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To: AMOD

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Subject: AM2014/196 - Part time work - NDIS and other matters

Dear AMOD Team,

We refer to paragraph 7 of the Statement issued by the Part-time & Causal Employment Full Bench on 22 February 2016. We attach the expert report of Dr Olav Muurlink in reply to the employer claims listed for hearing on 14 and 15 July 2016. We copy the relevant employer parties by way of service.

Best regards,

Michael Robson

National Industrial Officer

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Predictability and control in working schedules

Dr Olav Muurlink B.A. (Hons.) M.Phil. Ph.D. MAPS

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Biography:

Dr Muurlink is a member of the Australian Psychological Society and the Working Time Society (Switzerland). He is a senior lecturer in organisational behaviour at Central Queensland University (Brisbane), and Senior Research Fellow (adjunct) at Griffith University (Griffith Institute of Educational Research). Dr Muurlink is a member of the Central Queensland University's Academic Board, and the Human Research Ethics Committee. He is also chair of management of the international charity Co-operation in Development (Australia) Inc (CO-ID), and head of country, Bangladesh, of CO-ID and has held management positions in manufacturing and media companies in Australia and overseas.

Previously Dr Muurlink has held positions at the University of St. Andrews' Environmental Policy and Research Unit lead by Professor Terence Lee FBPsS, and Griffith University's Centre for Work, Organisation and Wellbeing, and was later later senior research fellow at the Centre for Learning Futures. He has also held senior management positions in manufacturing and media firms.

His PhD studies were conducted at Griffith University under the supervision of health psychologist Associate Professor Frances O'Callaghan and Emeritus Professor Drew Nesdale. He gained his undergraduate qualification at Charles Sturt University winning the 1990 University Medal, completing his masters at the Psychological Laboratory at the University of St Andrews with distinction on a project relating to the perception of risk.

1.0 Overview

This report relates to the current four-yearly review of modern awards being conducted by the Fair Work Commission, in particular common issue proceedings concerning part time employment (AM2014/197) and casual employment (AM2014/196) ('the Common Issue Proceedings'). These proceedings include claims to vary the part time work provisions in the Social, Community, Homecare and Disability Services Industry Award 2010, Aged Care Award 2010 and Nurses Award 2010 ('The Awards'). This report includes a

- review of work on scholarly work on unpredictable patterns of work and the effect of a roster on workers' well-being (with an emphasis on material that is specific to the types of workers covered by the above Awards); and
- review of scholarly work on the impact of lack of control over patterns of work on workers' well-being (with an emphasis on material that is specific to the types of workers covered by the above Awards);

2.0 The literature search

Comprehensive searches were conducted using search terms commonly and internationally associated with non-standard shifts and working patterns. In addition to the searches (including wild card searches) conducted in Google Scholar (see Table 1) a further non-exhaustive search on "control over * hours" was conducted. This search was not exhaustive because comprehensive searches returned too many results to enable complete coverage.

Note that while perhaps a decade ago it would be considered inappropriate to base scholarly literature reviews on Google Scholar searches alone, there has been a significant shift in thinking in the last decade. Early studies criticised the coverage of Google Scholar, but more recently, it has become clear that Google Scholar has matched or overtaken rivals. For example, Gehanno et al in 2012 reanalysed searches in 29 systematic Cochrane reviews (the gold standard of reviews with a medical focus) and found that **100%** of articles drawn from specialist medical databases were found in Google Scholar (Gehanno, Rollin, & Darmoni, 2013). This is in addition to earlier studies already confirming its superiority in accessing less mainstream scholarly material (Falagas, Pitsouni, Malietzis, & Pappas, 2008).

Table 1: List of complete searches conducted

"unpredictable * hours"
 "inconsistent work hours"
 "unpredictable rosters"
 "flexible rosters"
 "flexible * rosters"
 "workers on standby"
 "standby work"
 "inconsistent working hours"
 "inconsistent * rosters"
 "inconsistent rosters"
 "variable rosters"
 "variable * rosters"

3.0 Unpredictability and its correlates

In Australia, there is relatively little regulation pertaining to the amount of consecutive hours worked, or the minimum length of rest periods, relative to for example, the US and Europe. However, regardless of regional variation, there is little focus on the *predictability* of work patterns. Australian working patterns continue to follow an international trend toward greater variety. Where once the police officer or nurse stood apart in terms of their working hours, now there is a large and growing cohort of workers from a range of occupational categories whose work day is characterised by unpredictability and lack of control over work hours, in addition to lack of real or perceived job security. In Australia in the twenty year period from 1982 alone, the percentage of all employees who were casual more than doubled to 27.3% (Campbell, 2004) and these casual workers generally over-represent the number of workers who experience a unsteady 'beat' in their working week. The ABS (2009) notes, for example, that variability in working days is more than twice as common amongst casual employees (24%) than other employees (11%).

I will deal in this section, as cleanly as possible, with the issue of unpredictability/variability/flexibility/inconsistency in working patterns, and separately with the issue of control, but the two broad constructs are closely related in practice.

The arhythmicity of the working week for an increasingly large proportion of workers contrasts with the traditional regular seven-day work/rest 'beat' (Zerubavel, 1989, p. 136) which forms the basis on which we have traditionally considered occupational health and safety. This "weekly rhythm" (Almeida, 2004, p. 128) is influenced by work schedules (Zerubavel, 1989), as well as other factors, including social norms and conventions, and biological parameters such as the circadian and other 'clocks' that govern our response to light and the seven day week.¹

¹ There is evidence, for example, of a circaseptum (seven-day) rhythm evident in both human, animal and even plant (Duca, 2015) studies.

