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The rhythms of project life: a longitudinal analysis of work hours and work–life experiences in construction

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A diary data collection method was used to collect data from project-based construction workers in a large civil engineering construction project in Melbourne, Australia. Data capturing the number of hours worked, satisfaction with work–life balance and capacity to complete required tasks at work and at home were collected for 21 consecutive weeks. A strong correlation was found between hours worked each week and participants' work–life experiences. Data were subjected to time series modelling procedures and weekly work hours were found to significantly predict participants' capacity to complete tasks at work and at home, but not their satisfaction with work–life balance. The impact of work leading up to a major project milestone was found to increase the predictive capacity of the time series models, indicating that project events have a significant impact upon the work–life experiences of project-based workers. The period of intense work prior to the milestone (the opening of a new ramp on to an operating freeway) contributed significantly to an immediate reduction in capacity to complete tasks at home. Further time series modelling revealed that recovery opportunities associated with workers taking a short, temporary break from work can also contribute to improved work–life balance. It is proposed that construction organizations use the naturally fluctuating workloads implicit in project work to 'build' recovery opportunities into project schedules.

Keywords: Work hours, work–family balance, diary studies, project work.

Introduction

The dynamic nature of project-based work

Work–family research has taken place almost exclusively in stable organizational environments with repetitive processes and regular work patterns. Furthermore, Huemann *et al.* (2007) argue that research into the management of people in project-oriented work is limited to the extent that it has not been underpinned by robust theory. Consequently little is known about work–life experiences in project-based work. Projects are dynamic and the pace of work is often rapid (Aitken and Crawford, 2007). Project workers are reported to experience intense involvement in work, which can result in burnout (Asquin *et al.*, 2010). Lindgren and Packendorff (2006) reflect on the inherent 'greediness' of project-based jobs citing evidence from the IT industry that project-based workers find it difficult to engage in stimulating activities outside work. Throughout the project life cycle there are critical points at which components of the project must be completed. Immediately prior to these critical points work is typically very intense. During these periods project-based workers are expected to work extraordinary long hours, which potentially impact significantly upon their ability to their balance work and personal lives (Perlow, 1998). Wharton and Blair-Loy (2006) report that long hours combined with tight deadlines, characteristics of project work, significantly increase the extent to which work negatively impacts upon family life.

The effect of long hours

Van Hooff *et al.* (2006) assert that time engaged in effortful work reduces the time available for family and consumes energy that could otherwise be spent in tasks required at home. Long work hours have been linked to

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high levels of work interference with family (Jansen *et al.*, 2004). Long working hours are linked to poor health, strained family relationships and ineffective parenting (Shepanski and Diamond, 2007), role conflict, lower job satisfaction, increased stress, decreased productivity (Veiga *et al.*, 2004), employee turnover, absenteeism and burnout (Stavrou, 2005).

The working hours of Australians have steadily increased in recent decades (Campbell, 2002). Unlike European Union countries, Australia has no statutory limits on the hours that can be worked (Van Wanrooy and Wilson, 2006) and most Australian workers have limited control over their work hours (Peetz *et al.*, 2003). Research has highlighted a mismatch between people's actual and preferred work hours (Reynolds, 2005). Van Wanrooy and Wilson (2006) report that significant numbers of Australian workers who work long hours (45 hours per week or more) believe their hours are too long and would prefer to work less. Reynolds and Aletraris (2007) report that when work hours are perceived to interfere with family life, Australian workers (both male and female) express stronger preferences for reduced hours.

Work hours in the construction industry

In Australia, the longest average work hours are observed in blue-collar, traditionally male industries, including construction (Van Wanrooy, 2007). Lingard and Francis (2004) report that the average number of hours worked each week is 63 among site-based employees in direct construction activity, 56 hours among employees who worked mostly in the site office and 49 among employees in the head office of construction companies. Lingard and Francis report a significant relationship between work hours, work-to-family conflict and burnout (Lingard and Francis, 2005). Since 1985, the proportion of people in the Australian construction industry working more than 44 hours increased by 11%—one of the largest increases in any industry (Van Wanrooy and Wilson, 2006). Construction workers are also expected to work non-standard work schedules, including regular weekend work. Researchers report weekend work and irregular shifts to be associated with higher work-to-family conflict among Australian men (Hosking and Western, 2008) and parents working non-standard work hours report significantly lower levels of family functioning, more depressive symptoms and less effective parenting than those working standard hours (Strazdins *et al.*, 2006).

Opportunities for recovery

Little is known about how workers experience the fluctuations of work intensity inherent in project work in the construction industry and previous research, most of which has adopted a cross-sectional survey design, has failed to reveal the work–life impacts of dynamic project-based work. It is possible that work activity 'peaks' reflect periods of work overload for project workers but work activity 'troughs' may conversely provide the opportunity for workers to re-energize, recover and restore their work–life balance. There is empirical evidence to suggest that periods of holiday reduce the consequences of work stress and alleviate workers' experiences of burnout (Westman and Eden, 1997; Westman and Etzion, 2001). However, Westman and her colleagues also report that the beneficial effect of holiday breaks diminishes quickly when workers return to work. Thus, more frequent but shorter periods of rest and recovery between intense work activities may be as important as longer periods afforded by annual leave.

Aim

The aim of the research was to explore the way in which the interface between work and personal life is experienced on a weekly basis by project workers in the Australian construction industry. Specific hypotheses investigated in the research were:

(1) Site-based construction workers' satisfaction with work–family balance and capacity to complete required tasks at work and at home is significantly inversely correlated with hours worked over time.
(2) Major project milestones have a significant impact upon the work–life experiences of site-based construction workers.
(3) Opportunities for recovery afforded by time spent away from work are positively correlated with site-based construction workers' satisfaction with work–family balance and capacity to complete required tasks at work and at home.

