

科技部補助專題研究計畫成果報告
期末報告

企業職場女性的周產期憂鬱的相關研究(A01)

計畫類別：個別型計畫
計畫編號：MOST 104-2629-B-214-001-
執行期間：104年08月01日至106年01月31日
執行單位：義守大學健康管理學系

計畫主持人：蔡夙穎

中華民國 106 年 01 月 04 日

中文摘要：大多數台灣婦女在整個懷孕期間仍繼續工作，很少有研究調查企業職場中懷孕婦女的產前憂鬱的狀態與可能相關的工作因素。本研究探討了工作相關因素對產前憂鬱的影響，包括懷孕婦女自我感覺到的工作壓力和工作場所支持。在2015-2016期間，我們使用問卷調查了153名員工，收集有關人口統計資料、妊娠狀況和身體狀況、工作相關因素、家庭功能、愛丁堡產後抑鬱量表（EPDS）和健康相關生活品質（HRQoL）。利用EPDS量表（分數>12）來進行篩檢，產前憂鬱症的盛行率為13.7%。有產前憂鬱症的在職孕婦在家庭APGAR得分及健康相關生活品質的分數上均較低（ $P < 0.05$ ），在控制了其他變項後發現，工作相關的壓力和痛苦的感覺會增加產前憂鬱的風險（ $OR = 4.7, P = 0.0221$ ）。此外，產前憂鬱症的其他重要預測因素包含有在工作中感到疲勞（ $OR = 9.1, P = 0.0035$ ）和感受到缺乏同事的支持（ $OR = 16.7, P = 0.0023$ ）。這樣的資訊可提供給雇主、主管、職業和環境衛生護士做為參考，為懷孕職工實施較具支持性的工作環境與相關支持，這可能有助於改善懷孕僱員的健康。

中文關鍵詞：懷孕職工，工作壓力，職場支持，產前憂鬱

英文摘要：Most Taiwan women continue to work throughout pregnancy. Few studies have investigated the occurrence of antenatal depression in employed women and its relationship with work-related factors. We explored the effects of work-related factors, including perceived job strain and workplace support, on antenatal depression among pregnant employees in Taiwan. During 2015-2016, we interviewed 153 employees in their third trimester of pregnancy using questionnaires to collect data on demographics, pregnancy status and physical conditions, work-related factors, family function, Edinburgh Postnatal Depression Scale (EPDS), and health-related quality of life (HRQoL). The prevalence of antenatal depression based on EPDS scales (scores ≥ 13) was 13.7%. Pregnant employees with antenatal depression had lower Family APGAR scores ($P < 0.0001$) and lower scores on all scales of the HRQoL ($P < 0.05$). After controlling for all covariates, work-related feelings of stress and distress were associated with an increased risk of antenatal depression ($OR = 4.7, P = 0.0221$). Additional significant predictors for antenatal depression were feeling tired at work ($OR = 9.1, P = 0.0035$) and lack of support from colleagues ($OR = 16.7, P = 0.0023$). Such information will facilitate the implementation of a supportive workplace climate for pregnant employees by employers, supervisors, and occupational and environmental health nurses, which may help to improve the health of pregnant employees.

英文關鍵詞：pregnant employees; job stain; work-related stress; workplace support; antenatal depression

科技部專題研究計畫成果報告撰寫格式

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科技部補助專題研究計畫成果報告

(期中進度報告/期末報告)

計畫名稱：企業職場女性的周產期憂鬱的相關研究(A01)