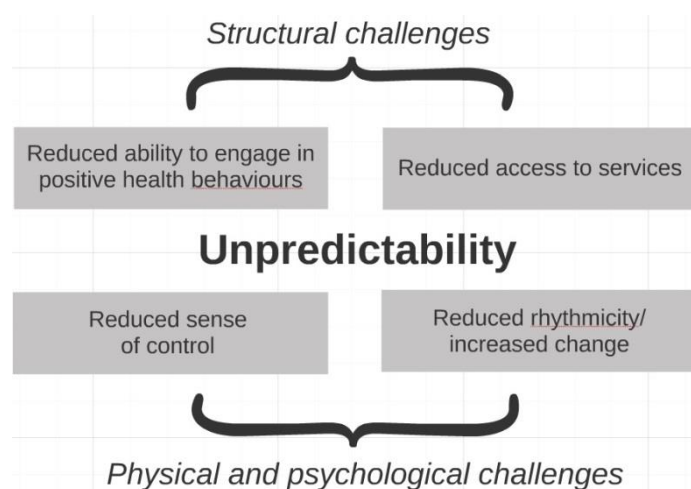
Contrast the increasingly complex working week (featuring night work, shift work, weekend work, overtime, compressed working weeks and on-call patterns) with the relatively predictable and steady beat of non-working life: Saturday sport, children's school hours, television or public transport scheduling. Not surprisingly, then, rhythmicity has clear implications for a worker's ability to maintain work-life balance. Increased variability in working hours has not been matched by increased flexibility in non-work activities. Hofäcker and König (2013) found that rather than the quantum of working hours, *this* issue was critical in predicting work-life conflict.

"Flexibility" is a broad term that does not specify *for whom* the flexibility exists, and who controls that flexibility and it is important to make the distinction between worker and employer-controlled variability. Giovanni Costa, a past chairman of the International Commission of Occupational Health Scientific Committee on Shift work and Working Time, thus prefers to split 'flexibility' into two terms, two very different ways of looking at non-standard working schedules. One, which Costa et al (2006) calls 'variability', reflects employer control over working hours designed to respond to the evolving requirements of the business and service sector. By contrast, 'flexibility' refers to "individual *workers'* discretion and autonomy to adjust working hours to reduce work-life conflict and better accommodate other activities needs and responsibilities' (Costa et al., 2006, p. 56). The two have an almost opposite relationship with employee control, variability tending to reduce it, flexibility tending to increase it. Flexibility is thus often associated with employee wellbeing² while variability is high on the list of desired employer outcomes. The US Survey of Employers in the Low Skill Labor Market report that applicants' willingness to be flexible about work hours is prominent in employer's preferences for low-skilled new hires (Acs & Loprest, 2008).

Unpredictability in the workplace has a range of corollaries for employee physical, psychological and social health (see Figure 1). I will first focus on two aspects of unpredictability that relate to *structural* changes in time management.

² Costa et al found in fact using a sample of 21,505 European workers, that health and psychosocial well-being were favourably associated with higher flexibility and lower variability. Notably, flexibility was the *strongest* predictor of job satisfaction.

Figure 1: Overview of the challenges posed by unpredictable or less predictable work schedules.



3.1 Structural challenges to health posed by unpredictability in time scheduling

Firstly, it results in the reduction of employee ability to engage in positive health behaviours. If work has a predictable ‘beat’, health behaviours can be more easily synchronised with work, for example family meal times and team sports (Sargent et al 2015). Unusual hours tend to be significantly associated with an increase in smoking and alcohol consumption (Bushnell, Colombi, Caruso, & Tak, 2010) and lack of exercise (C. Thomas & Power, 2010), and are reliably associated with long term increases in BMI, particularly in countries such as Australia and the US. Some of these consequences of irregular work patterns, such as drinking alcohol, may have secondary health impacts, for example, further increasing sleep impairment (Vitello, 1997) which in itself has health consequences.

Crouter and Maguire (1998) refer to the clash between different schedules as closing “windows of socialisation” but equally, erratic schedules close windows of self-care. Bittman’s careful diary studies (2005) using ABS data, for example, finds that those who work on Sunday, for example, are less able to undertake activities usually associated with Sunday, notably sleeping in and undertaking personal care activities such as doing one’s teeth or eating with family members. The minutes ‘lost’ in these traditional non-work periods of the week are not fully recovered elsewhere in the week (Bittman, 2005; Craig & Brown, 2015). Higher wage individuals, however, are able to recover ‘lost’ time more effectively; for lower wage earners, there is less elasticity in a 24-hour schedule. As Ennis (1968) suggested in the wake of dramatic increases in employment in the 1960s, “higher level occupations ...[may] have the same amount of leisure time [now as previously] because they spend less time (but maybe more money_ on maintenance-nurturance” (p. 556), spending money for example on cleaning services to ‘buy back’ time. Time and money have long been linked in scholarly literature in disciplines as distinct as economics and psychology. “Consumers not only spend time and money to

acquire products and services but also often use time as a substitute for money and vice versa” (Jacoby, Szybillo, & Berning, 1976, p. 320). So for lower paid workers, these changes to work schedules have amplified work-life balance implications.