Theoretical framework

The conservation of resources (COR) theory proposes that people aim to preserve, protect and build up their resource stock (Hobfoll, 1989). Resources can be objects, conditions, characteristics or energies that are important to an individual (Demerouti *et al.*, 2007). The COR theory posits that stress arises when a person is threatened with resource loss, or fails to regain resources after effort expenditure. Researchers have used COR theory to explain experiences at the work–family interface. For example, Grandey and Cropanzano (1999) suggest that balancing work and non-work demands causes resource loss which can affect job and family dissatisfaction, life distress and physical health.

Taking a break from work can restore depleted resources or help people to gain new resources (Sanz-Vergel *et al.*, 2009), thereby mitigating harmful impacts of resource loss. Recovery is defined as 'the process of replenishing depleted resources or rebalancing suboptimal systems' (Sonnentag and Zijlstra, 2006, p. 331). The availability of time and the opportunity to take a break from resource-draining demands is needed for recovery to take place.

Consistent with the focus upon recovery, the effort-recovery (E-R) model developed by Meijman and Mulder (1998) has been used to examine work–life experiences. According to the E-R model work results in temporary physiological and psychological 'costs' but, after a period of recovery, workers' psychobiological systems stabilize and return to baseline (pre-work) levels. If recovery opportunities are sufficient a high workload will not have an enduring adverse impact. Peeters *et al.* (2005) suggest that when negative effects associated with work overload build up and 'spill over' into the home domain, the opportunity for recovery in the home domain is reduced. Workers who are unable to recover from the previous day's work must exert additional effort to complete work tasks the following day, resulting in even higher psychological and physical 'costs' and an intensified need for recovery. Taris *et al.* (2006) suggest this 'downward spiral' results in an accumulation of negative effects and long-term consequences, such as exhaustion and disengagement from work. According to the E-R model, working long hours impacts upon workers in two ways: (1) first, because effort is expended over a longer period, it increases the psychological and physical 'costs' experienced by workers; and (2) second, it reduces the time available to workers to engage in restorative recovery activities (Taris *et al.*, 2006).

Research context

Data collection took place at a freeway upgrade project in Melbourne, Australia. The project aimed to eliminate conflicting merging and weaving movements along Melbourne's most heavily trafficked and economically important transport connection by constructing extra collector-distributor lanes in both directions. The freeway was widened by one lane, a new elevated carriageway was constructed and a major interchange was redesigned. The length of the 5.5 kilometre stretch of freeway covered by the project was a mixture of at-grade and elevated carriageways and, during construction, work was required to take place adjacent to the existing freeway that remained open, as well as above other roads, railways and tramlines. The requirement to minimize traffic disruption necessitated construction work at night and during weekends. The project was delivered using an innovative alliancing delivery mechanism. Alliance participants included VicRoads, Thiess, Baulderstone, Parsons Brinkerhoff and Hyder Engineering.

Throughout the research period, the number of waged employees at the project remained steady at 60, while the number of salaried employees was approximately 210 at week 1 of diary collection, and steadily decreased to 170 at week 21 of diary collection. The human resource manager estimated that there were up to 400 subcontracted workers engaged in direct construction activity, in addition to the waged and salaried employees throughout the research period, though numbers varied from week to week. The project commenced in August 2007, and the research was conducted in the final stages of the project, from June through to November 2009. The project was generally unaffected by the global financial crisis (GFC) because public infrastructure projects formed part of the Australian government's 'economic stimulus' package to combat the GFC and the funding for this project was committed prior to the onset of the GFC.

Research methods

Data collection

Participants were invited to complete a weekly diary over a 21-week period. Primarily, diaries captured quantitative information about work–life experiences using three Likert scale items. Items included: (i) 'All things considered, how satisfied have you been with your work–life balance this week?' which was rated on a seven-point scale from 'very dissatisfied' (1) to 'very satisfied' (7); (ii) 'In the past week how frequently have you felt rushed and unable to complete all that was required at work?' and (iii) 'In the past week how frequently have you felt rushed and unable to complete all that was required at home?' The latter two items were rated on a seven-point scale from 'all the time' (1) to 'not at all' (7).

Participants were asked to indicate how much time they spent engaged in work the week of the diary entry. Work hours were rated in eight increments from 'less than 35 hours' to 'more than 65 hours'. Interim ratings were in five-hour increments, e.g. 35–40 and 41–45 hours. Participants were also asked to provide additional explanatory comments if they wished to do so. Unfortunately, a requirement of the researchers' University Human Research Ethics Committee to protect the anonymity and confidentiality of data prevented the collection of detailed demographic information about participants, such as their sex, age or

family status. No analysis of responses by personal characteristics was therefore possible.

The advantages of diary-based longitudinal research designs

Diaries are increasingly used to explore experiences at the interface between work and personal life. Diary data are useful for assessing processes in everyday life because they are subject to less retrospective bias (Bolger *et al.*, 2003) and enable even small changes to be detected. Williams and Alliger (1994) proposed three levels of analysis of the work–family experience: (i) immediate experiences, current thoughts and feelings and events that are happening in the present; (ii) short-term judgements where a person only has a short time to reflect upon their experiences; and (iii) global, long-term evaluations of their experiences. Surveys are useful to measure general patterns of stable variables of interest (i.e. level 3 analysis) but diary data are arguably more useful in providing detailed information about work and family experiences (i.e. level 2 analysis).

Van Hooff *et al.* (2006) and Sanz-Verzel *et al.* (2009) utilized a daily diary method to explore the relationship between daily pressures, recovery, work–family conflict and exhaustion. Diaries are particularly useful in work–life research because the interface between work and family life is not static. Butler *et al.*'s (2005) daily diary study revealed significant within-person variation in work demands and work–family experiences over a 14-day period. A diary-based approach is ideally suited to the analysis of workload fluctuations and work–life experiences in the dynamic environment of a construction project.

