-person effect showed that mothers working nonstandard schedules experienced poorer relationship quality compared to their counterparts who worked standard schedules. And the effect increased as more covariates were added in to the model, suggesting that covariates masked the effect of nonstandard schedules. For fathers, while the between-person effect showed no significance, the within-person effect strengthened as more covariates were included, indicating that when fathers moved into non-standard work schedules their relationship quality declined (Models 4 and 5). In addition, when each type of work schedule was examined, the significant between-person effect for mothers' relationship quality was driven by rotating shifts, while the significant within-person effect on fathers' relationship quality seemed to be driven by fathers working irregular shifts (see Supplementary Table S10).

5. Discussion

The current study set out to understand whether work schedule is a salient contextual factor that might influence workers' parenting and family functioning, with a focus on the psychological resources Belsky (1984) has proposed as central to successful parental functioning – psychological wellbeing, relationship quality and managing the work-family interface. Prior to this, no nationally representative longitudinal research has examined the association between nonstandard work schedules and these resources specifically for parents. By adopting hybrid modelling, the analyses were able to use all the data available to consider the contribution made by both between-person differences and within-person changes in workers' schedules.

The results of the current study show that the relationship between nonstandard work schedules and the resources needed for optimal parental functioning depend on gender, the particular resource, the type of work schedules, and whether the focus is on between-person differences (i.e. those working standard schedules vs those working nonstandard schedules) or within-person change (i.e. changes when people move in and out of nonstandard schedules).

The results showed that when a broad binary measure of nonstandard work schedules was adopted, no association with psychological distress was found for either fathers or mothers. This was the case when focusing on both between-person differences and within-person change. This finding differs somewhat from prior meta-analysis results which found that nonstandard-schedule-workers were 32% more likely to have mental health problems than standard-schedule-workers (Zhao et al., 2019). However, very few past studies (including the meta-analysis) have focused specifically on parents. In support of the current findings, Llena-Nozal (2009, pp. 72–87) used fixed effect regression modelling with nationally representative Australian household panel data, and similarly found no evidence that within-person changes in nonstandard work schedules were associated with changes in psychological distress. The supplementary analyses examining differences between each type of work schedule showed some evidence that when fathers worked evening or night shifts, they had higher psychological

Table 3
Population-level responses on the association between nonstandard work schedules and resources for parental functioning.

Mothers										
Psychological distress (*6–30*)	*Model 1* (n[#] = 6146)		*Model 2* (n = 6146)		*Model 3* (n = 6141)		*Model 4* (n = 5995)		*Model 5* (n = 5907)	
	Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
	0.00	0.09	0.01	0.09	0.01	0.09	−0.08	0.09	−0.09	0.09
Work-family conflict (*1–5*)	*Model 1* (n = 6054)		*Model 2* (n = 6054)		*Model 3* (n = 6048)		*Model 4* (n = 5967)		*Model 5* (n = 5907)	
	Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
	−0.02	0.02	−0.02	0.02	−0.01	0.02	0.01	0.02	0.01	0.02
Relationship quality (*1–5*)	*Model 1* (n = 6135)		*Model 2* (n = 6135)		*Model 3* (n = 6129)		*Model 4* (n = 5982)		*Model 5* (n = 5907)	
	Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
	0.02	0.02	0.02	0.02	0.01	0.02	0.00	0.02	−0.00	0.02
Fathers										
Psychological distress (*6–30*)	*Model 1* (n = 6120)		*Model 2* (n = 6120)		*Model 3* (n = 6069)		*Model 4* (n = 5878)		*Model 5* (n = 5850)	
	Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
	0.10	0.09	0.11	0.10	0.12	0.09	0.08	0.10	0.01	0.10
Work-family conflict (*1–5*)	*Model 1* (n = 6104)		*Model 2* (n = 6104)		*Model 3* (n = 6051)		*Model 4* (n = 5925)		*Model 5* (n = 5850)	
	Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
	0.06**	**0.02**	**0.06****	**0.02**	**0.07****	**0.02**	**0.05***	**0.02**	0.04†	0.02
Relationship quality (*1–5*)	*Model 1* (n = 6153)		*Model 2* (n = 6153)		*Model 3* (n = 6098)		*Model 4* (n = 5907)		*Model 5* (n = 5850)	
	Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
	−0.03†	0.02	−0.03	0.02	−0.03†	0.02	−0.04†	0.02	−0.03	0.02

[#]In this table, n represents number of observations.
† sig at 0.1 level, * sig at 0.05 level, **sig at 0.01 level.
Model 1: own work schedules. Model 2: including variables in Model 1 + partner's work schedules. Model 3: including variables in Model 2 + number of children, infant at home, socioeconomic status, age, share of domestic work. Model 4: including variables in Model 3 + work hours, partner's work hours, job quality and occupation. Model 5: including variables in Model 4 + the other two psychological resources.