Secondly, unpredictability may reduce the ability of the individual to access services that follow a predictable ‘beat’. These may include, relatively more trivially, access to health maintenance services such as gyms or good quality food options (as opposed to fast food options, which tend to have higher degree of accessibility regardless of time), or more significantly, access to medical facilities. There is evidence that workers who experience accidents at non-standard hours may well suffer a worse fate than those who work during standard working periods. Crowley et al (2009) reviews a number of relatively recent studies of death rates by day, suggesting that higher mortality rates are associated with poorer treatment available on the weekends in hospitals. This may be due to lower staffing on weekends, or it may be due to those who are present at hospitals on weekends are suffering from greater weariness accumulated during the working week. (The weariness effect on medical professional’s effectiveness is measurable: Thomas et al (2012) found a relationship between the number of hours a surgeon worked—independent of all other variables—and the increased risk of complications when performing pulmonary lobectomies for example, while Virtanen et al (2009) found relationships between work stress and hours and hospital-associated infection in patients.) Studies by Crowley and others on off-peak mortality (e.g. Bell & Redelmeier, 2001; Epstein, Barmania, Robin, & Harbord, 2007; Hamilton, Mathur, Gemeinhardt, Eschiti, & Campbell, 2010) suggest that medical services are not evenly spread around the clock or the calendar week.

4.0 Physical and psychological challenges of unpredictability

4.1 *Reduced sense of control*

The overwhelming evidence from health psychology is that a sense of control (which needs to be distinguished from actual control, even though the two concepts are clearly related) is one of the most critical psychological variables in both directly and indirectly determining health responses to stressors such as work conditions. I will review some of the larger studies that relate specifically to control in the workplace, however, more generally, a stronger sense of control is associated with better health outcomes, fewer symptoms, faster recovery from illness, and even longer life (Lachman & Weaver, 1998a). Animal studies confirm that depriving even laboratory animals of control over the environment will lead to premature and sometimes otherwise unexplained death (Gatchel, Baum, & Singer, 1980).

Even small amounts of ‘actual’ or ‘perceived’ control can have significant and measurable impacts on health outcomes, and to anticipate a later section of this report, *change* in degree of control (in particular a reduction) can itself be negative, while higher levels of stress combined with loss of control (as in the animal studies alluded to earlier) can have catastrophic effects. When residents at another nursing home had their feelings of choice and personal responsibility over pot plants in their rooms curtailed, Rodin and Langer (1977) even observed a significant increase in mortality, an

early study that influenced the later inclusion of control in epidemiological studies of occupational health.

Work stress is in fact now commonly defined as a combination of work *demand* with work *control* (Karasek et al., 1998), and a significant component of this sense of control relates to *control over work hours*. Perceived control over working hours correlates highly with overall sense of job control, (Ala-Mursula, Vahtera, Kivimäki, Kevin, & Pentti, 2002). Job control is thought to ameliorate the role that job demands place on human health, with a job that places high demand on the worker without concomitant high job control regarded as high strain work, which has in turn been associated with a very broad range of negative physical and psychological health outcomes: coronary heart disease (Kivimäki et al., 2012), dementia in late life (Wang, Wahlberg, Karp, Winblad, & Fratiglioni, 2012), depression (Siegrist, 2008) and illness determined through absenteeism (Niedhammer, Sultan-Taïeb, Chastang, Vermeylen, & Parent-Thirion, 2012) and disability pensioning (Laine et al., 2009).

One of the most significant epidemiological studies looking at control in the workplace, Kopp et al (Kopp, Skrabski, Szántó, & Siegrist, 2006), is worth examining in greater detail. Working with a very large Hungarian dataset, the Kopp team found that low levels of perceived control at work, along with job insecurity and a high weekend workload were the best of the working-time predictors of premature cardiovascular disease mortality for men, and also highly predictive for women. The Kopp studies (Kopp et al., 2006; Kopp, Skrabski, Szekely, Stauder, & Williams, 2007) are particularly well assembled, although their measure of control is a single item “how much can you influence what happens in your working group?” Control at work is likely to be multidimensional (Loudoun, Muurlink, Peetz, & Murray, 2014; Wergeland & Strand, 1998). However—remarkably—this single item measure of control was the second strongest work-related predictor amongst female and male workers of premature death from cardiovascular disease (Kopp et al 2006) and the single most powerful predictor of female ischaemic heart disease mortality. To put this in perspective, the correlation between the strongest single demographic or behavioural predictor, education and premature death from heart disease is between 0.385 and 0.599, while the correlation between control and heart disease lies between 0.188 and 0.344. Education increases sense (if not reality) of control, and when factoring education and other classically-associated variables such as drinking and smoking into account, unusual hours and low control at work still accounts for upwards of 10% of the variation in death rates from heart disease. In modelling predicting death, this is an extraordinarily large proportion

In an earlier Kopp study (Kopp et al 2005), the same job control was examined in relation to common measures of depression and the WHO wellbeing score. In bivariate analysis the connection between control on the one hand and depression and wellbeing was very significant. In multiple regression models, where other factors are taken into account, sense of control (and job security) remained an important predictor of wellbeing, but not of depression, although other studies show depressive symptoms *are* associated with depressive symptoms, after adjusting for age and gender (e.g. Steptoe, Tsuda, & Tanaka, 2007). In the Kopp study job control and security were the most important work-related determinants of wellbeing (ahead of working hours, income, job satisfaction or work troubles). It is important to note that depression in and of itself is an independent risk factor in the development of cardiovascular disease.

