

Cooke, Dawson C.; Kendall, Garth; Li, Jianghong; Dockery, Michael

Article — Accepted Manuscript (Postprint)

Association between pregnant women's experience of stress and partners' fly-in-fly-out work

Women and Birth

Provided in Cooperation with:

WZB Berlin Social Science Center

Suggested Citation: Cooke, Dawson C.; Kendall, Garth; Li, Jianghong; Dockery, Michael (2019) : Association between pregnant women's experience of stress and partners' fly-in-fly-out work, Women and Birth, ISSN 1878-1799, Elsevier, Amsterdam, Vol. 32, Iss. 4, pp. e450-e458, <https://doi.org/10.1016/j.wombi.2018.09.005>

This Version is available at:

<https://hdl.handle.net/10419/207955>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by-nc-nd/4.0/>

**Association between pregnant women's experience of stress
and partners' fly-in-fly-out work**

Accepted Manuscript September 2018 – Women and Birth

Dawson C Cooke PhD^a

dawson.cooke@curtin.edu.au

Garth Kendall PhD^a

G.Kendall@curtin.edu.au

Jianghong Li PhD^b

jianghong.li@wzb.eu

Michael Dockery PhD^c

Mike.Dockery@cbs.curtin.edu.au

a School of Nursing, Midwifery, and Paramedicine - Curtin University
G.P.O Box U1987, Perth, Western Australia 6845
Tel | +61 8 9266 2191
Fax | +61 8 9266 2959

b WZB Berlin Social Research Center, Centre for Population Health Research -
Curtin University, Telethon KIDS Institute - The University of Western Australia
WZB Berlin Social Research Center
Reichpietschufer 50, 10785 Berlin, Germany
Tel: +49 30 254 91 564
Fax: +49 30 254 91 562

c Curtin Business School, Curtin University
G.P.O Box U1987, Perth, Western Australia 6845
Tel | +61 8 9266 3468

Corresponding Author: Dawson Cooke
Postal Address: PO Box 326, Karrinyup Western Australia 6921
Corresponding Email: dawson@familyworks.com.au
+61 0403 990 251

Association between pregnant women's experience of stress and partners' fly-in-fly-out work

Abstract

Background: It is relatively common in Western Australia for men to commute long distances and work away from home for extended periods of time, often referred to as fly-in-fly-out work. Women are particularly susceptible to the effects of stress during pregnancy, and the absence of a partner due to working away could be an additional risk to their wellbeing. While there is little published fly-in-fly-out literature, there is evidence that working non-standard hours, more generally, has a negative impact on health and well-being of workers and their families.

Aim: To determine if there is an association between pregnant women's report of stress and their partners working fly-in-fly-out, and if so, is there is a differential impact that is dependent on family socioeconomic status.

Methods: Data from a Western Australian pregnancy cohort study were analysed ($n = 394$ families). Couples completed self-report ratings of anxiety, depression, stress, family functioning, and stressful life events. Comparisons were made between three groups: fly-in-fly-out workers, non-fly-in-fly-out regular schedule workers, and non-fly-in-fly-out irregular schedule workers.

Results: After controlling for a range of variables, women's stress was significantly associated ($p < .05$) with their partners working fly-in-fly-out. Neither women's education, partners' occupation nor an interaction between partners' fly-in-fly-out work and partners' occupation were significantly associated with women's stress.

Conclusion: There is some evidence that the pregnant partners of fly-in-fly-out workers perceive their lives to be more stressful than women whose partner works non-fly-in-fly-out regular schedules.

Key Words: Fly-in-fly-out, FIFO, long distance commute, pregnancy, work, stress

Statement of Significance

Problem or Issue

Little is known about the effects on pregnant women due to their partner working fly-in-fly-out (FIFO).

What is Already Known

Excessive stress during pregnancy is likely to have long-term health consequences for both mother and child. Research on other forms of long distance commuting work and non-standard work hours has indicated increased risk to the well-being of workers' partners and children.

What this Paper Adds

A comparison of pregnant women with partners working FIFO and non-FIFO work schedules, which indicates an association between pregnant women's stress and partner's FIFO work.

Introduction

Pregnancy is a time when women and their unborn children are especially vulnerable to stress which in turn gives rise to anxiety and depression ¹. There is accumulating evidence that the experience of prolonged stress during pregnancy not only leads to maternal anxiety and depression, but also influences the development of the infant ^{2,3}. Through psychological and physiological processes, the experience of excessive stress during pregnancy is likely to have long-term health consequences for both mother and child ^{4,5}, although low levels of stress may actually be beneficial to child outcomes ⁶. Mother reports of perceived stress in particular, have been found to be associated with infant temperament difficulties ⁷ preterm birth ⁸, and low birthweight ⁹. One of the main sources of support for most women during pregnancy is their male partner. Conversely, the male partner is potentially a major source of stress. Whether or not the absence of the partner due to working away for extended periods of time is likely to be a source of increased risk of stress during pregnancy is an important research question.

In recent decades, many Australian workers have been required by their employers to commute long distances to work in relatively remote parts of the country in the mining and related construction industries for extended periods of time. The practice of fly-in-fly-out (FIFO), as it has become known, is seen to be of benefit to employers with regard to cost savings in the provision of infrastructure, as well as to employees who earn considerably more than their counterparts working in the major towns and cities. No national statistics are available that identify FIFO workers and research targeting this population is limited. The best estimates of FIFO worker numbers are from Western Australia, where in 2015, there were approximately 60,000 people employed on FIFO contracts in the resources sector ¹⁰. FIFO is expected to remain the most common workforce arrangement for the resource sector for the foreseeable future. It is anticipated that the Pilbara region of Western Australia, which has the highest number of resource workers, will be employing approximately 75% of its resource workforce through FIFO arrangements by 2020 ¹¹.

Rosters for FIFO workers vary between two weeks away with two weeks at home (low compression) to three weeks away and one week at home (high compression). Despite the apparent benefits afforded by a higher than usual income ¹², FIFO work has come to the attention of industry and Government authorities due to reports that the practice may be detrimental to the health and well-being of the workers, themselves, as well as their partners and children ^{10,13,14}. However, these reports generally conclude that there is a lack of evidence from which to make a clear assessment of the risks of the FIFO work arrangement to workers or their family members. Suggested negative consequences for workers have included an increased prevalence of alcohol and substance use, relationship problems, depression, and suicide ¹⁵. Issues for the partners of workers have included stress, as well as relationship and parenting problems ^{16,17}. Findings of no differences seem to suggest that many concerns regarding FIFO work may be exaggerated or misguided. These studies and others ¹⁸ also bring attention to many strengths and benefits of FIFO work, which is mostly reported as the high income and benefits from the sustained periods off work. Collectively, these findings highlight the need for more carefully planned independent research that minimizes self-selection bias, draws more representative samples of FIFO workers and families, and includes community (control group) samples so differences can be identified.