Sampling strategy

A stratified sampling approach was designed to include male and female representatives, waged and salaried workers and workers in different age brackets and family circumstances. The stratified sample is shown in Table 1. A number of rules were established in an attempt to ensure that the sample represented a balanced mix of single participants and those with dependent children. The human resources manager at the project invited all workers to participate in the weekly diary collection. Upon acceptance of intention to participate, workers were asked to self-nominate into a category according to age bracket, gender, family structure and employment status. A total of 45 workers were allocated to a demographic category according to the stratified sample (as outlined in Table 1) and invited to complete a weekly diary. As with most diary studies, the sample was a convenience sample but, owing to the fact that the purpose of this research was not to examine between-person or group comparisons, the use of a convenience sample does not necessarily present a problem (see also Conway and Briner, 2002).

Table 1 Sampling strategy

Salaried participants (in supervisory or administrative roles)			
	Age bracket	No.	Requirements
20 males	30 years old or under	6	At least 2 singles At least 2 with dependent children (under 18 years old)
	31–40 years	6	At least 2 singles At least 2 with dependent children (under 18 years old)
	41–50 years	6	At least 2 singles At least 2 with dependent children (under 18 years old)
	51–60 years	2	
5 females	30 years old or under	3	
	31–40 years	1	
	41–50 years	1	
Waged participants (in direct construction activity)			
	Age bracket	No.	Requirements
20 males	30 years old or under	6	At least 2 singles At least 2 with dependent children (under 18 years old)
	31–40 years	6	At least 2 singles At least 2 with dependent children (under 18 years old)
	41–50 years	6	At least 2 singles At least 2 with dependent children (under 18 years old)
	51–60 years	2	

Data analysis

Bivariate (Pearson) correlations were performed to examine the relationship between weekly work hours, satisfaction with work–life balance and reported capacity to complete required tasks at work and at home. Time series data are often characterized by properties that violate the assumptions underlying traditional statistical models (Gottman and Glass, 1978; Hartmann *et al.*, 1980). Consequently, time series modelling techniques using the SPSS software package (version 17) were used. Multivariate time series analysis was conducted to ascertain whether weekly work hours predicted satisfaction with work–life balance and capacity to complete tasks at work and home. Further interrupted time series analysis was performed, using an impact assessment technique developed by Box and Tiao (1975), to ascertain whether satisfaction with work–life balance and capacity to complete tasks at work and home were impacted by project events and/or recovery opportunities.

Results

Response rate

Weekly diary data were collected from 15 June 2009 through to 8 November 2009. Table 2 summarizes the number of diary responses completed per week. The number of participants differed on a weekly basis, with participation rates falling in the later weeks. The proportion of waged respondents was highest in weeks 1, 2 and 4 (46%, 42% and 42% respectively).The average number of participants in any week was 12.9. However, participation fell sharply after week 12. This was particularly the case for waged participants and in a number of weeks (12, 13, 18, 19, 20 and 21) 100% of respondents were salaried. Reasons for the reduction in participation are unclear. Diary data collection requires a high degree of participant engagement and many previous diary-based work–family studies have collected data for a considerably shorter period. For example, Van Hooff *et al.* (2006) and Sanz-Verzel *et al.* (2009) collected diary data for a period of only five consecutive days. Relative to other diary studies the achieved sample was low. However, for the purposes of the time series analysis the number of cases equals 'person-weeks' rather than 'persons' giving an effective sample size of 270 data points. It is generally accepted that a minimum of 50 data points are needed for time series modelling (Box and Jenkins, 1976).

Bivariate correlations

The relationship between work hours and the three 'outcome' variables of interest is shown in Figure 1. A bivariate (Pearson) correlation (Table 3) revealed that weekly work hours were significantly negatively correlated with overall satisfaction with work–life

Table 2 Weekly responses by employment status

Week	Date	Total	White collar (salaried)	Blue collar (waged)
1	15–21 June 2009	30	16	14
2	22–28 June 2009	19	11	8
3	29 June–5 July 2009	11	9	2
4	6–12 July 2009	18	14	4
5	13–19 July 2009	19	11	8
6	20–26 July 2009	21	15	6
7	27 July–2 August 2009	12	10	2
8	3–9 August 2009	13	11	2
9	10–16 August 2009	14	10	4
10	17–23 August 2009	16	11	5
11	24–30 August 2009	19	12	7
12	31 August–6 September 2009	9	9	0
13	7–13 September 2009	8	8	0
14	14–20 September 2009	8	7	1
15	21–27 September 2009	10	9	1
16	28 September–4 October 2009	11	9	2
17	5–11 October 2009	7	6	1
18	12–18 October 2009	7	7	0
19	19–25 October 2009	8	8	0
20	26 October–1 November 2009	5	5	0
21	2–8 November 2009	5	5	0
Total responses		270	203	67