There are studies, not surprisingly, looking at the issue of control over work scheduling in the care sector specifically. An Australian study (Pisarski, Lawrence, Bohle, & Brook, 2008) found that nurses who judged their work environment as more controllable reported reduced work-life conflict and superior psychological well-being, with the work-life conflict finding particularly robust. Karhula et al (2013) measured job control with Karasek's Job Content Questionnaire and used job strain at a ward level rather than an individual level to do their comparisons. This reduces the subjective element of measuring control and demand. Job strain was associated with cognitive and physical workload perceptions. Sense of control has also been strongly associated with another, less direct marker of wellbeing: intention to leave the profession and absenteeism. Dalton and Mesch (1990) found that both markers of discontent went down when a system of nurse-controlled flexible rostering operated consistent with findings elsewhere that nurse sense of control is associated with lower turnover intentions (Weisman, Alexander, & Chase, 1981) in common with findings from other professions.

While the evidence that lack of control over work characteristics has serious health consequences, there is also a more positive body of evidence emerging that employees given greater control over, for example, work scheduling, can experience positive outcomes. These outcomes are also measurable in terms of outcomes valued by employers (such as lower turnover and greater productivity).

Barton et al. (1993) examined individual choice and shift system tolerance, finding greater tolerance was associated with greater control over work hours³. Either regular or flexible (worker controlled) rostering was found to lead to a greater sense of control than irregular or rotating shifts. In a more recent example from the work setting, however, Garde et al (2012) implemented self-rostering in employees, and found favourable consequences for health, stress and recovery, without changing actual working hours. In a study of police officers, Vila (2006), analogously found that those who preferred to work evening hours did not experience the same negative effects as those who were assigned to shift work non-voluntarily. More generally, Costa et al's (2006) analysis of a European dataset of 21,505 participants – a Third European Survey on Working Conditions found that *flexibility* had positive effects on health. Mikko Harma (2006), a specialist in working time at the Finish Institute for Occupational health⁴, believes that other than regulating overtime or excessive hours and provisioning more sleep-friendly principles into roster design, the best way to decrease the negative health effects of work hours in general would be to “increase individual work-time control” (Härmä, 2006, p. 502).

However, another overarching variable here is socioeconomic status, or at least job role. Control over work variables, not surprisingly is significantly determined by rank: that is, more senior positions (often associated with higher income) perceive that they have greater control over their work conditions. Where lower income workers perceive a high sense of control, their health levels are remarkably comparable to that of higher income workers (Lachman & Weaver, 1998b). Control requirements may also differ by occupational level. Stein (2015) looked at different occupational levels within the US

³ Wilson (2002) recommends that regular shift rotas are superior due to the ability of staff to organise personal and social lives, and I will deal specifically with the issue of regularity and change.

⁴ Prof. Harma's recent work includes examinations of shift ergonomics/working hours in nurses.

health care profession, ranging from physicians to certified nursing assistants and showed how different kinds of control over work hours impacted differently on different occupational levels. Stein found, for example, that physicians were stressed by having the *ability* to work extra hours, while for low level workers, the desire to work fewer hours than 'offered' was a significant stressor. An hours mismatch was not a significant stressor for higher levels of health care workers, while supervisor pressure was not a significant stressor for entry-level positions—possibly because lower level employees have different expectations of supervisor behaviour.

These findings about control are so universal as to be considered almost a rule. The exact mechanism by which sense of control impacts on human health is not fully understood, however. It does appear to relate to coping resources, and these differ between individuals. "The emotional impact [of stress]," Frankenhaeuser found, is "determined by the person's cognitive appraisal of the severity of the demands in relation to his or her own coping resources" (Frankenhaeuser, 1986, p. 101). Amongst the resources that the individual can draw on (apart from wealth in giving sense of freedom and control) is support offered by supervisors or colleagues which can help ameliorate the impacts of a uncontrolled or uncontrollable work environment (Pisarski et al., 2008).

There are a number of work scheduling variables that have been associated with sense of control. A qualitative study of casual employees in five star hotels in Sydney found marked differences sense of control between permanent and casual staff (Bohle, Quinlan, Kennedy, & Williamson, 2004). Lower sense of tenure may be a contributing cause for the negative impacts of unusual work schedules (Brogmus, 2006). In a study of Scandinavian nurses, Abrahamsen et al (Abrahamsen, Holte, & Laine, 2012) note that "under-employed nurses frequently take extra shifts at short notice to reach desired working hours" (p. 70). For these workers, increased irregularity in hours may be a function of their choice. These choices may have idiosyncratic reasons not associated with working hours. In studies I have co-authored of heavily over-worked shift workers, it is obvious that there is always a proportion of staff, for example, which *prefers* to work nights, not for the additional money, but because of the absence of supervisory staff.

In the following section I will be examining the role of sleep in mediating unpredictability of work practices in determining health, but it is worth pointing out that studies show that sense of control over work variables has itself been related to key sleep quality (Smith & Iskra-Golec, 2003).

4.2 Change and arrhythmia

Like control, change has a long relationship in the scholarly literature with negative health effects. There are a number of studies looking specifically at major (divorce, marriage, moving house and so on) and minor changes in life showing significant associations with negative health outcomes. These studies, such as the Americans' Changing Lives Study, tend to show a close relationship between socioeconomic status and negative life events that constitute major changes, and that a simple 'count' of

negative life events is positively associated with mortality (Lantz, House, Mero, & Williams, 2005). Remarkably, minor life events ('hassles') also retain this significant relationship with serious health outcomes (DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982). This relationship between change and health outcomes holds true for psychological outcomes such as depression (Kendler et al., 2010) or physical health outcomes such as breast cancer, with Lillberg et al (2003) suggesting immunologic and other hormonal changes, or changes, as I proposed earlier, in positive health behaviours that in turn could trigger negative health effects. Change is also capable of directly interrupting sleep, and circadian disruption in turn is a well-established pathway to health impacts.