Table 4
Between- and within-person associations between nonstandard work schedules and resources for parental functioning.

Mothers										
		Model 1 (n[#] = 6146)		*Model 2* (n = 6146)		*Model 3* (n = 6141)		*Model 4* (n = 5995)		*Model 5* (n = 5907)	
		Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
Psychological distress (*6–30*)	Within-person effect	−0.05	0.10	−0.04	0.10	−0.04	0.10	−0.11	0.11	−0.10	0.11
	Between-person effect	0.21	0.17	0.20	0.17	0.18	0.17	−0.01	0.17	−0.01	0.16
		Model 1 (n[#] = 6054)		*Model 2* (n = 6054)		*Model 3* (n = 6048)		*Model 4* (n = 5967)		*Model 5* (n = 5907)	
		Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
Work-family conflict (*1–5*)	Within-person effect	0.01	0.03	0.01	0.03	0.02	0.03	0.03	0.03	0.04	0.03
	Between-person effect	**−0.13****	**0.05**	**−0.12****	**0.05**	**−0.10***	**0.05**	−0.04	0.05	−0.05	0.04
		Model 1 (n[#] = 6135)		*Model 2* (n = 6135)		*Model 3* (n = 6129)		*Model 4* (n = 5982)		*Model 5* (n = 5907)	
		Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
Relationship quality (*1–5*)	Within-person effect	**0.04***	**0.02**	**0.04**	**0.02***	0.04†	0.02	0.03	0.02	0.02	0.02
	Between-person effect	−0.06	0.04	−0.06	0.04	−0.07	0.04	−0.08†	0.04	**−0.09***	**0.04**
Fathers											
		Model 1 (n[#] = 6120)		*Model 2* (n = 6120)		*Model 3* (n = 6069)		*Model 4* (n = 5878)		*Model 5* (n = 5850)	
		Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
Psychological distress (*6–30*)	Within-person effect	0.14	0.11	0.15	0.11	0.16	0.11	0.16	0.12	0.10	0.11
	Between-person effect	0.10	0.17	0.08	0.17	0.14	0.17	−0.09	0.19	−0.16	0.17
		Model 1 (n[#] = 6104)		*Model 2* (n = 6104)		*Model 3* (n = 6051)		*Model 4* (n = 5925)		*Model 5* (n = 5850)	
		Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
Work-family conflict (*1–5*)	Within-person effect	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03
	Between-person effect	**0.13****	**0.04**	**0.13*****	**0.04**	**0.14*****	**0.04**	0.08†	0.04	**0.09***	**0.04**
		Model 1 (n[#] = 6153)		*Model 2* (n = 6153)		*Model 3* (n = 6098)		*Model 4* (n = 5907)		*Model 5* (n = 5850)	
		Coeff	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*	*Coeff*	*SE*
Relationship quality (*1–5*)	Within-person effect	−0.04†	0.02	−0.04†	0.02	−0.04†	0.02	**−0.05***	**0.02**	**−0.04***	**0.02**
	Between-person effect	−0.01	0.04	−0.01	0.04	−0.02	0.04	0.02	0.05	0.01	0.04

[#]In this table, n represents number of observations.
[‡] For occupation, Managers are reference group.
† sig at 0.1 level, * sig at 0.05 level, **sig at 0.01 level, ***sig at 0.001 level.
Model 1: own work schedules. Model 2: including variables in Model 1 + partner's work schedules. Model 3: including variables in Model 2 + number of children, infant at home, socioeconomic status, age, share of domestic work. Model 4: including variables in Model 3 + work hours, partner's work hours, job quality and occupation. Model 5: including variables in Model 4 + the other two psychological resources. See supplementary tables for the effects for covariates included in the sequential models.

distress (within-person effect). This is consistent with the results of a previous longitudinal study (Bara & Arber, 2009). Fathers working rotating shifts were found to have less psychological distress, but this was a between-person effect only, suggesting this association likely due to other related factors.