Concerns about the impact of FIFO work have been examined in only a small number of peer-reviewed publications. Qualitative research has described a range of challenges facing FIFO families, including adjustment to rosters and long shift patterns, social isolation ¹⁹, negative impacts on

personal relationships and the partner at home²⁰, and the experiences of children²¹. However, these studies also report positive aspects of FIFO work, including high work satisfaction and financial benefits, which would be likely to have positive effects for family members.

Torkington et al.,²⁰ found that male FIFO workers reported both positive and negative impacts of FIFO work on their personal relationships and partner at home. Potential sources of partner stress included: being the sole carer of children; attending to all housekeeping and maintenance chores; dealing with financial issues; and thinking about unresolved marital difficulties²⁰. Conversely, some participants suggested that their partner would experience less stress in their absence because they were free from displaced work-related anger and hostility at the end of each working day²⁰. In addition, it was found that FIFO workers who did experience problems did not seek support from friends or professionals; a lack of insight into their stress was seen as a barrier²⁰. This reluctance on the part of men to seek help for psychosocial issues²² is another potential source of stress for their partner.

The benefits of having two adults in a family who are able to undertake child caring duties and domestic chores are significant. Social capital that is generated through a trusting, reciprocal dyadic relationship is a resource that is available for the couple, themselves, as well as their children. In addition to the benefits of physical support, the relationship has exceptional psychological value. "Each can confide in the other, can expose inner doubts, can be completely forthright with the other, can raise sensitive issues – all without fear of the other's misuse of the trust"^{23, p.307}. It is plausible that the time FIFO couples spend apart may significantly reduce the amount of social capital in the relationship and the family.

Quantitative studies of FIFO families are fewer in number and some have methodological problems that preclude generalisation to all FIFO workers and their families. One study found higher levels of maternal stress with regard to family communication, support and behaviour control in FIFO families compared with military families and those in the general population, and no difference in child well-being¹⁷. However, the sample included only mother and child reports from 30 FIFO families and 30 of each of the comparison groups. Another study also explored aspects of family functioning in FIFO families, but the sample size was similarly very small (n = 33 FIFO workers) and there was no group of non-FIFO workers with whom comparisons could be made²⁴. A relatively large study of over 3,000 adolescent children in Western Australia²⁵ showed children from FIFO families were more likely to report depressive symptoms and emotional and behavioural difficulties. Also, parental presence and family connectedness were found to be important mediating factors between family FIFO status and adolescent difficulties.

Another large study with results that are likely to be representative of the general population used data from the Western Australian Health and Wellbeing Surveillance System to make comparisons between 380 FIFO workers and 10,613 non FIFO non-shift workers²⁶. It was found that FIFO workers had higher levels of smoking and alcohol consumption, and were more likely to be overweight or obese. The study also compared a range of diagnosed chronic health problems of which only mental health differed between FIFO and other employment types, with FIFO workers reporting fewer mental health problems. The authors suggest that this surprising result may reflect self-selection which has been termed a *healthy hire* effect²⁷. Workers may recognise the need for resilience in this type of work and those who have problems may be less likely to apply for a FIFO position^{26,27}. On the other hand, FIFO workers are likely to under-report mental health difficulties and not seek help from services due to a lack of mental health awareness, workplace stigma regarding mental health

difficulties, and for fear of losing their job²². This study had no data from the partners of the FIFO workers or on the effects they experienced, and it is possible that under-reported difficulties may have detrimental impacts on FIFO partners.

Broader commuting perspective

Australia is by no means unique in that people work away from home for extended periods of time. There are many other forms of employment that require working in remote locations or commuting to a distant location for extended periods of time. For example, such absence from home is common for those working in the defence forces, industries such as off-shore oil and gas rigs, and long distance transport involving the delivery of goods. Furthermore, requirements of specific jobs can require people to work away regularly for reasons specific to their work, such as needing to provide services for a large region (e.g. sales, health, maintenance) or for responsibilities of management or government.

As with FIFO workers in Australia, there is little published research about the impact of the work away from home on partners, and pregnant partners in particular. Studies specific to the military have shown increased stress for pregnant women with deployed partners compared to civilians²⁸ and increased risk for preterm birth and postpartum depression²⁹. However, it is not clear if there are additional concerns for women that are specific to the nature of their partner's military activity. Within this scant literature on working away from home, there are two qualitative studies conducted in the US that have highlighted the unique stresses experienced by family members, including difficulties with decision making and coping strategies^{30,31}. In a study of Japanese businessmen who mostly live and work in distant cities (*tanshin funin*), it was found that the mothers in these families were mostly restricted to child care duties, whereas the fathers had little opportunity to get to know their children³². In another qualitative study that focused on business travellers in the UK, it was found that participants undertook compensatory behaviours to make up for their time away from their family³³. In a similar study conducted in the Netherlands the authors concluded that professional commuter families made sacrifices, but also experienced substantial enrichment³⁴. The attitudes of spouses of workers on offshore oil and gas installations, such as in the North Sea have been examined qualitatively with similar results as studies with FIFO families²¹.

Recently, a study conducted in Germany has found that the children of long distance commuting fathers have an increased prevalence of emotional and behavioural problems³⁵. Such problems are likely to be a source of stress for the mother. To our knowledge, this is the only large study ($n = 559$), to date, that has assessed the impact of fathers' long distance commuting on children's health and well-being. More broadly, however, a great deal of international research has examined the potential impact of one or more parents working non-standard schedules on their children's health and developmental outcomes. Parents' non-standard work hours have been found to negatively impact adolescent mental health^{36,37}, as well as child behaviour and well-being³⁸.

It is possible that for members of well-educated, high-income families the impact of work away from home is likely to be minimal because they have resources to adapt to the work arrangement they have chosen. Families that have fewer financial and human capital resources, on the other hand, may find the work away from home more challenging and might not have other work options readily available. There is some evidence to support this proposition in a recently published study that focused on US Military spouses³⁹. Compared to their non-military community counterparts, military families contended with significant family-related stress distinct from the unique stress associated with

deployment. Also, socioeconomic vulnerability significantly contributed to maternal psychological health, which, in turn, held implications for psychosocial family health ³⁹. However, another qualitative US study based on reports from the wives of truckers and fishermen supports previous qualitative findings that these families adapt to their differing circumstances ⁴⁰. If there is a differential impact of working away from home that is dependent on family socioeconomic status, this explanation is yet to be the subject of quantitative studies that include comparison groups.