However, a new US study (Tamaki, Bang, Watanabe, & Sasaki, 2016) found that even sleeping in a new bed takes at least a day's accommodation, associated with an increase in relatively unconscious levels of *vigilance*, and it is the issue of perpetual vigilance associated with not knowing when work will commence that I want to emphasise here.

4.3 On-call or standby work

A particular category of variable work that I will emphasise in this report is 'on call' or 'standby' work, as it is a common work practice in the care sector and beyond. On call work has been predominantly studied in the area of 'high value' professions, particularly in medicine (medical technologists, doctors, midwives), but also transport and marine (ship engineers, junior airline pilots, tug boat pilots) and IT workers (Nicol & Botterill, 2004a). On-call work, like casual work itself, is no longer a rarity, with over a quarter of Australian workers having an on-call component to their work (ABS, 2012)

On-call or standby work is often not an optional choice, but an operational requirement, used to ensure particular essential hours of duty or tasks are covered. On-call work requires the worker to subsume control over lifestyle choices to allow the ability to respond to work requirements, "limiting behaviours...to activities that would not interfere with their ability to work" (Nicol & Botterill, 2004a, p. 1). Studies have focused heavily on work-life balance and domino impacts on family and home life of on-call work patterns, however there is also a substantial emerging literature on the role of being on call on physical health.⁵ Some of these impacts may, when separated out, be *positive*: for example, on-call surgeons are forced to restrict alcohol intake in order to be able to respond to work requirements as required. The 'unique' negative impacts of on-call work appear to be related to the requirement to remain alert and available to being called to work, and not surprisingly, this requirement impacts on sleep.

⁵ The two areas of impact are of course not independent. Emslie et al's UK study of 2176 full time white collar bank employees found that work-life conflict strongly predicted self-reported physical symptoms including minor psychological problems, and did so equally for men and women (2004).

The research into 'on-call' workers is focused quite heavily, but not exclusively, on the medical industry. For example, Tucker et al (2010) found that on-call work was associated with increased work-life interference and psychological strain. A series of studies of British GPs, while focused on job satisfaction showed that until GP co-operatives (designed facilitate out-of-hours calls) were introduced in the 1998, on-call at night in particular was either the most or second most stressful aspect of their jobs (Cooper, Rout, & Faragher, 1989; Sibbald, Enzer, Cooper, Rout, & Sutherland, 2000; Sutherland & Cooper, 1992).

There are a series of studies looking at on-call work and sleep. A comparison by Richardson et al (2007) of doctors sleeping on site at a hospital, between those who were on-call and those who were protected from being woken found poor sleep efficiency and poorer quality sleep in the former category findings replicated to a significant degree in sleeping-off-site studies (e.g. Jay, Thomas, Weissenfeld, Dawson, & Ferguson, 2008) and in laboratory studies where on-call vigilance is replicated (Wuyts et al., 2012). In other words, the anticipation of being woken up is sufficient to disturb sleep quantity and quality, and the degree of uncertainty appears to exacerbate this effect (Ferguson, Paterson, Hall, Jay, & Aisbett, 2016). Smithers' (1995) study of organ transplant co-ordinators found that on-call impacts on sleep spilt over to periods when workers were *not* on call, suggesting that sleep patterns established during periods of disruption have inertia.

Outside the health industry, Pilcher et al (2000) looked at on-call work patterns and sleep of 198 train engineers, using a diary method, and a timescale of 14 days. The study methodology is solid, but the response rate was low (around 25%) allowing the possibility that only the worse effected are over-represented (or underrepresented) in the study. They found that those on-call were more likely to report sleep related problems, and interestingly found that being on-call *at home* was, if anything worse than being on-call at other locations (e.g. worker 'bunks' on site), possibly because the presence of family interfered with the worker's ability to implement sleep patterns that would conform with on-call requirements. In a major review of health impacts of on-call work (focused away from the medical industry), Nicol and Botterill (2004) identified 16 papers of relevance. The authors (Nicol & Botterill, 2004b) conclude that on-call work poses a risk to psychological health in particular.

The research finds that even when workers are *not* working, they are not sleeping or resting as effectively as a result of being on-call. Torsvall and Åkerstedt (1988) using objective and subjective measures of sleepiness in a study of ship engineers, found that on-call workers experienced higher levels of sleepiness during the day following an on-call period, and a decrease in the quality of sleep. These effects were largely independent on whether or not they *had* been called to work. The authors reported that being on-call was associated with apprehension, uneasiness and anxiety. These impacts once might be 'passed on' to those living with or near the worker. A French study of electrical and gas engineers found that on-call work also impacted on family life (Imbernon, Warret, Roitg, Chastang, & Goldberg, 1993).

Ferguson et al's very recent re-examination of the issue (Ferguson et al., 2016) expands the evidence by looking at laboratory evidence where the factors in causal relationships

are better controlled, but the scale of the outcome variables are necessarily obtained. To be clear, it is possible in a laboratory to examine the impact of on-call work (recreated for the laboratory) on outcomes such as sleep or attention, but not to, say heart disease (although other studies have shown long term relationships between sleep disruption and heart disease). The laboratory evidence confirms that being ‘on call’ appears to equate to being vigilant: the apprehension of being woken up impacts on quality of sleep. Other researchers have also shown that early morning shifts are associated with “apprehension of difficulty wakening” in cabin crew (Kecklund, Åkerstedt, & Lowden, 1997), and the association between shorter sleeps and apprehension about waking was echoed in the recollections of on-call fire and emergency service workers (Paterson, Aisbett, & Ferguson, 2016).