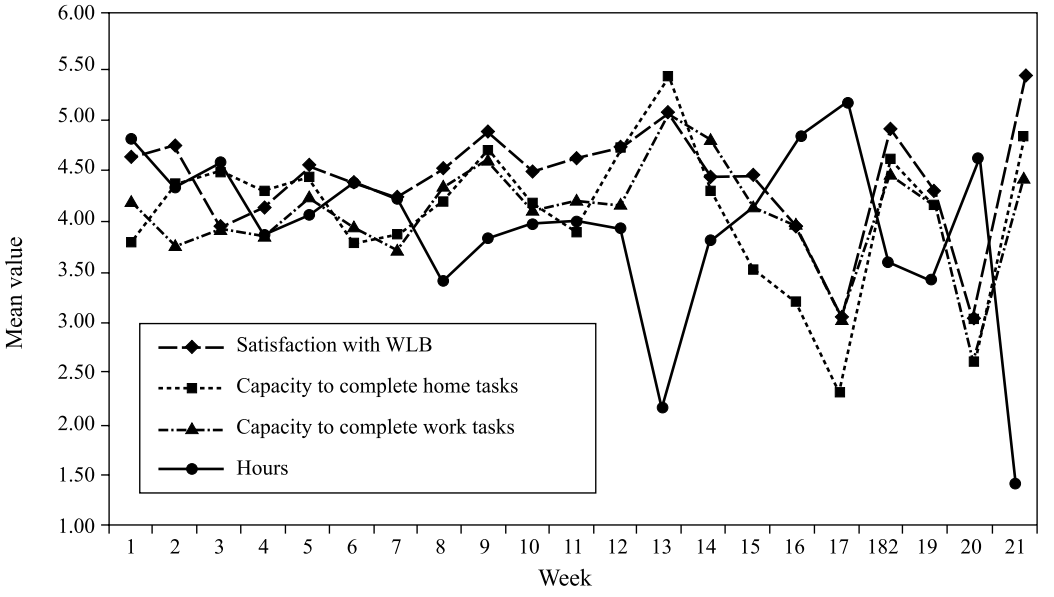

Figure 1 Weekly work hours, satisfaction with work–life balance and capacity to complete required tasks at home and work

Table 3 Bivariate Pearson correlations between weekly work hours, satisfaction with work–life balance and feelings of 'being rushed' at work and at home

		1	2	3	4
1. Hours worked in the past week	Pearson correlation	1			
	Sig. (2-tailed)				
2. Overall satisfaction with work–life balance	Pearson correlation	–0.142*	1		
	Sig. (2-tailed)	0.020			
3. How often have you felt rushed at work? (low score is more rushed)	Pearson correlation	–0.126*	0.662**	1	
	Sig. (2-tailed)	0.039	0.000		
4. How often have you felt rushed at home? (low score is more rushed)	Pearson correlation	–0.260**	0.641**	0.631**	1
	Sig. (2-tailed)	0.000	0.000	0.000	

Notes: * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

balance (r = –0.142, p = 0.020), capacity to complete tasks at work (r = –0.126, p = 0.039) and capacity to complete tasks at home (r = –0.260, p = 0.000). Visual examination of Figure 1 also suggests that, as weekly work hours increased workers' capacity to complete tasks at home decreased to a greater extent than their capacity to complete tasks at work.

Time series analysis

A bivariate time series modelling procedure was used to ascertain the extent to which the dependent variables, i.e. satisfaction with work–life balance and capacity to complete tasks at work and at home could be predicted by weekly work hours. The results of this modelling are presented in Figure 2. The Expert Modeler function in SPSS version 17 was used to identify the most appropriate model for each series. For each dependent variable, weekly work hours was entered as a predictor variable. Figure 2 shows the observed values (solid line) and the 'fit' values (dashed line) for each dependent variable. The 'fit' values provide an indication of how well the model predicted the observed values for each dependent variable. The predicted values show good agreement with the observed values for participants' capacity to complete tasks at work and at home. However, the fit was poor for participants' satisfaction with work–life balance.

Table 4 shows the time series model statistics. All three models were simple 0,0,0 ARIMA models, indicating no autoregressive, differencing or moving average components. Weekly work hours were a

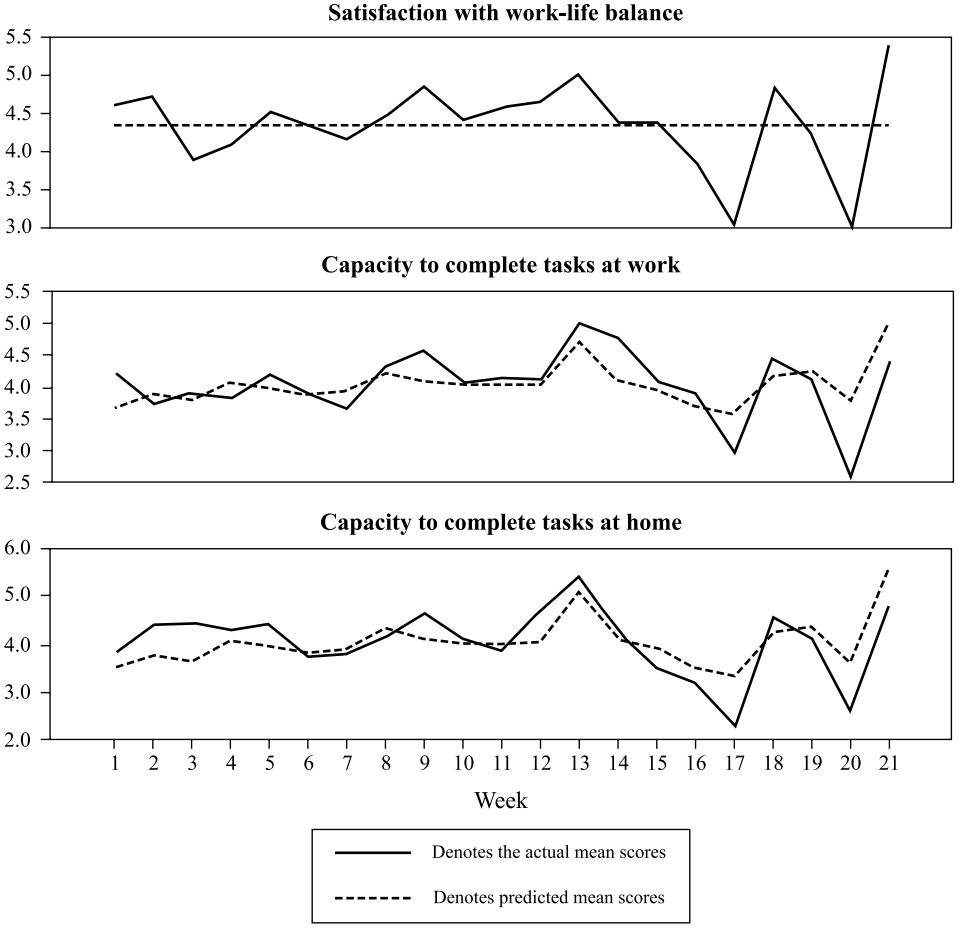

Figure 2 Bivariate time series models for work hours, satisfaction with work–life balance and capacity to complete tasks at work and at home