The present study

Data for this study were obtained from a pregnancy cohort study of families residing in a single region within Western Australia. The aim of the study was to compare the levels of stress experienced by pregnant women whose partners worked away for days or weeks at a time with pregnant women whose partners did not work away. The analysis took into account three work schedules: working away or FIFO, those who did not work away but had non-standard work schedules, and those who did not work away and had standard work schedules. We included analyses of comparisons between work schedules for a range of variables to identify differences between the three work schedule groups and potential sources of stress. In addition to demographics, these variables included number of financial hardships, depression, anxiety, family functioning, and stressful life events. The specific objective was to determine if there is an association between pregnant women's experience of stress and their partner's work schedule. Secondary objectives were to determine if this relationship is mediated the women's psychological and social characteristics and if there is a differential impact of partners' FIFO work that is dependent on family socioeconomic status.

Methodology

Participants

Participants were couples who lived in the same region of Western Australia who were expecting a child at the time of taking part in the Peel Child Health Study⁴¹ between the years of 2008 and 2012. The study recruited 441 families during the women's visit to a general medical practitioner at 18-weeks in pregnancy. A total of 439 women and 310 partners completed questionnaires administered at the time of recruitment, which included 77 families that identified the partner as working away from home (FIFO) as part of his job, 229 working non-FIFO regular schedules and 88 non-FIFO nonstandard schedules (57 did not indicate their schedule).

The demographic characteristics of the sample compared with the Australian population have been reported elsewhere (see [Cooke, 2015](#)⁴²). While similar in most respects to the broader population, the participants were more likely to have a post-secondary school certificate or diploma and less likely to have no post-school qualification or a higher degree. In addition, a slightly lower proportion of participants were born outside Australia.

Ethics

Ethics approvals for the collection and analysis of data were obtained by: Curtin University Human Research Ethics Committee: HR 02/2008

Variables

Exposure variable

Partner work schedules

Men who were working FIFO were identified by their response (or their partner's response) to the question 'Do you work away (Is the father of your baby away) from home for days or weeks at a time as part of your (his) job (e.g. 'fly in – fly out' in the mining industry)?' Non-FIFO workers were further distinguished as those who worked regular work-days rather than shifts (regular schedule) or those who worked other schedules (irregular schedule).

Focal outcome variable

Perceived stress

Stress was assessed with a self-report with the Perceived Stress Scale PSS⁴³ which has been shown to be a valid instrument to assess stress with pregnant women⁴⁴. The PSS consists of 14 questions asking how often in the past month situations or conditions were considered stressful, as rated on a five point rating scale, labelled from 'never' to 'very often'. For example, 'In the last month, how often have you felt that you were on top of things?' Positively worded items are reverse scored so that higher scores reflect higher levels of stress. The scale demonstrated high levels of reliability (Cronbach's alpha) for both women ($\alpha = .85$) and their partners ($\alpha = .81$).

Additional outcome and control variables

Specific socio-demographic questions were included: age, if the pregnancy was the woman's first, woman's country of birth, woman's and partner's education, partner's occupation, family income, and financial hardship. In addition, participants completed the following validated psychological and social instruments.

State and trait anxiety

The Spielberger State-Trait Anxiety Inventory STAI⁴⁵ is a commonly used rating of anxiety symptoms that has been successfully applied in the study of antenatal anxiety⁴⁶. The 'Trait' scale of the STAI is self-report of how the person 'generally feels' and in this sample showed high internal consistency for both women ($\alpha = .93$) and their partners ($\alpha = .92$).

Stressful life events

The number of stressful life events (SLE) experienced over the past year was assessed with a checklist of 15 items, based on the List of Threatening Experiences Questionnaire⁴⁷. The number of positive responses is summed to produce a score. Higher scores indicated a higher number of stressful life events.

Financial crisis and drug or alcohol problems

Within the stressful life events index, three items were of particular interest, one referring to financial strain and the other two regarding drug and alcohol use problems. A positive response to these items was used as an indication of these difficulties being present in the family.

Depression

The Edinburgh Postnatal Depression Scale EPDS⁴⁸ was used to assess women's report of depressive symptoms over the past week. The EPDS is commonly used to screen for postnatal depression, and

has also shown validity with women during pregnancy⁴⁹, with scores of 11 or higher in early pregnancy indicating high risk for depressive symptoms. In this sample of women at 18 weeks of pregnancy there were 32% that scored 11 or higher, and the scale had good internal consistency ($\alpha = .73$). Three percent of participating women reported they sometimes had thoughts of self-harm (question 10) and support was available to these women as per the ethics statements addressing participant risks. Partners reported depression symptoms experienced over the past two weeks using the Beck Depression Inventory II [BDI](#)⁵⁰. Scale reliability for this sample was high ($\alpha = .90$).

Family functioning

The general functioning subscale of the McMaster Family Assessment Device [FAD](#)⁵¹ consists of 12 items describing a broad range of family adjustment to which a level of agreement is indicated on a four point rating scale. Higher scores indicate healthier family functioning. Scale reliability for this sample was high (women $\alpha = .91$, partners $\alpha = .90$).

Analytical strategy

Data analysis was conducted using SPSS software version 23, with a significance level of $p = .05$. Case responses with missing data from only one or two items in a scale were imputed with means from the person's remaining scores⁵². For cases where more than two item responses were missing from a scale, the person data for that scale were excluded from analyses. Chi Square tests were used to compare frequencies of responses to dichotomous variables. One-way between subjects ANOVAs were conducted to compare the effect of partners' work schedule on each of the self-report psychosocial variables. Post hoc comparisons were performed using Bonferroni tests for differences between groups. Regression analyses were performed to examine the effect of FIFO work on outcomes of mothers' perceived stress, while controlling for sociodemographic factors, mothers' mental health and family functioning.

Results

Socio-demographic characteristics of women and their partners who work FIFO or other work schedules

Overall, the mean age of both women and their partners was approximately 30 years, approximately 75 per cent of women were born in Australia, about 40 per cent of women were expecting their first child, and approximately 15 per cent of couples experienced one or more financial hardship. Table 1 shows that FIFO families differed from non-FIFO families in terms of family education, occupation status and income. FIFO family incomes were generally higher than non-FIFO incomes ($p = 0.000$). A higher proportion of FIFO workers had an education at the level of certificate or diploma and a higher proportion of non-FIFO regular schedule workers had a degree or higher ($p = 0.007$). Furthermore, FIFO workers were over-represented by a higher proportion of technicians, tradesmen, machinery operators and labourers, whereas non-FIFO workers were more highly represented by managers, professionals, and clerical or administrative positions ($p = 0.009$).

Table 1: Socio-demographic characteristics for women and their partners – with differences between groups according to partners' work schedule

Table 2 shows that compared to women whose partner worked non-FIFO regular schedules, those whose partner worked FIFO had lower ratings of family functioning, but the ratings of the women

whose partner worked FIFO were higher than those whose partner worked non-FIFO irregular schedules. However, there were no statistically significant differences ($p > .05$) between women or partners in groups according to partner work schedule, with regard to mean scores for depression, anxiety, stress, stressful life events or family functioning.