A Swedish study of ship engineers, while using a smaller sample than some of its rival studies, did have a more objective measure of sleep disruption (Torsvall & Åkerstedt, 1988), using electroencephalogram (EEG) and electrocardiogram (ECG) recordings and subjective ratings, providing evidence that subjective ratings *are* a reliable measure of sleep disruption (something I have confirmed in my own sleep laboratory work) (Korompeli et al., 2016). Interestingly, the Swedish study established that disruption to sleep often occurs during the anticipatory phase. That is, workers experience disrupted sleep *before* their sleep is actually disrupted. Being on-call, thus involves the brain being switched ‘half on’ to receive call signals, something this team found in previous research with ship engineers (Torsvall, Castenfors, Åkerstedt, & Fröberg, 1987).

The issue of naps—short sleeps of less than four hours—is relevant here, with on-call workers more likely to engage in brief ‘catch-up’ sleeps. Most sleep researchers agree that naps of at least 4 hours in length can partially or fully restore eroded functioning (Krueger, 1989). However, if sleep occurs in shorter lengths over a period of 24 hours, its effectiveness is degraded, even if the total quantum of sleep over a whole 24 hour period is the same (Naitoh & Angus, 1987). Thus, the process of ‘grabbing a quick nap’ to recover sleep may not be entirely successful.

Turning to impacts other than sleep⁶, one of the better longitudinal studies, albeit tracking participants for a total of two weeks (one week on-call and one week not on-call) found no differences in cortisol (a marker of stress) but found significant increases in irritation and a reduction in mood and social activities, household activities, and low-effort activities (Bamberg, Dettmers, Funck, Krähe, & Vahle-Hinz, 2012). Bamberg et al’s study focused on a relatively low stress work—software administrators--but found the effects were independent of whether or not the workers were *actually* called to work.

⁶ It is important to note that sleep has serious implications for both physical and mental health. Apart from the direct physiological consequences noted elsewhere in this report, studies show that even restricting daily sleep by as little as 30 minutes can make significant differences to outcomes such as vigilance that have personal and societal health implications (Dinges, 1990; Harrison & Horne, 2000) such as accidents and failure to maintain proper self or other-care.

A small handful of studies have examined the impact of on-call work on mental health, again with an emphasis on the medical profession. The studies rely on self-report, using either questionnaires or mood diaries. Chambers (R Chambers & Belcher, 1994; Ruth Chambers & Campbell, 1996) conducted studies looking at anxiety and depression in two published studies in the 1990s. The studies showed on-call night work was associated with depression and anxiety, roughly equally predictive in male and female GP samples. This is correlational data, which does not in itself provide strong evidence. Measuring outcomes such as mental health *at the same time* as measuring (presumably) causal factors (such as on-call work) does not allow one to firmly establish causation. Similarly, Rout, Cooper and Rout's (1996) 'one-shot' questionnaire study uses terms such as 'predictors of health' to describe correlates (Rout, Cooper, & Rout, 1996). A better test of the impact of on-call work on mental health was a French study of male gas and electrical employees because a comparison was conducted between on-call workers and those working in similar roles but *not* on-call. The study produced the weakest 'mental health' impacts, but psychological and global wellbeing were significantly worse, and family and social wellbeing were severely impacted (Imbernon et al., 1993).

Studies have also looked at the impact of on-call work on personal security, and seem to indicate that workers in on-call professions *feel* significantly more at risk (Masterson, Ashcroft, & Shah, 1994).⁷ Some cross-sectional studies do offer a degree of longitudinal strength. Heponiemi et al (2016) used a large panel of over 2500 physicians, and found that those who had been on call for more than 40 hours per month experienced highly significantly more distress than those not on call, and were more likely to indicate they were considering leaving their job. Lindfors et al (2006) sampled 60% of all working Finnish anaesthetists finding highly significant relationships between on-call workload and stress symptoms. One of the very few true longitudinal studies of on-call work, again conducted in the health sector, found that being on-call, independent of a range of other variables was significantly associated with the outcome measured in this study, musculo-skeletal disorders (Trinkoff, Le, Geiger-Brown, Lipscomb, & Lang, 2006)

4.4 Newness in work practices

Part of the problem here, as noted at the outset of this section, is that change *per se* presents a challenge. An influential article by Stinchcombe (1965) introduced the term the 'liability of newness' to the lexicon. Stinchcombe's focus was organisational: new organisations require bedding down before they become robust. His point can be easily transferred to individuals, and the evidence that newness is a liability is extensive.

Cornélissen et al (2008) for example show that frequent *change* in exposure to light (associated with changes in shift patterns) is associated with mortality in a number of species—not just humans. Adaptation to change is not immediate, and inconsistent patterns of change do not assist the process. An individual worker's body clock adjusts after 10 or more night shifts in a row (much in the manner of jet lag) (Hakkinen, 1969). Not surprisingly, *rotating* shift work even more than shift work *per se* is associated with objectively measured illness (Nicholson, Jackson, & Howes, 1978) and stable patterns

⁷ These subjective feelings, as with the issue of control, may have objective health implications.

are thought to be associated with lower negative impacts of night shift work (Ahasan, Lewko, Campbell, & Salmoni, 2001).