計畫類別：個別型計畫 整合型計畫

計畫編號：MOST 104-2629-B-214-001-

執行期間：104 年 8 月 1 日至 106 年 1 月 31 日

執行機構及系所：義守大學健康管理學系

計畫主持人：蔡夙穎

中 華 民 國 106 年 1 月 5 日

Abstract

Most Taiwan women continue to work throughout pregnancy. Few studies have investigated the occurrence of antenatal depression in employed women and its relationship with work-related factors. We explored the effects of work-related factors, including perceived job strain and workplace support, on antenatal depression among pregnant employees in Taiwan. During 2015-2016, we interviewed 153 employees in their third trimester of pregnancy using questionnaires to collect data on demographics, pregnancy status and physical conditions, work-related factors, family function, Edinburgh Postnatal Depression Scale (EPDS), and health-related quality of life (HRQoL). The prevalence of antenatal depression based on EPDS scales (scores \geq 13) was 13.7%. Pregnant employees with antenatal depression had lower Family APGAR scores ($P<0.0001$) and lower scores on all scales of the HRQoL ($P<0.05$). After controlling for all covariates, work-related feelings of stress and distress were associated with an increased risk of antenatal depression (OR=4.7, $P=0.0221$). Additional significant predictors for antenatal depression were feeling tired at work (OR=9.1, $P=0.0035$) and lack of support from colleagues (OR=16.7, $P=0.0023$). Such information will facilitate the implementation of a supportive workplace climate for pregnant employees by employers, supervisors, and occupational and environmental health nurses, which may help to improve the health of pregnant employees.

Keywords: pregnant employees; job stain; work-related stress; workplace support

INTRODUCTION

Depression during pregnancy is a major health problem because it is prevalent and chronic, and has a serious impact on birth outcome and child health (Bisetegn, Mihretie, and Muche 2016). Antenatal depression, also known as prenatal depression, is a form of clinical depression that can affect women during pregnancy, and may be a precursor to postpartum depression if not properly treated (Harvey and Pun 2007). Any form of prenatal stress experienced by the mother can have negative effects on various aspects of fetal development, which may harm both mother and child. According to a World Health Organization survey (World Health Organization 2009), 10% to 15% of women in developed countries and 20% to 40% of women in developing countries experience depression during pregnancy or after childbirth. Antenatal depression has been identified as a serious health problem, yet remains a neglected component of care for women in the third trimester of pregnancy (Abujilban et al. 2014; Howard et al. 2014; Zeng, Cui, and Li 2015). One reason for this may be the difficulty in diagnosing antenatal depression because the physiologic signs of pregnancy overlap with the symptoms of antenatal depression; and healthcare providers tend to mainly focus on the physical health aspects of pregnancy (Harvey and Pun 2007; Strass and Billay 2008). Previous studies reported that the lack of social support, poor interpersonal relationships, poor marital adjustment, life dissatisfaction, lower socioeconomic status and lower income, a stressful life event, history of depression, unintended pregnancy, domestic violence, and single status are risk factors for antenatal depression (Abujilban et al. 2014; Kaaya et al. 2010; Koleva et al. 2011; Lancaster et al. 2010).

The population of women employed during their childbearing years is growing. Few studies have focused on the adverse effects of job-related risk factors on antenatal depression in pregnant employees. The increasing concern over job strain has led many researchers to examine psychosocial job strain and its adverse effects on health in general employees (Kouvonen et al. 2007; Rusli, Edimansyah, and Naing 2008). Only a few studies, however, have focused on pregnant employees in the workplace with regard to the relationship of their working environment status, perceived workplace support, and work-related stress with their psychologic distress during pregnancy. Psychologic distress

is preceded by a specific stressful event that occurs repeatedly, becoming a chronic stressor (Alder et al. 2007). One study reported that higher job demand increases self-perceived stress and decreases the self-perceived quality of life related to environmental factors (Rusli, Edimansyah, and Naing 2008). Women's work tends to be associated with a higher prevalence of job strain and low control over the work conditions; therefore, women have higher odds of experiencing multiple disadvantages resulting in psychologic distress in many industrialized countries (Virtanen et al 2007).

Most Taiwanese women continue to work throughout their pregnancy; however, little is known about job strain and work-related factors in relation to antenatal depression. In the present study, we conducted a survey among pregnant women employed in a female labor-intensive electronics manufacturing company in Taiwan to explore the connections among work-related factors and antenatal depression in the third trimester of pregnancy adjusting for other factors. We also surveyed the health-related quality of life (HRQoL) for pregnant employees. We postulated that work-related factors would be independently predictive of antenatal depression in the third trimester of pregnancy. Such information will elucidate the current state of the friendly workplace environment and facilitate the implementation of a supportive workplace climate for pregnant employees by occupational and environmental health nurses.

METHODS

The study procedure, instruments, and all materials were reviewed and approved by the Institutional Review Board of E-Da Hospital in Taiwan.