Table 2: Summary scores for psychosocial instruments (for both women and their partners) with differences between groups according to partners' work schedule

Mean scores on all psychosocial measures for women whose partner worked FIFO indicated a greater, although non statistically significant different, level of difficulty compared to women whose partner worked non-FIFO regular schedules (see Figure 1). For example, women with FIFO partners reported slightly higher levels of stress and depression than those with non-FIFO regular schedule partners.

Figure 1: Plots of women's mean scores for psychosocial instruments grouped by partners' work schedule

The differences in means indicated a trend towards more financial problems being reported by women whose partners were FIFO workers compared with women whose partners were non-FIFO workers, as well as more alcohol or drug problems. However, no statistically significant differences were found between the proportions of women in each group who reported a financial crisis ($p = 0.207$), or for someone in their household having an alcohol or drug problem ($p = 0.188$).

There were no statistically significant differences ($p > .05$), or higher mean scores, for partners in the FIFO and non-FIFO groups with regard to mean scores for depression, anxiety, stress, stressful life events or family functioning.

Two regression models were created to determine if partners' FIFO work, compared to non-FIFO regular schedule work, was associated with pregnant women's perceived stress in addition to sociodemographic factors, mothers' mental health (anxiety & depression), family functioning and report of stressful life events. Model 1 in Table 3 shows that higher trait anxiety scores ($p < .001$), higher depression scores ($p < .001$), lower family adjustment scores ($p < .001$), and higher reports of stressful life events ($p < .05$) were all significantly associated with women's perceived stress (*Adjusted R*² .48; *F* 31.63; $p < .001$).

Table 3: The association between partners' work schedule and women's perceived stress adjusted for sociodemographic factors, women's mental health (anxiety & depression), family functioning and life stress

Model 2 in Table 3 shows that partners' FIFO work was also significantly associated with women's perceived stress ($p < .05$) and that this variable increased the amount of variance accounted for by Model 1 (*Adjusted R*² .49; *F* 29.52; $p < .001$; *Adjusted R*² change 0.01; *F* Change 5.96; $p < .05$). An interaction term was added to Model 2 (partners' FIFO work x partners' occupation) to test for a differential effect by socioeconomic status. As the coefficients were not statistically significant, they were not included in the final model. None of the sociodemographic control variables were significantly associated with women's perceived stress.

Discussion

This study found evidence that pregnant women's level of stress was higher if their partners worked FIFO, compared to those with partners working non-FIFO regular schedule work. This finding is consistent with the evolving FIFO literature as well as the broader literature regarding commuter families. However, the difference was not evident in analysis directly comparing groups of women with partners with different work schedules. Only when demographic and psychosocial variables were considered in a regression analysis was the influence of partner work schedule a significant factor predicting the women's stress level.

It is noteworthy that the men working FIFO in this sample had no difference in ratings of mental health and relationship difficulties compared to men working non-FIFO schedules. There was, therefore, no evidence that the association found between pregnant women's perceived stress and their partners' FIFO work was likely to be mediated by their partners' psychosocial characteristics. This result is consistent with other quantitative findings of a low self-report of mental health problems for FIFO compared to other employment types ²⁶. However, there remains the possibility this result is influenced by characteristics of FIFO workers such as limited insight into stress, reluctance to disclose problems, embarrassment and concerns regarding confidentiality ²⁰. An alternative explanation is that for many FIFO workers, the freedom from daily chores and child care and the companionship offered by their colleagues in the mining communities may have a positive influence on their mental health.

On the other hand, women and their partners who are FIFO workers may have certain characteristics that predispose them to self-select and are therefore more likely to be resilient with regards to the pressures of the FIFO work arrangement. Many FIFO families report being proactive regarding the stressors of this schedule of work and engage in behaviours that mitigate the stressors for FIFO work ¹⁶. Many FIFO families are likely to have chosen FIFO work and have continued with it after weighing up the obvious benefits and challenges. This may have the effect of self-selecting individuals who tend to be more resilient and motivated to resolve their work related stressors compared to average non-FIFO families.

This perception is reflected in the broader commuting literature, where a small number of qualitative studies conducted in the US ^{30,31}, Japan ³², the Netherlands ³⁴, and the UK ^{21,33} have all found some evidence of additional stress experienced by women whose partner is away from the family home for protracted periods of time. As previously mentioned, however, it may be that for some families, especially the members of well-educated, high-income families, the impact of work away from home is likely to be minimal. Supporting this assertion, Green et al., ³⁹ surveyed 161 US military spouses about deployment, family socioeconomic resources, life stress and psychological functioning, and found that when the sample was dichotomized by socioeconomic resources (education, finances, age first became a parent) there were significantly higher levels of anxiety reported by those with fewer resources ³⁹.

Having included a number of sociodemographic measures (women's age, women's country of birth, women's first child, women's education level, partners' occupation) in our regression models we were able to determine if there is a differential impact of working away from home that is dependent on family socioeconomic status. We found that neither women's education, partners' occupation, nor an interaction between partners' FIFO work and partners' occupation were significantly associated with women's perceived stress. Pregnant women whose partner worked FIFO were more likely to report perceived stress whether he was a professional, manager, tradesperson, cleric, machine operator, or

labourer. On this basis, we can conclude that there is no evidence in this study that the association between partners' FIFO work and pregnant women's perception of stress is dependent on socioeconomic status. It should be noted that we did not include family income in our regression models. We purposefully omitted this variable because in the mining industry in Western Australia workers in all occupational categories typically earn a great deal more than their non-FIFO regular schedule peers.

Knowledge of the association between partner FIFO work and pregnant women's perceived stress is important for FIFO work schedule policy as well as antenatal care. Also, the sources of stress during pregnancy is important due to the potentially negative outcomes for the developing fetus. We suspect that those with high compression rosters (3 weeks away and 1 week at home) are most at risk of poor psychosocial outcomes, including the increased experience of stress. While high/low compression information was available in our dataset, we were not able to examine this relationship due to the limited sample size associated with the use of data that were part of a larger study. The relationship between partners' FIFO work and pregnant women's perceived stress will require further empirical scrutiny. Specifically, we suggest that future studies recruit larger samples and include detailed measures of FIFO schedules, as well as family sociodemographic and psychosocial characteristics, so that more complex analysis may identify the patterns of factors, rather than the single risk factors, that place women at high risk of stress.

Strengths and limitations

This study has a number of strengths. Unlike most FIFO studies, it was possible to compare the characteristics of work away families with non-work away families. The analysis also included the distinction between non-FIFO workers with a regular schedule and those with an irregular schedule. The measures used in the study included a range of widely recognised and validated self-report scales of mental health and relationship quality. The questions regarding work schedules and working away from home comprised a small fraction of the total number of questions in the Peel Child Health Study; therefore, response and information bias are minimised, unlike studies where FIFO work was clearly the focus of the study. Furthermore, the study was free of potential bias associated with involvement by interest groups, such as the employers of FIFO workers and service organisations that support FIFO families.