Adaption is also occurring at a behavioural level, and again, takes time. Change in the workplace is generally accompanied by risk, and no change accompanied by a gradual reduction in risk (as much as 1.5% a year). Askenazy's (2001) analysis suggests a 1.5% annual reduction in workplace injuries and illnesses in the US during the 1970s, a period characterised by stagnant workplace reform, was contrasted by a sharp spike (as much as 10% a year) during periods of change in workplace practices in the 1980s.

In coming to these conclusions, Askenazy's (2001) relied on a meta-analysis of American Bureau of Labor Statistics Occupational Safety and Health Administration data. His focus was on a basket of practices known in the management literature as "high performance practices". These practices include job rotation, team work, contract work, flexible work hours, and unusual work hours. Askenazy's (2001) narrowly focused on injuries rather than illnesses. Askenazy argues that after an initial period of increase in autonomy, the long term effects are a diminution of autonomy and an intensification of work (see also Skorstad, 1994).

His analysis concludes that "the adoption of high performance practices seems correlated with a dramatic increase in occupational injuries and illnesses" (p. 485)⁸. The increase is in the order of 30%, which is reasonably consistent with the order of effect noted elsewhere in this report.⁹ However, his analysis is muddled by having poor empirical linkage between particular work practices and particular outcomes. He says "the logic of flexible production is to reduce waste, to maximise the use of production factors, notably labour, so as to reduce downtime and enhance the pace of work" (p. 490),

Haouas and Yagoubi (Haouas & Yagoubi, 2008) conducted a similar study to Askenazy's, focusing on a single large representative Tunisian sample of 2000 workers. The Haouas and Yagoubi study has the advantage of addressing each captured form of 'flexible' work practices separately, and the nature of the dataset also controls for characteristics of the job, such as industry and firm size. An overview of results is shown in Table 2. The authors note that flexible hours *per se*¹⁰ are not associated with injury, but the study finds a strong relationship between flexible work forms and psychological strain. Psychological strain, it should be noted, has been linked with workplace injury in a large (N=21,505) study of European workers by Costa and Sartori (2006).

⁸ Askenazy's use of the word "dramatic" probably relates more to the statistical significance of the increase rather than the order of the increase itself.

⁹ Not all studies find a relationship between non-secure, non-stable working time practices and occupational health. For example, Guest and Clinton (2006) in a study of 642 workers in the UK, found the association between temporariness and a sense of job insecurity, with no significant impact on wellbeing.

¹⁰ Probably what Costa (2006) called variability, not flexibility .

Table 2: Impact of various flexible work forms on injury rates

	Correlation	Significance
<i>Part-time work</i>	0	NS
<i>Flexible hours</i>	0.002	NS
<i>Night work</i>	0.036	NS
<i>Overtime</i>	0.046	p<.05
<i>Weekend work</i>	0.071	p<.01
<i>Job rotation</i>	0.078	p<.01
<i>Short term contract</i>	0.11	p<.01

NS= not significant Source: Hauoas and Yagoubi (2008).

In relation to part-time and casual work, there are definite 'liabilities' in relation to worker vulnerability to accidents. The rate of occupational accidents in the first year of employment (regardless of part-time status) is substantially higher than for experienced workers (Jeong, 1997), and one Turkish study showed that 32.5% of occupational accidents happen in during the first hour of work (Ünal, Gök, & Gök, 2008) as workers become accustomed to routines. Smith et al's meta-analysis similarly showed risks associated first shift of a series of shifts (Smith, Folkard, Tucker, & Macdonald, 1998). There is a limit to which 'newness' can be seen as a liability, however. With overload and associated fatigue being in itself a significant factor in predicting injuries and other negative health outcomes for workers, a study by Alamgir et al (Alamgir, Yu, Chavoshi, & Ngan, 2008) found that injury rates for full-time nurses and care aides, per 100 person years, was greater than for part-time or casual staff. This relationship held after adjusting for age and gender (N. I. Thomas et al., 2006), and almost certainly relates to risks that rise at the end of shifts or longer working weeks, due to fatigue.

4.5 Gender effects

Hofäcker and König (2013) found that irregularity and unpredictability of working hours is associated with work-life conflict for both genders. The Hofäcker and König study takes advantage of the 2010 European Social Survey which includes large nationally representative samples of workers in 26 countries. Their study finds that short-notice overtime accounts for a significant amount of variance in the relationship between long working hours and negative effects on work-life balance. The issue of control also shows itself in effects for poor fit between actual working hours and working hour preferences leading to particularly strong effects on work-life imbalance for men. Women, it seems, suffer disproportionately when it comes to issues of synchronicity of working hours with their partners. Working women with a husband who experience less predictable working hours are more likely to experience greater difficulties with their own reconciliation of family tasks and employment. Finally, Hofäcker and König (2013) found a positive impact for job security, reducing work-life-conflict for both genders, but particularly for men.

There is a literature focusing specifically on the impact of irregular work hours on marital satisfaction and other aspects of family life. Studies tend to indicate that 'ordinary' day workers experience greater job and marital satisfaction and social integration (Frost & Jamal, 1979; Khaleque & Rahman, 1984; Newey & Hood, 2004; Simon, 1990), while those who work non-standard hours experience greater marital strain (Hughes, Galinsky, & Morris, 1992; Mills & Täht, 2010; Perry-Jenkins, Repetti, & Crouter, 2000; Rogers & May, 2003).