Table 4 Time series model statistics—weekly work hours as independent variable

Dependent variable	Model	No. of predictors	No. of outliers	R-square	Ljung-Box statistics		
					Statistics	DF	Sig.
Satisfaction with work–life balance	0,0,0	0	0	1.006E-14	16.40	18	0.565
Capacity to complete tasks at work	0,0,0	1	0	0.388	12.63	18	0.813
Capacity to complete tasks at home	0,0,0	1	0	0.496	31.05	18	0.028

significant predictor of capacity to complete tasks at work ($t = -3.47$, $p = 0.003$) and capacity to complete tasks at home ($t = -4.32$, $p = 0.000$), but did not significantly predict weekly fluctuations in satisfaction with work–life balance. The R-square (goodness of fit) statistics indicate that weekly work hours explained 38% of variability in capacity to complete tasks at work and 50% of variability in capacity to complete tasks at home. The Ljung-Box statistic was non-significant for satisfaction with work–life balance and capacity to complete tasks at work but was significant for capacity to complete tasks at home. This indicates that the model is correctly specified for capacity to complete tasks at work but that there is structure in the 'capacity to complete tasks at home' series that is not accounted for by the model.

To evaluate the impact of project events on participants' experiences, a technique for impact assessment recommended by Box and Tiao (1975) was used. This technique includes four stages:

(1) the development of a model for a time series;
(2) adding one or more dummy variables that represent the timing of the events of interest;
(3) re-estimating the model including the new dummy variables; and
(4) interpreting the coefficients of dummy variables as measures of the impact of the events.

On the basis of the qualitative comments, two dummy variables were created. One represented the end of the month reporting periods at which participants indicated they experienced time pressure. These occurred at weeks 2 and 3, weeks 6 and 7, weeks 9 and 10, weeks 15 and 16 and weeks 19 and 20. The second dummy variable represented the pre-ramp opening period of work (weeks 13 to 17).

The resulting time series models provided a considerably higher degree of 'fit' between predicted and observed values for participants' capacity to complete required tasks at work and at home. The R-square statistic for these models increased to 0.79 and 0.85 for capacity to complete tasks at work and home, indicating the model explained 79% and 85% of these variables respectively. Figure 3 shows the predicted and observed values for capacity to complete home and work tasks when work hours and the project event variables were included in the model.

The model parameter statistics are presented in Table 5. The dummy variable representing the end of month reporting periods was not a significant predictor of capacity to complete tasks at work or home. Weekly work hours and the dummy variable representing the

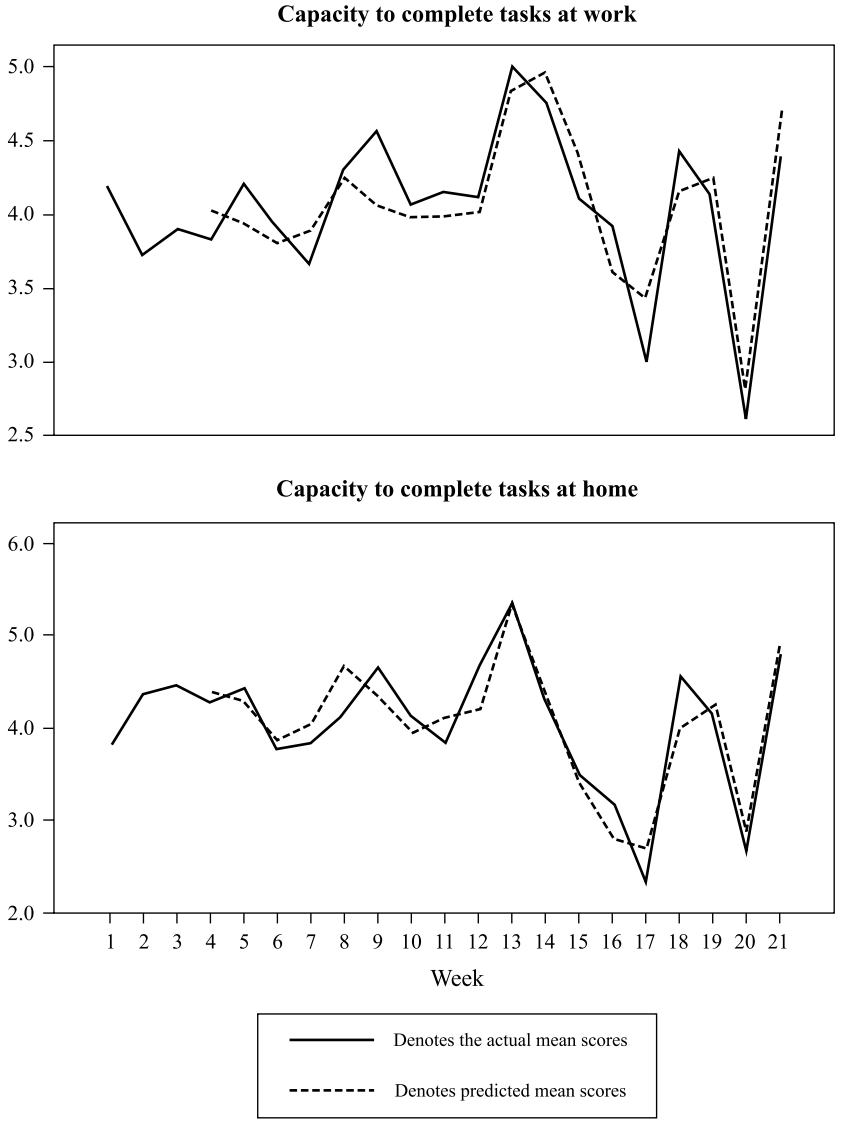

Figure 3 Ability of weekly work hours and project activity variables to predict capacity to complete tasks at work and home