As to limitations, the number of non-statistically significant differences between mean scores brings into question the study's level of statistical power. Also, factors not considered in this analysis may have contributed to mitigating negative effects of FIFO work, such as additional social supports sought out by FIFO partners or other characteristics of resilience, similar to the healthy hire effect²⁷. It should also be noted that the data collection was cross-sectional and that causal relationships cannot be proven. Furthermore, due to the sample size, it was not possible to consider a number of other moderating factors in the analysis, such as roster compression, length of time working FIFO, the type of FIFO industry, distance travelled, or distance to point of fly-out. The impact of FIFO work on pregnant women may differ by these factors. Hence, it will be necessary to collect and analyse similar data in large and diverse population groups before any definitive conclusions can be drawn.

Conclusion

There is some evidence presented in this study that the pregnant partners of FIFO workers are negatively impacted by the FIFO work arrangement. These women perceive their lives to be more stressful than women whose partner work non-FIFO regular schedules. A great deal of time spent

alone, separated from one's partner, may be a barrier to the formation of trusting, reciprocal relationships that are especially important for the mental health of pregnant women. Further research that focuses on the health and well-being of pregnant women whose partners spend long periods of time away from the family is warranted. Long distance commuting to work is now common throughout the world and pregnant women are especially vulnerable to the experience of excessive stress during pregnancy, which is likely to have long-term health consequences for both mother and child. The perceived economic benefits of this work arrangement are possibly over-shadowed by the potential negative consequences for families.

Acknowledgments and Disclosures

We would like to thank the families who willingly participated in this study. We declare we received no financial assistance for the analysis and writing of this study and have no conflicts of interest.

Accepted manuscript

Table 1.

Socio-demographic characteristics for women and their partners – with differences between groups according to partners' work schedule

		Non-FIFO Regular Schedule		Non-FIFO Irregular Schedule		FIFO		Sig.
		<i>n</i> = 229		<i>n</i> = 88		<i>n</i> = 77		
		Mean	SD	Mean	SD	Mean	SD	
Age	Women	30.15	5.51	29.61	5.12	29.79	5.10	0.70
	Partner	32.45	6.20	32.20	6.09	32.80	5.83	0.88
Note: <i>p</i> values are derived from one-way between subjects ANOVAs								
		n	%	n	%	n	%	
Women's country of birth	Australia	164	73%	71	83%	58	76%	0.204
	Not Australia	61	27%	15	17%	18	24%	
Women's first child	Yes	90	40%	29	34%	33	43%	0.466
	No	137	60%	57	66%	44	57%	
Women's level of education	Less than Year 12	32	14%	8	9%	11	15%	0.752
	Year 12	22	10%	9	10%	7	9%	
	Cert or Dip	96	43%	42	48%	38	51%	
	Degree or Higher	74	33%	28	32%	19	25%	
Partners' level of education	Less than Year 12	24	15%	7	12%	2	5%	0.007
	Year 12	18	11%	8	14%	6	14%	
	Cert or Dip	83	51%	39	68%	31	72%	
	Degree or Higher	39	24%	3	5%	4	9%	
Partners' occupation	Managers / Professionals	60	27%	14	18%	7	9%	0.009
	Technicians / Trades /Services	88	40%	34	44%	39	51%	
	Clerical / Admin / Sales	22	10%	5	7%	3	4%	
	Operators / Drivers / Labourers	52	23%	24	31%	27	36%	
Family income	Less than \$60,000	38	19%	22	29%	7	10%	0.000
	\$60,000 to \$104,000	95	47%	33	43%	22	31%	
	Over \$104,000	69	34%	21	28%	41	59%	
Financial hardships	None	199	87%	73	83%	66	86%	0.666
	One or More	30	13%	15	17%	11	14%	

Note: *p* values are derived from the chi-square test of association

Table 2.

Summary scores for psychosocial instruments (for both women and their partners) with differences between groups according to partners' work schedule

		Non-FIFO Regular Schedule		Non-FIFO Irregular Schedule		FIFO		Sig.
		Mean	SD	Mean	SD	Mean	SD	
Depression	Women (EDS)	7.37	4.33	8.09	4.57	8.41	4.64	0.169
	Partners (BDI)	5.28	6.81	4.97	5.64	5.18	5.10	0.955
Anxiety (STAI Trait)	Women	34.79	10.17	36.08	10.59	35.55	11.04	0.613
	Partners	32.37	8.77	34.57	9.80	33.30	9.22	0.296
Stress (PSS)	Women	21.10	7.27	22.10	8.00	23.13	8.64	0.137
	Partners	19.95	7.17	19.91	7.13	18.77	6.27	0.607
Family functioning (FAD)	Women	42.08	4.76	40.45	6.08	41.50	6.16	0.063
	Partners	40.56	5.04	40.98	5.57	40.25	5.16	0.777
Stressful life events	Women	1.50	1.61	1.47	1.63	1.92	1.94	0.152
	Partners	1.50	1.91	1.56	1.79	1.35	1.62	0.841

Note: *p* values are derived from one-way between subjects ANOVAs

		Non-FIFO Regular Schedule		Non-FIFO Irregular Schedule		FIFO		
		n	%	n	%	N	%	
Women had a financial crisis	Yes	30	13%	12	15%	16	22%	0.207
	No	194	87%	71	86%	57	78%	
Women reported family problem with alcohol or drugs	Yes	14	6%	10	12%	8	11%	0.188
	No	209	94%	73	88%	65	89%	

Note: *p* values are derived from the chi-square test of association

Table 3.