Research setting and participants

This was a cross-sectional study of antenatal depression in the third trimester among pregnant employees in a large electronics manufacturer in Taiwan that was conducted from August 1, 2015 to October 2016. The research setting was Company C, a large electronics manufacturer with high labor-intensive employees (labor intensive industry refers to industries that require a substantial amount of human labor to produce industrial products) in the Tainan Science Park in Southern Taiwan, which is one of the Taiwan's largest areas for electronics manufacturers. This company has

approximately 19,000 employees, 41% of whom were female in 2014. Company C was selected for the study setting upon consideration of company size and stability. Company C has many female employees, and the employer and director of health management are interested in female employee health during pregnancy and the negative impact of antenatal depression on occupational productivity and attendance. Thus, Company C was willing to provide assistance in administering this survey. The researchers inquired about the willingness of this company to participate in the study by first sending an explanatory letter about the research project and then visiting the company's employee health management department director to explain the purpose of the research. After obtaining consent from the employee health management department, occupational and environmental health nurses helped distribute and collect the questionnaires during regular prenatal health visits in the workplace. In this cross-sectional study, participants were eligible if they were employed; worked full-time for at least 6 months during the pregnancy; were between 26 and 38 weeks of gestation at the time of data collection; had regular prenatal health visits during the third trimester of pregnancy (n=216); and provided their informed consent before the health visits. A total of 153 valid questionnaires were collected, with a response rate of 71%. Written and signed informed consent was obtained from all participants.

Data Collection Instruments and Definitions

Questionnaires were used to collect data on demographics, personal lifestyle, pregnancy status, employment status, self-reported physical conditions, perceived job strain and workplace support, family support, the Edinburgh Postnatal Depression Scale (EPDS), and HRQoL. Mean time required to complete the survey was 15 minutes.

1. Demographics, personal lifestyle, and employment status

Participants' self-reported demographics, personal lifestyle and behaviors, pregnancy status, and employment status were assessed. A demographic inventory was developed for this study to gather data on age, education, and monthly income. Level of education attained was used as a proxy measure for social class and categorized as: (1) high school or below or (2) college or above.

Monthly income was treated as individual work salary from this job and categorized into one of two grades: below \$1250 dollars and \$1250 dollars and above per month. The participants were asked

questions about their cigarette smoking behavior (current smoker and non-smoker); alcohol intake was limited to wine and hard alcohol, and was categorized as no habit of alcohol consumption (or frequency of alcohol consumption was only once a week or less) and habit of alcohol consumption (frequency of alcohol consumption was more than once a week).

The participants were office workers or clean-room workers (a room that is maintained virtually free of contaminants, used in laboratory work and in the production of precision parts for electronic equipment). Employment status was collected, including worksite (office vs. clean room), and work hours per day (<9 hours a day or ≥9 hours a day).

2. Pregnancy status, personal medical history and self-reported physical conditions

Because a woman's or her fetus's health during pregnancy has a potentially strong influence on the woman's mental health, we also collected participants' pregnancy status, personal medical history, and self-reported physical conditions. Participants were asked to respond to the following questions: "Is this the first pregnancy?" (yes/no), "Has a doctor told you that your fetus may have slight problems or health problems?" (yes/no), "Has a doctor told you that your health during pregnancy may have slight problems or health problems?" (yes/no). The participants were asked whether a physician had diagnosed them with a chronic disease such as diabetes or hypertension (yes/no). Data of self-reported physical symptoms were collected in the study, and included memory loss, physical decline, back pain and muscle aches, fatigue headache, urinary frequency, and constipation, focusing on symptoms during the preceding 1 month. Sleep problems were surveyed and were defined as difficulty falling asleep; difficulty remaining asleep (more than twice a week); the belief that one is not getting enough sleep, resulting in a disturbance of daily activities or normal social activities; and the use of medication for insomnia, focusing on symptoms during the preceding 4 weeks.

3. Perceived job strain and workplace support during the preceding 3 months

In this study, we defined job strain as that work demands that are not matched to the knowledge, skills, or abilities of the worker, and that challenge the ability to cope (Chou, Li, and Hu 2014). These demands may be related to time pressure or the amount of work (quantitative demands), or may refer to the difficulty of the work (cognitive demands) or the empathy required (emotional demands), or

even to the inability to show one's emotions at work. Participants responded to the following question: "Did you feel stress due to time pressures, the amount of work, difficulty of the work, or the empathy required in the last 3 months?" (yes/no). Moreover, data of perceived job strain-related feelings were collected in the study and included feeling tired, exhausted, weak and sick, frustrated, still thinking about work when back home, going to bed still thinking about work, and unable to engage in other activities during the preceding 1 month. Workplace support related to colleagues and supervisors refers to the empathy required (emotional demands) or even the inability to show one's emotions at work. Hence, to assess employees' perceptions of friendly workplace support, participants were asked, "Were you able to obtain support from colleagues or your supervisor?" (yes/no), and "Do you agree that your relationship with your colleagues (or supervisor) is good?" (yes/no).