In terms of work-family conflict, the results of the population-average models suggested that a nonstandard schedule was related to work-family conflict for fathers but not mothers – consistent with prior research (e.g. Davis et al., 2008; Jansen et al., 2003; Zhao et al., 2020a). However, the results of the hybrid models further indicated that this association for fathers seemed to be driven by between-person differences rather than the nonstandard schedule itself - suggesting that working nonstandard hours is likely to be correlated with other unobserved variables associated with work-family conflict. However, additional comparisons between different types of work schedules tell a different story - both mothers and fathers were found to have higher

work-family conflict when they worked rotating shifts (within-person effects), indicating that rotating shifts may cause greater disruptions to employed parents' family functioning than other work schedule types. This finding is somewhat consistent with findings from a previous cross-sectional study (Zhao et al., 2020a), and points toward less regulated schedules as the most problematic for balancing work and family. However, the small number of rotating shift workers in our sample means this finding should be interpreted with caution, and the omission of this same finding for irregular shift work also raises questions. More research on the disruption effect of rotating shifts and unpredictable schedules on work-family conflict is necessary in the future.

There are some interesting possible interpretations regarding the findings for couple relationship quality. For mothers, an association between nonstandard schedules and relationship quality was only shown for between-person differences (with supplementary analyses hinting that this effect was driven by differences for rotating shift workers). Turning to fathers, the within-person results from the hybrid model suggested that fathers experienced poorer relationship quality when they worked nonstandard schedules (especially irregular shifts, as shown in supplementary results) compared to the times when they worked standard schedules, and no other characteristics in the model explained this association. This result provides support for a causal link between nonstandard schedules and relationship quality for fathers, and aligns with Maume and Sebastian, (2012) finding of gender differences in the associations between nonstandard schedules and relationship quality. Specifically in our case, that nonstandard work schedules were associated with poorer relationship quality for men, while the same association for women was less clear (and possibly dependent on other job, individual and/or family characteristics). Overall, this finding is likely because mothers working nonstandard hours fit their work schedules around the family needs, while fathers work nonstandard hours out of the requirements of the job (Dinh et al., 2020; Presser, 2000).

6. Limitations

Despite the strengths of the study, there are important limitations to acknowledge. First, this study controlled for a variety of factors as covariates to isolate the associations between nonstandard schedules and parents' psychological resources. However, the large number of covariates included into the models, and the potential interactions between these covariates (e.g. the three psychological resources measured in this study are interrelated), raises the possibility that the models were 'over-controlled', masking some significant results. Also, the relatively large standard errors in the results suggest that the statistical significance of the results may be somewhat unstable. It is also important to note that the shift work categories included smaller numbers of participants than the broad binary indicator of nonstandard schedules. We also acknowledge that multiple comparisons were undertaken potentially increasing the chances of obtaining statistically significant findings. These issues potentially compromise the robustness of our conclusions, reinforcing the need for more comprehensive longitudinal studies in this area. Second, although the analyses included partners' work hours, schedules and basic information on their share of domestic work, these variables were broad. More specific data (e.g. from a time use survey) would shed further light on how these covariates are operating to impact on working parents. Thirdly, although the analyses made it possible to control for unmeasured time-invariant covariates, unmeasured time-varying variables may have played a role in the association between work schedules and wellbeing (Allison, 2009). Finally, while the study brings us closer to understanding the causal relationship between these factors than do cross-sectional or population-averaged studies, causality, and in particular the direction of causality, cannot be concluded. For example, the results may be influenced by the healthy worker effect, where that healthy people are selected into better quality work (Kröger et al., 2015).

7. Conclusion

The results of this study suggest that working a nonstandard schedule has implications for the psychological resources needed for optimal parenting – in some contexts due to the nonstandard schedule itself and in other contexts because of other related factors. The most robust and meaningful result when a broad binary measure of nonstandard schedule was adopted was for fathers - where moving into a nonstandard schedule was associated with a concurrent deterioration in fathers' relationship quality. In terms of specific schedule types – there was additional evidence that when mothers moved into rotating shifts they experienced higher work-family conflict. Fathers experienced the same increase in work-family conflict when they moved into rotating shift work, as well as higher psychological distress when they moved into evening/night work and poorer relationship quality when they moved into irregular shift work. The findings of this study represent a starting point for further exploration and validation. As families continue to negotiate their working time within a global context of increasingly fractured work routines (in terms of schedules, work hours, and workplace locations), it is critical to acknowledge the complexities involved and continue to explore the potential impacts of nonstandard work hours on families and workers' ability to be psychologically resourced in their roles within families as parents.

CRediT authorship contribution statement

Yixuan Zhao: Conceptualization, Formal analysis, Writing – original draft. **Amanda Cooklin:** Conceptualization, Writing – review & editing. **Peter Butterworth:** Methodology, Supervision. **Lyndall Strazdins:** Conceptualization, Supervision. **Liana S. Leach:** Supervision, Writing – review & editing.

Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2021.100931.

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