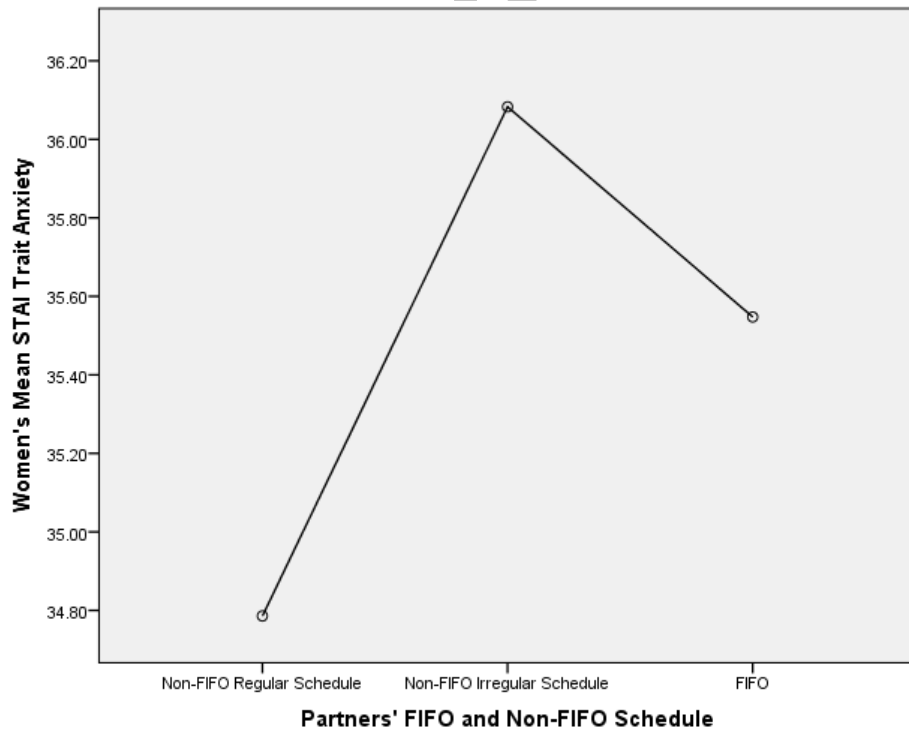
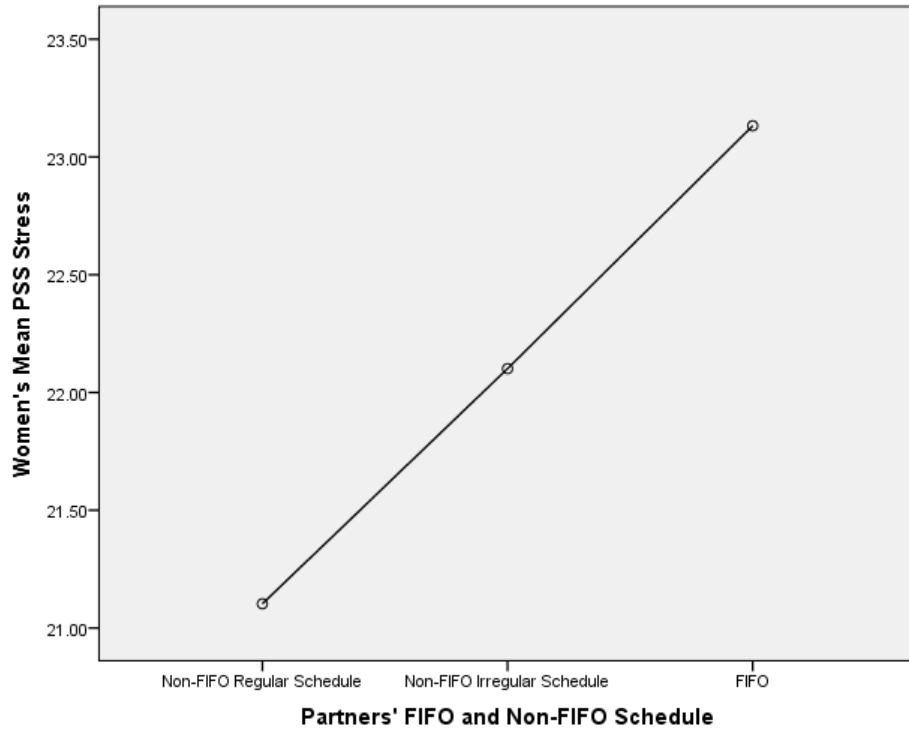
The association between partners' work schedule and women's perceived stress adjusted for sociodemographic factors, women's mental health (anxiety & depression), family functioning and life stress

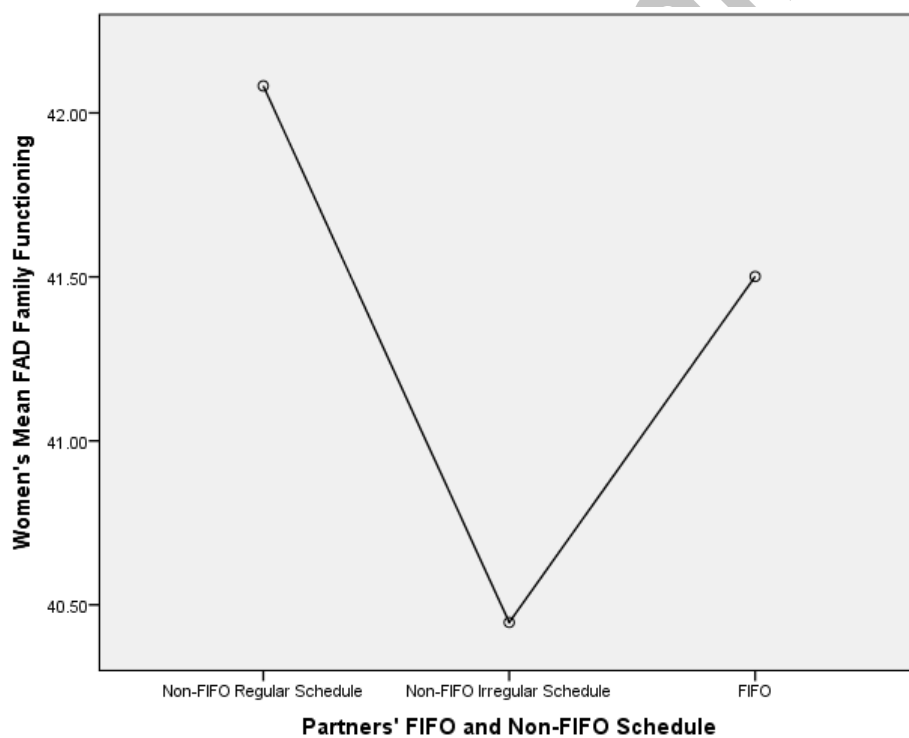
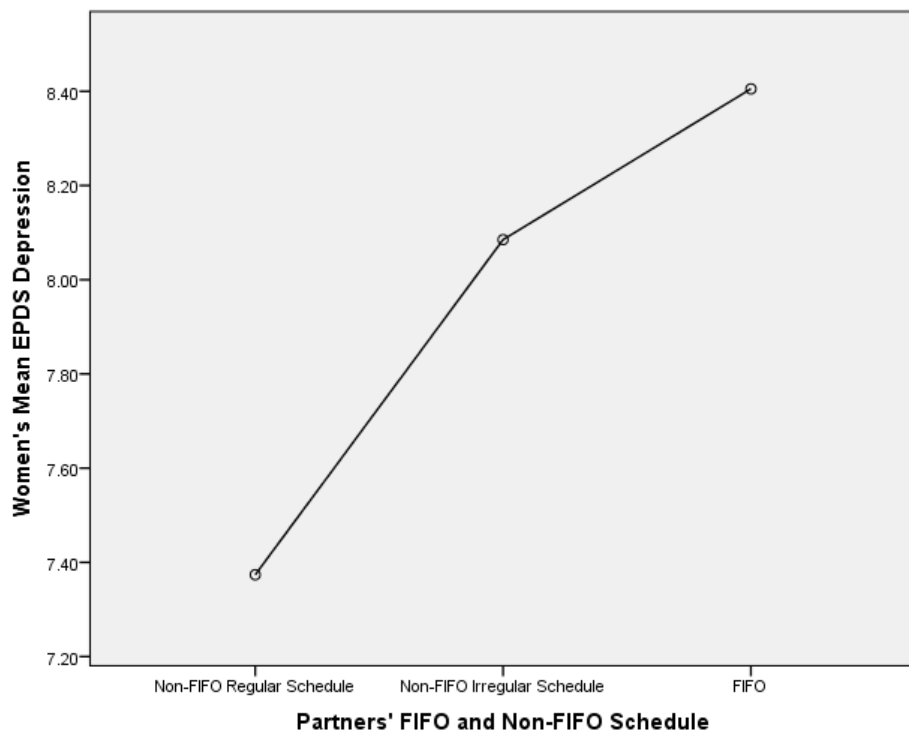
Independent Variables	Women's Perceived Stress			
	Model 1 <i>B</i>	Model 2 (including work schedule)		
		<i>B</i>	95% CI	Sig.
Constant	27.266	30.465	21.70, 39.23	.000
Women's Age > 30	-.590	-.643	-2.02, 0.73	.358
Women's Country of Birth	.376	.396	-1.16, 1.95	.616
Women's First Child	-.005	.120	-1.22, 1.46	.860
Women's Education Level	-.388	-.319	-1.02, .38	.371
Partners' Occupation	.046	-.016	-.61, .58	.957
Women's Trait Anxiety STAI >40	6.049***	5.982***	4.31, 7.65	.000
Women 's Depression EPDS ≥11	4.314***	4.402***	2.85, 5.95	.000
Family Adjustment FAD	-.341***	-.340***	-.47, -.21	.000
Mother Stressful Life Events ≥3	2.019*	1.978*	.31, 3.65	.020
FIFO or Non-FIFO Regular Schedule	.	-1.944*	-3.51, -.38	.015
<i>Adjusted R²</i>	.48		.49	
<i>F</i>	31.63***		29.52***	.000
<i>Adjusted R² Change</i>			0.01	
<i>F Change</i>			5.96*	.015