4. Family function

The Family APGAR (Adaptability, Partnership, Growth, Affection, and Resolve) score was introduced in 1978 as a utilitarian screening instrument for family function and is used to assess a family member's perception of family function and social support in family life by examining his/her satisfaction with family relationships (Smilkstein 1978, 1984). The self-reported, five-item questionnaire is designed to detect dysfunction in the following areas: 1) family adaptation; 2) partnership; 3) growth; 4) affection, and 5) resolve. The instrument allows for three possible responses: almost always, some of the time, and hardly ever, and the scoring is 2, 1, and 0, respectively, for each of the five items in the questionnaire. Responses to the items are added, and thus the score can range from 0 to 10. A higher score indicates a greater degree of satisfaction with family function.

5. Edinburgh Postnatal Depression Scale

Antenatal depression in this study was assessed using the EPDS. The EPDS was developed by Cox, Holder, and Sagovsky (1987) to screen for the risk of postpartum depression. The EPDS scale was selected for use in this study because it is suitable for use during both pregnancy and the postpartum period (Cox, Holder, and Sagovsky 1994). It is a 4-point self-reported scale composed of 10 items. Responses are scored from 0 to 3. The lowest and the highest scores that can be obtained from the scale are 0 and 30. Items 1, 2, and 4 are scored from 0 to 3, and items 3, 5, 6, 7, 8, 9, and 10 are scored

in the reverse order (Cox, Holder, and Sagovsky 1994). The Taiwanese version of the EPDS (EPDS-T) exhibits satisfactory sensitivity and specificity (Su et al. 2007). The previous study reported that the optimal cutoff points of the EPDS-T differ for detecting major depression during different trimesters: 13/14 for the second trimester and 12/13 for the third trimester (Su et al. 2007). We defined a score of 13 or more in the EPDS as antenatal depression.

6. Short-Form 36-Item Health Survey

The Short-Form 36 (SF-36) is a generic measure because it assesses health concepts that represent basic human values relevant to everyone's functional status and well-being, and this assessment is extensively documented in reports from studies of clinical patients and general populations as reliable and valid (McHorney, Ware, and Raczek 1993; McHorney et al. 1994). The SF-36 comprises 36 questions covering 8 aspects of health status: physical functioning, role-physical (role limitations due to physical health problems), bodily pain), general health, vitality, social functioning, role-emotional (role limitations due to emotional problems), and mental health. The scores of questions relating to each scale were summed and rescaled to a 100-point scale, where 100 is the best possible score and 0 the worst possible score.

Statistical Analysis

The aim of this study was to explore whether work-related factors would be independently predictive of antenatal depression in the third trimester of pregnancy and HRQoL, because little is known about the relationship between work-related factors and antenatal depression among employed women. The primary independent variables of interest were demographics and personal lifestyle, pregnancy status, self-reported physical conditions, perceived job strain and workplace support, and Family APGAR.

The dependent variable was antenatal depression using the EPDS. All analyses were performed using Statistical Analysis System (SAS 9.3; SAS Institute, Cary, NC) software.

Participants' profiles were reported and univariate analyses were performed between groups with and without antenatal depression using the EPDS, and other independent variables using the chi-square test or Fisher's exact test. Descriptive characteristics and distributions of Family APGAR and SF-36 scores of the participating pregnant employees and groups with and without antenatal depression were

estimated using Mann-Whitney U tests. A P value of less than 0.05 was considered statistically significant. To determine whether perceived job strain and workplace support were associated with antenatal depression in the multivariate modeling, independent variables associated with antenatal depression with $P \leq 0.05$ in the univariate logistic regression analysis were considered in the multivariate modeling of antenatal depression using multiple logistic regression after adjusting for confounding variables such as demographics, pregnancy status, self-reported physical conditions, and Family APGAR. Estimated odds ratio (ORs) of the association was used in the multiple logistics regression.