Table 5 Model parameter statistics—weekly work hours and pre-ramp work as predictors of capacity to complete tasks at work and at home

Dependent variables	Predictor variables	Estimate	SE	t	Sig.
Capacity to complete tasks at work	Constant	5.84	0.37	15.89	0.000
	Weekly hours	−0.47	0.10	−4.91	0.000
	Weekly hours (lag 0)	0.88	0.21	4.24	0.001
	Ramp pre-work (lag 1)	−0.48	0.24	−2.01	0.065
Capacity to complete tasks at home	Weekly hours (lag 0)	−0.66	0.09	−7.28	0.000
	Weekly hours (lag 2)	−0.37	0.13	−2.89	0.012
	Ramp pre-work (lag 0)	−0.71	0.17	−4.24	0.001
	Constant	5.34	0.62	8.67	0.000

work phase immediately prior to the ramp opening (ramp pre-work) were significant predictors of both capacity to complete tasks at work and at home. Weekly work hours were immediate predictors of participants' reported capacity to complete tasks at work and at home with 'lag 0' coefficients of $t = -4.91$ ($p = 0.000$) and $t = -7.28$ ($p = 0.000$) respectively. Weekly work hours also predicted capacity to complete tasks at home at 'lag 2' ($t = -2.89$, $p = 0.012$) indicating an additional delayed effect of weekly work hours on participants' ability to complete tasks at home. Ramp pre-work had a 'lag 0' positive coefficient ($t = 4.24$, $p = 0.001$) but a 'lag 1' negative coefficient for capacity to complete tasks at work ($t = -2.01$, $p = 0.065$). This suggests that the immediate impact of the ramp pre-work on capacity to complete tasks at work was positive but that this was followed by a negative effect delayed by one week. The effect of ramp pre-work on capacity to complete tasks at home was immediate and negative, evidenced by a 'lag 0' coefficient of $t = -4.24$ ($p = 0.001$).

In order to explore the impact of opportunities for recovery from work a final time series model was specified. In this model a dummy variable was created representing weeks at which participants indicated they were able to take time off work, either for a Rostered Day Off, as a result of a public holiday or as annual leave. The dummy variable was coded '1' for weeks 9 and 10, 13, 18 and 21 and coded '0' for all other weeks in the series. Figure 4 shows the predicted and observed values for satisfaction with work–life balance and capacity to complete tasks at work and home when recovery opportunities were included as an independent variable in the model. The resulting time series model explained a large percentage of variability in all three dependent variables. The R-square statistic was 0.88, 0.65 and 0.87 for satisfaction with work–life balance, ability to complete tasks at work and ability to complete tasks at home. Table 6 shows the model parameter statistics.

The dummy variable representing recovery opportunity positively predicted satisfaction with work–life balance ($t = 3.94$, $p = 0.002$) and capacity to complete tasks at home ($t = 3.87$, $p = 0.003$) at 'lag 0', indicating an immediate beneficial effect. However, recovery opportunity was a stronger predictor of satisfaction with work–life balance ($t = 8.44$, $p = 0.000$) and capacity to complete tasks at home ($t = 7.75$, $p = 0.000$) at 'lag 4', suggesting a strong positive impact delayed by approximately one month. Recovery opportunity was also a significant negative predictor of immediate (i.e. lag 0) capacity to complete tasks at work ($t = -4.70$, $p = 0.001$).

Discussion

Work hours as a predictor of work–life experiences

The research showed a strong correlation between weekly hours worked and work–life variables of interest. The time series analysis identified weekly work hours as a significant predictor of peaks and troughs in participants' reported capacity to complete required tasks at work and at home. Qualitative comments provided some possible explanations for the 'peaks' and 'troughs' observed in weekly work hours, satisfaction with work–life balance and capacity to complete required tasks at home and at work. For example, end of the month reporting requirements were identified as being a source of time pressure during week 2.

Weekly work hours were a stronger predictor of capacity to complete home tasks than they were of the capacity to complete work tasks. Also, as the time demands associated with the work role increase, participants report reduced capacity to complete tasks in both their work and home roles but feelings of being rushed at home increase more than those of being