* $p < .05$. ** $p < .01$. *** $p < .001$

Figure 1.

Plots of women's mean scores for psychosocial instruments grouped by partners' work schedule





References

1. Monk C, Spicer J, Champagne FA. Linking prenatal maternal adversity to developmental outcomes in infants: the role of epigenetic pathways. *Dev Psychopathol* 2012; **24**(04): 1361-76.
2. Huizink AC, Robles De Medina PG, Mulder EJJ, Visser GHA, Buitelaar JK. Stress during pregnancy is associated with developmental outcome in infancy. *Journal of Child Psychology and Psychiatry* 2003; **44**(6): 810-8.
3. Bergman K, Sarkar P, O'Connor TG, Modi N, Glover V. Maternal stress during pregnancy predicts cognitive ability and fearfulness in infancy. *Journal of the American Academy of Child & Adolescent Psychiatry* 2007; **46**(11): 1454-63.
4. Talge NM, Neal C, Glover V. Antenatal maternal stress and long-term effects on child neurodevelopment: how and why? *Journal of Child Psychology and Psychiatry* 2007; **48**(3-4): 245-61.
5. Li J, Robinson M, Malacova E, Jacoby P, Foster J, van Eekelen A. Maternal life stress events in pregnancy link to children's school achievement at age 10 years. *The Journal of pediatrics* 2013; **162**(3): 483-9.
6. DiPietro JA, Novak MF, Costigan KA, Atella LD, Reusing SP. Maternal psychological distress during pregnancy in relation to child development at age two. *Child development* 2006; **77**(3): 573-87.
7. Bush NR, Jones-Mason K, Coccia M, et al. Effects of pre- and postnatal maternal stress on infant temperament and autonomic nervous system reactivity and regulation in a diverse, low-income population. *Dev Psychopathol* 2017; **29**(5): 1553-71.
8. Staneva A, Bogossian F, Pritchard M, Wittkowski A. The effects of maternal depression, anxiety, and perceived stress during pregnancy on preterm birth: A systematic review. *Women and Birth* 2015; **28**(3): 179-93.
9. Sable MR, Wilkinson DS. Impact of perceived stress, major life events and pregnancy attitudes on low birth weight. *Family planning perspectives* 2000: 288-94.
10. Education and Health Standing Committee. Shining a Light on FIFO Mental Health - Final Report. *Report 5, Western Australian Legislative Assembly*, 2015. [http://www.parliament.wa.gov.au/parliament/commit.nsf/\(WebInquiries\)/2E970A7A4934026448257E67002BF9D1?opendocument](http://www.parliament.wa.gov.au/parliament/commit.nsf/(WebInquiries)/2E970A7A4934026448257E67002BF9D1?opendocument) (accessed).
11. Chamber of Minerals and Energy of Western Australia. 2015-2025 Western Australian Resources Sector Outlook 2014. <https://www.cmewa.com/policy-and-publications/annual-reports-special-publications/preview?path=2015-2025%2BWA%2BResources%2BSector%2BOutlook%2BFull%2BReport.pdf> (accessed).
12. Hoath A, Haslam McKenzie F. The socio-economic impacts of long distance commuting (LDC) on source communities. *Co-operative Research Centre for Remote Economic Participation Perth: Curtin University*, 2013. <http://www.crc-rep.com.au/resource/TheSocio-economicImpactsLDConSourceCommunities.pdf> (accessed).
13. House Standing Committee on Regional Australia. Cancer of the bush or salvation for our cities? Fly-in, fly-out and drive-in, drive-out workforce practices. *Parliament of Australia, Canberra*, 2013. http://www.aph.gov.au/Parliamentary_Business/Committees/House_of_Representatives_Committees?url=/ra/fifodido/report.htm (accessed).
14. Infrastructure Planning and Natural Resources Committee. Inquiry into fly-in, fly-out and other long distance commuting work practices in regional Queensland 2015. www.parliament.qld.gov.au/documents/committees/IPNRC/2015/FIFO/02-rpt-009-09Oct2015.pdf (accessed).
15. Meredith V, Rush P, Robinson E. Fly-in fly-out workforce practices in Australia: The effects on children and family relationships. *Australian Institute of Family Studies*, 2014. <https://aifs.gov.au/cfca/sites/default/files/cfca/pubs/papers/a146119/cfca19.pdf> (accessed).