RESULTS

A total of 153 subjects participated in the study. Mean age of the subjects was 32.6 ± 3.18 years. The descriptive characteristics of participants in this study are shown in **Table 1**. Most of the subjects (62.1%) were between 25 to 33 years of age, and 79.1% had a college education. Among participants, 69.3% were office workers (non-clean-room workers) and 62.1% of the subjects averaged at least 9 hours of work per day, and mean number of hours of work per day was 9.5 ± 1.3 hours. Most of the subjects (99.3%) reported no smoking habit and 98.7% reported no alcohol drinking habit. The participants' husbands were more likely to have a high education level (84.3%) and a smoking habit (74.5%). The prevalence of diabetes and hypertension history was 2.6% and 0.7%, respectively. The percentage of participants with antenatal depression using the EPDS scales (score ≥ 13) was 13.7%. A comparison of the pregnancy status, self-reported physical conditions, perceived job strain, and workplace support in subjects with and without antenatal depression is shown in **Table 2**. The findings revealed that subjects with antenatal depression reported more memory loss (87.7% vs 49.2%, $P=0.0018$), more physical decline (100% vs 67.4%, $P=0.0020$), more fatigue (100% vs 77.3%, $P=0.0145$ by Fisher's exact test), greater urinary frequency (100% vs 81.8%, $P=0.0462$ by Fisher's exact test), constipation (76.2% vs 51.5%, $P=0.0348$), and more poor sleep (66.7% vs 17.4%, $P<0.0001$) than those who did not experience antenatal depression. Perceived job strain variables, such as feeling of stress ($P=0.0003$), often feeling tired ($P<0.0001$), often going to bed still thinking about work ($P=0.0213$ by Fisher's exact test), and unable to engage in other activities due to work ($P=0.0034$

by Fisher's exact test) were all significantly correlated with antenatal depression. Perceived workplace support variables, including lack of support from colleagues ($P=0.0021$ by Fisher's exact test) and supervisors ($P<0.0001$), and unpleasurable relationships with colleagues ($P=0.0496$ by Fisher's exact test) and supervisors ($P=0.0474$ by Fisher's exact test) were all associated with antenatal depression. None of the pregnancy status variables were significantly different between the groups. The Kolmogorov-Smirnov statistic for a test of normality was used and all scales (Family APGAR scale and the 8 scales of the SF-36) had a significantly skewed distribution ($P<0.05$) for the groups with and without antenatal depression. The Mann-Whitney Test was adopted to examine the scores between pregnant employees with and without antenatal depression (**Table 3**). Pregnant employees with antenatal depression had lower Family APGAR scores (6.5 ± 2.5 vs. 8.6 ± 1.8 , $P<0.0001$), including the categories of adaptation, partnership, growth, affection, and resolve (all items $P<0.05$). Pregnant employees with antenatal depression had lower scores on all scales of the SF-36 (all scales $P<0.05$). Multiple logistic regression analysis was performed to examine the independent effects of perceived job strain and workplace support factors on antenatal depression among pregnant employees (**Table 4**). After controlling for all covariates, a feeling of stress was associated with an increased risk of antenatal depression ($OR=4.7$, $P=0.0221$). Besides a feeling of stress, significant predictors for antenatal depression were often feeling tired at work ($OR=9.1$, $P=0.0035$) and lack of support from colleagues ($OR=16.7$, $P=0.0023$).

DISCUSSION

In general, people attach more importance to physiologic disorders. When faced with psychologic problems, they tend to overlook the psychologic and emotional problems of women because they view childbirth as a joyous event. Therefore, perinatal depression in women has not been widely appreciated in Taiwan. Depression during pregnancy is an important health problem because depressive symptoms not only lead to serious psychologic problems in women, but also have a significant effect on family (Bisetegn, Mihretie, and Muche 2016). Several psychosocial and obstetric factors have been identified as predictors, risk factors for perinatal mental disorders are socioeconomic disadvantage, unintended pregnancy, not being married, complications during pregnancy and childbirth, adverse neonatal