Some studies have observed domino effects in terms of child behaviour (Joshi & Bogen, 2007), despite studies showing that parents, particularly mothers, work hard to shield children from the strains caused by parental work-life conflict. Amongst men, an Australian study showed that the main predictor for working fathers not being involved with their children is working in excess of 40 hours a week (Jeffery, Luo, Kueh, Petersen, & Quinlivan, 2015), but such relationships are much weaker for women. Non-standard work practices can of course also be used to *enhance* contact between parents and children. For example, a recent large Dutch study shows how couples desynchronized schedules to facilitate 'tag-team' parenting in dual-income parents (Täht & Mills, 2012).

Interestingly, the majority of studies tend to find that the impact of rotating/night shifts on relationship quality is overall greater for women (Perry-Jenkins, Goldberg, Pierce, & Sayer, 2007; Raudenbush, Brennan, & Barnett, 1995). However there are exceptions to this pattern (e.g. Barnett, Brennan, Raudenbush, & Marshall, 1994; Keizer & Schenk, 2012; Rogers & May, 2003).

These effects may be significantly dependent on the degree of synchronisation between partners' working patterns; however it is logical that irregularity in patterns on the part of one or both partners working hours will have desynchronisation as a consequence. Simon's (1990) study, for example, details a range of problems associated with poor integration of partner waking and sleeping cycles include challenges relating to parental roles, sexual activity and eating routines. The degree of difficulty of reconciling partners' working hours may be dependent on the stage of the week being examined. For example, Schneider et al (Schneider, Ainbinder, & Csikszentmihalyi, 2004) found no gender effect for stress during the normal working week, but evidence of stress emerged on weekends, particularly for women.

5.0 Conclusions

Responses to stressful events are not fixed, but depend on their meaning for the individual (Thompson, 1981) and when psychologists talk about individual control they almost invariably talk about *sense of control* or *perceived control*, not 'real' levels of control. It has long been established that manipulating behavioural control in the laboratory or beyond leads to significant increases in physiological arousal and self-report of negative arousal, particularly during the period prior to the aversive event (Thompson, 1981), but while this arousal may govern responses to measures of variables such as 'job satisfaction' or 'burnout', they are also very probably a marker of physiological changes in the human endocrinal system.

I have focused, where possible, on evidence directly specific to the health and care sector. It is important to note that the health and care sector, due to the 24-hour nature of many tasks within the sector, is also closely tied, both empirically and in the public mind, with shift work, but it is important to disentangle shift work from irregular or unpredictable work.

Shift work (even regular, predictable shift work) is associated independently with deleterious effects on human health (for a landmark review, see Costa, 2003) and WHO's International Agency for Research on Cancer Monograph Working Group in 2007 went further, declaring that circadian disruption is "probably carcinogenic" (Cornélissen et al., 2008). If one *adds* variability and unpredictability to shift work, for example with the addition of rotating shift work, then the impacts are amplified. For example, in a study of steel workers, Nicholson and Jackson (1978) found that multiple rotations (as well as weekend work) were associated with objectively measured illness and stable patterns of consecutive night shifts are thought to be associated with lower negative impacts of night shift work (Ahasan et al., 2001).

Irregularity, on-call and flexible work practices have been heavily linked in the literature with work-life imbalance, and the impact is particularly strong for women—and thus has particular relevance to the care sector, where there is a significant continuing gender imbalance in favour of women (Zurn, Dal Poz, Stilwell, & Adams, 2004). When events that constitute 'life' follow a relatively regular beat, and are not flexible (for example, school play times, or sporting fixtures) reconciling 'life' with work becomes inevitably more difficult when work becomes less predictable and regular.

Amongst the 'life' aspects that are most critical for physical and psychological health are positive health behaviours or habits that are ruptured by irregular work demands (including social links with the community, sporting activities, and healthy eating). The link between irregular hours or unusual work schedules and outcomes such as smoking, drinking and weight gain, is also very well established. Perhaps less well established is the disadvantage that this sector of workers suffer in relation to access to services, or the same quality of service. There is an emerging literature on the increased risk of sub-standard health services offered to those who experience a health event for example on Saturdays and Sundays.

While work-life balance is one of the impacts that workers subjectively notice first when work becomes less regular or predictable, I have focused relatively more attention on the less intuitively 'obvious' challenges posed by irregular or unpredictable work practices. I have focused most closely on two particular challenges: the issue of control, and the issue of change.

It is highly likely that these two factors are the root of many of the negative health effects that emerge in broad-scale epidemiological studies of work practices and health. Control is a variable that is rarely excluded from analysis when studies are planned in the field of health psychology; such is its importance in determining the impact of interventions. The dominant set of models on the impact of work on health, all sourced in Karasek's foundation work (Karasek, 1979) has *control* at its centre. Evidence is that level of control in a work context can predict everything from depression to cardiovascular disease to a highly significant degree. *Change*, in Karasek's models, is

cast as a demand variable, i.e. a stressor. Demand without control is a recipe for ill health and dissatisfaction.

Apart from being a general challenge to the human adaptability (with implications for workplace accidents for example) change also predicts sleep disturbance. In the section headed "newness in work practices" I summarise some of the better evidence relating to flexible work practices and their impact on injury rates. **Control and change are *the* two key psychosocial dimensions of work, and as noted in the research summarised in this report, have significant predictive power in determining a wide variety of health outcomes.** Control is particularly relevant for staff in relatively junior positions within care settings, and for these staff, I recommend particular care is taken with interfering with the predictability of work, as it is likely to compound existing problems associated with uncontrollability in the workplace.

DECLARATION.

I have made all the inquiries that I believe are desirable and appropriate and that no matters of significance that I regard as relevant have, to my knowledge, been withheld from the Commission.



Olav Titus Muurlink
14/05/2016

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