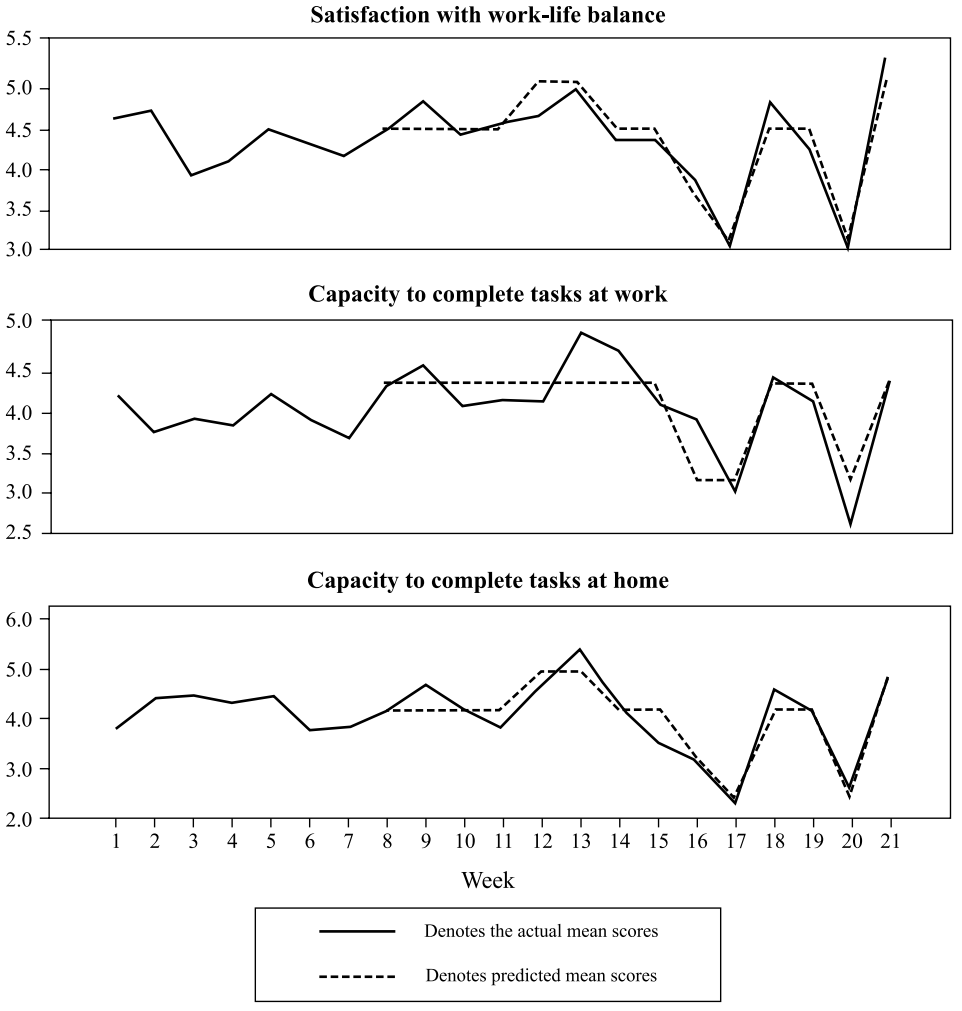

Figure 4 Ability of recovery opportunity to predict satisfaction with work–life balance and capacity to complete tasks at work and at home

Table 6 Model parameter statistics—opportunities for recovery as predictors of satisfaction with work–life balance and capacity to complete tasks at work and at home

Dependent variables	Predictor variables	Estimate	SE	t	Sig.
Satisfaction with work–life balance	Constant	4.50	0.09	51.93	0.000
	Recovery opportunities (lag 0)	0.59	0.15	3.94	0.002
	Recovery opportunities (lag 4)	1.40	0.165	8.44	0.000
Capacity to complete tasks at work	Recovery opportunities (lag 0)	–1.20	0.25	–4.70	0.001
	Constant	4.37	0.12	37.08	0.000
Capacity to complete tasks at home	Recovery opportunities (lag 0)	0.78	0.20	3.87	0.003
	Recovery opportunities (lag 4)	1.73	0.22	7.75	0.000
	Constant	4.15	0.12	35.56	0.000

rushed at work. This is consistent with previous research showing that the family domain is more permeable than the work domain (Frone *et al.*, 1992) and that home life is negatively influenced by demands in the work domain than to a greater extent than work life is negatively impacted by demands in the home domain (Lingard and Francis, 2007). The asymmetry in the work–home relationship was also reflected in comments made by participants. For example one participant commented:

> As a single parent it is impossible to keep up with family and home. When you have to work to keep it going at home, something must give and normally it's at home.

Another wrote:

> Major night shift on Saturday night. Came in Saturday morning for approximately 1.5 hours, catching some sleep during the day, then night shift of 12 hours. Needed Sunday to recover and straight back to work early on Monday. Felt tired almost all day Monday and left earlier than normal at 4.30pm which was still a 9 hour day. No time for any personal interests/activities all weekend.

The time series modelling also revealed that there was some structure in the data relating to participants' reported capacity to complete tasks at home that was not 'explained' by weekly work hours. It is possible that variability in capacity to complete tasks in the home domain is shaped by demands and resources in the home domain that were not measured in our diary data collection. For example, a number of participants commented that school holidays were a more relaxed time for them. One participant expressed this as follows:

> [My] kids are on school holidays, takes pressure off being at home at a certain time. The work flow is a bit less at the moment.

Unfortunately, it is impossible to ascertain whether the impact of school holidays differed between male and female respondents and further research is recommended.

The impact of project events

The ability to predict participants' capacity to complete tasks at home and at work was increased considerably when the timing of a major project activity phase was incorporated into the time series models. An analysis of the qualitative comments written by participants indicated that between weeks 14 and 17 the project was preparing for a major milestone, the opening of a ramp on to the freeway. The timing of this ramp opening was fixed as the event was to be attended by the State Premier of Victoria and would attract considerable media attention. When a dummy variable representing the timing of the pre-ramp opening work was included in the models, the proportion of variability 'explained' by the models increased by 41% for capacity to complete work tasks and 35% for capacity to complete home tasks. Further, the impact of the pre-ramp work explained variability in the data over and above that explained by weekly work hours. Qualitative comments made by participants in the weeks prior to the ramp opening indicate the impact of this significant project event. For example, one participant wrote:

> Peaking at the project—heaps of work on at the moment. Everyone's patience is running low and most people are very stressed out (week 15).

Another wrote:

> Opening the road! Crazy week! (week 16).

The model parameter statistics indicated that the nature of the impact of the pre-ramp opening phase on participants' capacity to complete tasks at home and at work was different. While the intense period of activity undertaken between weeks 14 and 17 had an immediate negative impact upon participants' capacity to complete tasks at home, the immediate impact upon their capacity to complete tasks at work was positive. However, a delayed negative relationship between the pre-ramp work and capacity to complete tasks at work was also observed. Thus, although the short-term impact upon work capacity was significant and positive, a negative impact, delayed by one week was also evident. The reason for this delayed negative impact on capacity to complete work tasks is unclear but qualitative comments made by participants during this period suggest that fatigue might have been a factor. For example one participant commented:

> Have felt a bit sick for two days, still went to work though as there is just too much going on that I couldn't miss. Didn't sleep well during this time and felt tired at work (week 14).