16. Gallegos D. "Aeroplanes Always Come Back": Fly-in Fly-out Employment: Managing the Parenting Transitions 2006. http://www.ngala.com.au/files/files/75_Fly_In_Fly_Out_Report.pdf (accessed).
17. Kaczmarek EA, Sibbel AM. The psychosocial well-being of children from Australian military and fly-in/fly-out (FIFO) mining families. *Community, Work & Family* 2008; **11**(3): 297-312.
18. Blackman A, Welters R, Murphy L, et al. Workers' perceptions of FIFO work in North Queensland, Australia. *Australian Bulletin of Labour* 2014; **40**(2): 180.
19. Carter T, Kaczmarek E. An exploration of generation Y's experiences of offshore fly-in/fly-out employment. *The Australian Community Psychologist* 2009; **21**(2): 52-66.
20. Torkington AM, Larkins S, Gupta TS. The psychosocial impacts of fly-in fly-out and drive-in drive-out mining on mining employees: A qualitative study. *Australian journal of rural health* 2011; **19**(3): 135-41.
21. Mauthner NS, Maclean C, McKee L. 'My dad hangs out of helicopter doors and takes pictures of oil platforms': Children's accounts of parental work in the oil and gas industry. *Community, Work & Family* 2000; **3**(2): 133-62.
22. Clement S, Schauman O, Graham T, et al. What is the impact of mental health-related stigma on help-seeking? A systematic review of quantitative and qualitative studies. *Psychological medicine* 2015; **45**(1): 11-27.
23. Coleman JS. Foundations of social theory. Cambridge, Massachusetts: Harvard university press; 1990.
24. Taylor J, Simmonds J. Family stress and coping in the fly-in fly-out workforce. *The Australian Community Psychologist* 2009; **21**(2): 23-36.
25. Lester L, Watson J, Waters S, Cross D. The Association of Fly-in Fly-out Employment, Family Connectedness, Parental Presence and Adolescent Wellbeing. *Journal of Child and Family Studies* 2016; **25**(12): 3619-26.
26. Joyce SJ, Tomlin SM, Somerford PJ, Weeramanthri TS. Health behaviours and outcomes associated with fly-in fly-out and shift workers in Western Australia. *Internal Medicine Journal* 2013; **43**(4): 440-4.
27. Petsonk E, Daniloff E, Mannino DM, Wang M, Short S, Wagner G. Airway responsiveness and job selection: a study in coal miners and non-mining controls. *Occupational and environmental medicine* 1995; **52**(11): 745-9.
28. Haas DM, Pazdernik LA, Olsen CH. A cross-sectional survey of the relationship between partner deployment and stress in pregnancy during wartime. *Women's Health issues* 2005; **15**(2): 48-54.
29. Tarney CM, Berry-Caban C, Jain RB, Kelly M, Sewell MF, Wilson KL. Association of spouse deployment on pregnancy outcomes in a US military population. *Obstetrics & Gynecology* 2015; **126**(3): 569-74.
30. Anderson EA, Spruill JW. The Dual-Career Commuter Family. *Marriage & Family Review* 1993; **19**(1-2): 131-47.
31. McBride MC, Bergen KM. Voices of women in commuter marriages: A site of discursive struggle. *Journal of Social and Personal Relationships* 2014; **31**(4): 554-72.
32. Bassani CD. The Japanese Tanshin Funin. *Community, Work & Family* 2007; **10**(1): 111-31.
33. Nicholas H, McDowall A. When work keeps us apart: a thematic analysis of the experience of business travellers. *Community, Work & Family* 2012; **15**(3): 335-55.
34. van der Klis M, Karsten L. The commuter family as a geographical adaptive strategy for the work-family balance. *Community, Work & Family* 2009; **12**(3): 339-54.
35. Li J, Pollmann-Schult M. Fathers' Commute to Work and Children's Social and Emotional Well-Being in Germany. *Journal of Family and Economic Issues* 2015: 1-14.
36. Dockery A, Li J, Kendall G. Parents' work patterns and adolescent mental health. *Social science & medicine* 2009; **68**(4): 689-98.
37. Dockery AM, Li J, Kendall G. Sole-parent work schedules and adolescent wellbeing: Evidence

from Australia. *Social Science & Medicine* 2016; **168**: 167-74.

38. Li J, Johnson SE, Han W-J, et al. Parents' Nonstandard Work Schedules and Child Well-Being: A Critical Review of the Literature. *The journal of primary prevention* 2014; **35**(1): 53-73.
39. Green S, Nurius PS, Lester P. Spouse psychological well-being: A keystone to military family health. *Journal of Human Behavior in the Social Environment* 2013; **23**(6): 753-68.
40. Zvonkovic AM, Solomon CR, Humble ÁM, Manoogian M. Family work and relationships: Lessons from families of men whose jobs require travel. *Family Relations* 2005; **54**(3): 411-22.
41. Cooke D, Marais I, Cavanagh R, Kendall G, Priddis L. Differences Between Mothers' and Fathers' Ratings of Family Functioning With the Family Assessment Device The Validity of Combined Parent Scores. *Measurement and Evaluation in Counseling and Development* 2015; **48**(3): 226-37.
42. Cooke D, Priddis L, Kendall G, Cavanagh R. Rasch analysis of the Parental Reflective Functioning Questionnaire: A Critical Examination of data from a non-clinical sample of Mothers and Fathers with a one-year old child. [PhD]. Perth, Western Australia: Curtin University; 2015.
43. Cohen S, Kamarck T, Mermelstein R. A Global Measure of Perceived Stress. *Journal of Health and Social Behavior* 1983; **24**(4): 385-96.
44. Solivan AE, Xiong X, Harville EW, Buekens P. Measurement of perceived stress among pregnant women: a comparison of two different instruments. *Maternal and child health journal* 2015; **19**(9): 1910-5.
45. Spielberger CD. Manual for the State-Trait Anxiety Inventory (Form Y). Palo Alto, CA: Mind Garden; 1983.
46. Grant KA, McMahon C, Austin MP. Maternal anxiety during the transition to parenthood: a prospective study. *J Affect Disord* 2008; **108**(1-2): 101-11.
47. Brugha T, Bebbington P, Tennant C, Hurry J. The List of Threatening Experiences: a subset of 12 life event categories with considerable long-term contextual threat. *Psychological medicine* 1985; **15**(01): 189-94.
48. Cox J, Holden J, Sagovsky R. Detection of postnatal depression: Development of the 10 item Edinburgh postnatal depression scale. *British Journal of Psychiatry* 1987; **150**: 782-6.
49. Bergink V, Kooistra L, Lambregtse-van den Berg MP, et al. Validation of the Edinburgh Depression Scale during pregnancy. *Journal of psychosomatic research* 2011; **70**(4): 385-9.
50. Beck A, Steer R, Brown G. Manual for the BDI-II. San Antonio, TX: Psychological Corporation; 1996.
51. Epstein NB, Baldwin L, Bishop DS. The McMaster Family Assessment Device. *Journal of Marital and Family Therapy* 1983; **9**(2): 171-80.
52. Raymond MR. Missing Data in Evaluation Research. *Evaluation & the Health Professions* 1986; **9**(4): 395-420.