outcome, lacking intimate partner empathy and support, problems in the relationship, economic and unemployment anxiety, low self-esteem, poor sleep, low quality of life, a stressful life issue in the last 6 months, experiencing intimate partner violence, having insufficient emotional and practical support, prolonged labor, and a history of mental health problems (Bisetegn, Mihretie, and Muche 2016; Fisher et al. 2012; Hanlon et al. 2009; Vigod et al. 2010); while protective factors include more education; a permanent job; and a kind, trustworthy, and intimate partner (Fisher et al. 2012). Work is very important for economic status and quality of life among women, but a permanent job is related to health in complex ways, posing both risks and benefits. Unemployment is associated with poor health or socioeconomic disadvantage, but some jobs may be worse than no job at all. One study demonstrated that poor quality jobs, such as those with high job strain or an unfriendly working environment, are associated with worse health when compared to jobs with fewer or no stressors; and people in jobs with three or more of the psychosocial stressors report health that is no better than that of the unemployed (Broom et al. 2006). Likewise, the results of the present study revealed that perceived work-related stress among pregnant employees, such as feeling stress from work (OR=4.7), often feeling tired at work (OR=9.1), and lack of workplace support by colleagues (OR=16.7) were significant predictors of antenatal depression.

Although scholars in Taiwan have conducted relevant studies, the participants of most of those studies were restricted to full-time housewives or postpartum women from hospitals or postpartum nursing homes (Chang et al. 2016; Liou, Wang, and Cheng 2014; Tsao, Creedy, and Gamble 2015; Wang and Chen 2010; Weng et al. 2016), and antenatal depression has received less scholarly attention than postpartum depression. Few studies have investigated antenatal depression in employed women and discuss the relationship between work-related factors and antenatal depression. To our knowledge, this is the first study of the effects of work-related factors, such as perceived job stress and workplace support, in relation to antenatal psychologic distress among employed pregnant women in Taiwan. Like many countries in the world, Taiwan has undergone a steady increase in women's participation in the labor force during the past several decades. Whereas 38% of women over 15 were in the labor force in early 1978, approximately 51% of women over 15 were in the labor force in 2015

(Directorate-General of Budget 2015). Hence, most Taiwanese women continue to work throughout their pregnancy. One study revealed that stress is related to depression in the prenatal period, and stress, depression, and fatigue are related to postpartum depression (Cheng and Pickler 2014). In the workplace in the present study, working mothers often worked more than the legally mandated 8 hours (62.1%), mean hours of work per day was 9.5 ± 1.3 hours, 30.1% reported often feeling tired from work, 28.8% reported a feeling of stress and distress from work, and 80.4% felt fatigue. Moreover, 30.7% participants were clean-room workers and clean-room workers work 12-hour shifts. Their jobs are inconvenient and inflexible because employees must remove and put on their clean-room suits when leaving and returning to their workstation. Office workers, comprising 69.3%, had higher educational and compensation levels than clean-room workers, and generally worked about 8 hours a day, but their positions encompass specific job responsibilities. Based on these findings, the pregnant employees in our study had a heavy work burden. A previous study reported that workplace adversity during pregnancy is associated with poorer maternal psychologic well being, and workplace conditions and benefits are salient factors for consideration in assessments of antenatal psychosocial well being (Cooklin, Rowe, and Fisher 2007). One longitudinal study in Australia examined whether poor quality jobs are associated with an increased risk of maternal postpartum psychologic distress, and the results demonstrated that after adjusting for known risk factors for poor maternal mood, mothers are significantly more likely to report psychologic distress with each reduction in the number of optimal employment conditions (Cooklin et al. 2011).

A similar study in Thailand (Sanguianklin et al. 2014) reported that the prevalence of psychologic distress is relatively high among employed pregnant women, and job strain is a significant predictor of psychologic distress regardless of the level of social support. Further, the study findings suggested that two types of coping strategies – wishful thinking and seeking social support (workplace and family support) – had moderating effects on the negative impact of job strain on psychologic distress (Sanguianklin et al. 2014). Our findings were consistent with previous results indicating that participants with poor perceived workplace support from colleagues or supervisors had a higher prevalence of antenatal depression (colleagues: 47.6% vs 5.3%, $P=0.0021$; supervisors: 66.7% vs

18.2%, $P < 0.0001$) and poor perceived workplace support from colleagues was a significant predictor of antenatal depression ($OR = 16.7$). Employers may influence the work climate of perceived workplace support by either adhering to or ignoring company policies, informally supporting or discouraging pregnant employees, or managing or disregarding issues arising among coworkers. A working mother may not perceive her work climate to be supportive of pregnancy due to both the company's policies and the attitudes that the employer holds toward pregnancy support. Workers with high levels of job strain and low levels of workplace support are at the highest risk for developing psychologic distress, depersonalization, job dissatisfaction, and sickness absences (Choi et al. 2011).