Another wrote:

> [I worked a] 10 hour night shift on Thursday after a 8.5 hr day shift with only 2 hours of light sleep in-between. Back at work for Friday day shift and start of night shift (until approximately 9pm). There were lots of essential works to complete this week for major ramp openings on Saturday. I will also be on night shift tomorrow. Feeling overall very tired and have little energy … (week 16).

The importance of recovery opportunities

The results suggest the importance of recovery opportunities. When included in the time series model, opportunities to recover demonstrated a significant immediate positive effect on participants' satisfaction with work–life balance and capacity to complete tasks at home. It is also noteworthy that recovery opportunities exhibited a strong positive effect at lag 4, suggesting that the benefits of taking a break from work are apparent approximately one month later. Again, qualitative comments made by participants support the importance of recovery opportunities in achieving work–life balance. For example, one commented:

> [I] have been busy covering other people's work and getting further behind on my own. [I] am tired and

> looking forward to taking some leave. [I] have been doing lots of overtime so am ready for time away from work.

Another wrote:

> To me the greatest balance tool is the Rostered Day Off as this allows a sleep in and the availability to go to businesses, shops etc that are not open Sunday.

The immediate impact of recovery opportunities on capacity to complete tasks at work was significant and negative. Time spent away from work, while facilitating greater satisfaction with work–life balance and ability to complete tasks at home, increases participants' perceptions of feeling rushed at work.

Effort and recovery

The results are consistent with the Effort-Recovery (E-R) model, which suggests that resources are depleted by effort expended at work and recovery is important in order to sustain a satisfactory work–life balance. The beneficial effects of recovery opportunity were apparent in our data. Construction organizations should carefully consider ways to build recovery opportunities into the schedule of project workers. Recovery is important because the need for recovery has been associated with lower levels of concentration at work and job performance (Demerouti *et al.*, 2007), which could have serious occupational health and safety consequences in the construction context. Sonnentag (2003) also reports that people who feel that they can recover during leisure time experience higher levels of work engagement and are more likely to adopt proactive behaviour at work, suggesting that organizations will also benefit from the provision of recovery opportunities.

Sonnentag and Zijlstra (2006) report that situational constraints and a lack of control at work are associated with high need for recovery. Project-based activities, such as the pre-ramp opening preparation work, present demands and constraints over which project workers have little control, potentially increasing workers' needs for recovery away from work. However, Sonnentag and Zijlstra (2000) report that the quality of off-work activities is important for recovery. Low effort activities, such as watching television, have shown little beneficial effect, while time spent in social and physical activities yield significantly greater restoration of resources. Moreno-Jiminez *et al.* (2009) also report psychological detachment from work is an effective recovery response. Thus, construction organizations could help project-based workers to better recover from work by providing programmes that facilitate psychological detachment and high quality recovery opportunities, such as time management and relaxation programmes, flexible work schedules and sponsored sports and leisure activities.

A number of qualitative comments made by participants in the present study suggested that some participants experienced insufficient recovery due to the length of their work hours. For example, one participant wrote:

> As usual [I have] too much to do—not enough hours in the week. Time flies by and you look at what you meant to achieve at the end of the day and end up carrying most of it over to the next day. I came into work at 4 am one morning to try to get ahead on work.

Another commented:

> [I] was a bit sleep-fatigued due to error one morning that carried over for a day or two.

This is of concern because Demerouti *et al.* (2007) suggest that there is a reciprocal relationship between workers' need for recovery and an inability to perform required tasks at home and at work. Thus, a high need for recovery leads to withdrawal from household tasks, leading to greater home-related stress that then impacts upon one's ability to complete work tasks. If experienced over an extended period, insufficient recovery among project-based workers could result in this type of 'downward spiral' effect.

Conclusions

The research has implications for research and practice. For researchers the results highlight the limitations associated with the reliance on cross-sectional surveys for collecting data concerning project-based workers' work–life experiences, which are likely to be influenced significantly by the timing of data collection. The evidence of non-random fluctuations in work–life experiences suggests that more research should be undertaken using longitudinal diary techniques. The research supported the hypothesis that work hours are significantly inversely correlated with satisfaction with work–life balance and capacity to complete tasks at work and at home over time. The proportion of variability in capacity to complete work and home tasks explained by work hours also indicates that work–life experiences can be predicted based upon the number of hours people work. Construction organizations concerned with providing workers with the ability to balance their work and personal lives could use this data to anticipate the impact of work hours and to inform the development of strategies to contain work hours to alleviate tension between work and personal life. The research also supported the second hypothesis, revealing that periods of peak project activity have a deleterious 'effect' upon workers' capacity to complete tasks at

work and at home and that this 'effect' extends beyond that explained by work hours alone. This suggests that construction organizations should carefully consider and strive to mitigate the impact of major project events on the work–life experiences of project-based workers. Finally, the research also supported the hypothesis that the recovery opportunities afforded by time away from the workplace have a significant positive impact upon satisfaction with work–life balance and capacity to complete tasks at home. Construction organizations may be able to support effective recovery by carefully planning and scheduling work activities to 'build in' opportunities for recovery for project-based workers during periods of reduced work intensity.

Limitations

Some important limitations inherent in the research must be noted. First the sample size and response rate was lower than desired. In particular, the response rate decreased significantly among waged (blue collar) workers. Thus, no claims to the generalizability of the findings are made. Also, the composition of the sample represents a potential source of bias. People who are experiencing intense time pressure at work were unlikely to complete the weekly diary, possibly skewing the data. By necessity, diary measures must be brief to minimize the burden on participants. For this reason single-item measures of work–life experiences were used. The use of single-item measures is not ideal and can result in reliability and validity problems. The use of both qualitative and quantitative data collection helped to overcome this limitation as the combination of data types enabled a degree of triangulation. Notwithstanding the limitations inherent in the research, the findings are important as they illustrate the importance of treating the work–life experiences of project-based construction workers as a dynamic process, rather than a steady state phenomenon.

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