Women constitute a large percentage of the workforce in industrialized countries. As a result, addressing pregnancy-related health issues in the workplace is important toward formulating appropriate strategies to promote and protect maternal and infant health. One study suggested that core recommendations to improve maternal and infant health outcomes and improve workplace conditions for women include: (i) shifting organizational culture to support women in pregnancy; (ii) conducting early screening of occupational risk during the preconception period, and (iii) monitoring manual labor conditions, including workplace environment and job duties (Salihu, Myers, and August 2012).

Pregnancy is not an illness, and pregnant employees are not any less committed to their jobs or less capable of doing them. Pregnancy does, however, affect women differently and the effects change throughout the term of the pregnancy. Employers should assess health and safety risks that could affect the health of the employee or her unborn child and carefully consider requests to change working hours or shift patterns, be willing to look at reorganization with other staff, recruit part-time staff, and job sharing to cover responsibilities.

There are some limitations to the present study. First, this study was cross-sectional in design, allowing only for the evaluation of association, not causation. Second, assessment of predictors adopted a dichotomized classification, which was simplistic, and predictor measurements mainly relied on self-report, which might have biased the results. Third, a selection bias due to non-response was inevitable. Moreover, questions of demographics, pregnancy status, self-reported physical conditions, perceived work-related stress, and workplace support in the questionnaire were developed for this

study; therefore, the fact that standard instruments were not applied in the present study could have led to a misclassification of information, and might have also affected the validity and reliability of the questionnaire. The small sample size reduces the strength of the established associations.

In conclusion, in the present study, perceived work-related factors among pregnant employees, including a feeling of stress from work (OR=4.7), often feeling tired at work (OR=9.1), and unfriendly workplace support for colleagues (OR=16.7) were significant predictors of antenatal depression after adjusting for other factors. Such information can be used to understand the current state of the friendly workplace environment and facilitate the implementation of a supportive workplace climate by employers, supervisors, and occupational and environmental health nurses for pregnant employees, which may decrease antenatal depression or psychologic distress and improve the health of pregnant employees.

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Table 1: Descriptive characteristics of 153 employee study participants

Variable		Number	%
Age, years (32.60±3.18)	≥34 (advanced maternal age)	58	37.9
	25-33	95	62.1
Education level	College and above	121	79.1
	High school education and below	32	20.9
Monthly income	\$ 1250 dollars	101	66.0
	≥\$1250	52	34.0
Smoking	Yes	1	0.7
	No	152	99.3
Alcohol	Yes	2	1.3
	No	151	98.7
Husband's education level	College and above	129	84.3
	High school education and below	24	15.7
Husband's smoking status	Yes	114	74.5
	No	39	25.5
Work hours per day	<9	58	37.9
	≥9	95	62.1
Worksite	Cleanroom	47	30.7
	Office	106	69.3
History of diabetes	Yes	4	2.6
History of hypertension	Yes	1	0.7
Edinburgh Postnatal Depression Scale (EPDS)	≥13	21	13.7
	<13	132	86.3

Table 2: Pregnancy status, self-reported mental and physical conditions during 1 month, and perceived job strain and workplace support among 153 pregnant employee study participants and the Edinburgh Postnatal Depression Scale (EPDS).

Variables	Total (%)	EPDS		P-value for Chi-square test
		≥13	<13	
Pregnant status				
First pregnancy	55.6	47.6	56.8	0.4307
Health of fetus with slight problem	2.6	9.5	1.5	0.0910(Fisher's exact test)
Health of the mother with slight problem	11.8	14.3	11.4	0.7160(Fisher's exact test)
Self-reported physical conditions				
Memory loss	54.3	85.7	49.2	0.0018
Physical decline	71.9	100	67.4	0.0020
Back pain and muscle aches	71.2	85.7	68.9	0.1147
Fatigue	80.4	100	77.3	0.0145(Fisher's exact test)
Headache	26.3	40.0	24.2	0.1359
Urinary frequency	84.3	100	81.8	0.0462(Fisher's exact test)
Constipation	54.9	76.2	51.5	0.0348
Sleep problem	24.2	66.7	17.4	<0.0001
Perceived job strain factor				
Feeling of stress and distress	28.8	61.9	23.5	0.0003
Often feel tired	30.1	66.7	24.2	<0.0001
Often feel exhausted	7.8	19.1	6.1	0.0626(Fisher's exact test)
Often feel weak and sick	1.3	4.8	0.8	0.2564(Fisher's exact test)
Often feel frustrated	3.3	9.5	2.3	0.1391(Fisher's exact test)
Often still thinking about when work back home	10.5	19.1	9.1	0.2390(Fisher's exact test)
Often go to bed still thinking about work	5.9	19.1	3.8	0.0213(Fisher's exact test)
Unable to engage in other activities due to work	3.9	19.1	1.5	0.0034(Fisher's exact test)
Perceived workplace support				
Lack of support from colleagues	11.1	47.6	5.3	0.0021 (Fisher's exact test)
Lack of support from supervisor	24.8	66.7	18.2	<0.0001
Unpleasant relationship between colleagues	2.0	9.5	0.7	0.0496(Fisher's exact test)
Unpleasant relationship with supervisors	10.5	23.8	8.3	0.0474(Fisher's exact test)

Table 3: Family APGAR and SF-36 scores among 153 pregnant employee study participants and Edinburgh Postnatal Depression Scale (EPDS).

Variables	Mean±SD	EPDS		P-value
		≥13	<13	Mann-Whitney U test
Family APGAR scores	8.3±2.1	6.5±2.5	8.6±1.8	<0.0001
Adaptation	1.6±0.5	1.2±0.6	1.7±0.5	0.0011
Partnership	1.6±0.5	1.2±0.6	1.7±0.5	0.0011
Growth	1.5±0.5	1.1±0.6	1.6±0.5	0.0005
Affection	1.7±0.4	1.3±0.7	1.8±0.4	0.0002
Resolve	1.8±0.4	1.6±0.5	1.8±0.4	0.0031
SF-36				
Physical function	62.5±19.7	54.0±18.6	63.8±19.6	0.0181
Role limitations: Physical	53.4±39.1	28.5±33.8	57.3±38.5	0.0016
Bodily pain	70.7±16.8	60.1±17.7	72.4±16.1	0.0053
General health perceptions	70.4±15.6	58.0±11.9	72.3±15.2	<0.0001
Vitality/energy	57.8±16.3	42.2±14.4	60.2±15.3	<0.0001
Social function	80.0±15.7	67.2±19.1	82.2±14.0	0.0004
Role limitations: Emotional	85.1±30.5	63.4±43.3	88.6±26.6	0.0016
Mental health	69.0±12.7	52.7±10.7	71.6±11.0	<0.0001

Table 4: Multiple logistic regression of antenatal depression (EPDS>12) with perceived job strain and workplace support risk factors among pregnant female employees in Taiwan, adjusted for other variables

Variables	Antenatal depression (EPDS≥13)	
	Odds Ratio	P value
Perceived job strain and workplace support		
Feelings of stress and distress (Yes)	4.7	0.0221
Often feel tired at work (Yes)	9.1	0.0035
Often go to bed still thinking about work (Yes)	3.8	0.2488
Unable to engage in other activities due to work (Yes)	6.6	0.0742
Obtain support from colleagues (No)	16.7	0.0023
Obtain support from supervisors (No)	1.1	0.9285
Relationship between colleagues (displeasure)	3.6	0.4427
Relationship with supervisors (displeasure)	4.7	0.1378

*Adjusted for other variables, including demographics, self-reported physical conditions, and Family APGAR scores.

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以 100 字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形(請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊)

論文： 已發表 未發表之文稿 撰寫中 無

專利： 已獲得 申請中 無

技轉： 已技轉 洽談中 無

其他：(以 200 字為限)

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果學術或應用價值。

Most Taiwan women continue to work throughout pregnancy. Few studies have investigated the occurrence of antenatal depression in employed women and its relationship with work-related factors. We explored the effects of work-related factors, including perceived job strain and workplace support, on antenatal depression among pregnant employees in Taiwan. The prevalence of antenatal depression based on EPDS scales (scores \geq 13) was 13.7%. Pregnant employees with antenatal depression had lower Family APGAR scores and lower scores on all scales of the HRQoL. After controlling for all covariates, work-related feelings of stress and distress were associated with an increased risk of antenatal depression. Additional significant predictors for antenatal depression were feeling tired at work and lack of support from colleagues. Such information will facilitate the implementation of a supportive workplace climate for pregnant employees by employers, supervisors, and occupational and environmental health nurses, which may help to improve the health of pregnant employees.

4. 主要發現

本研究具有政策應用參考價值： 否 是，建議提供機關_____

(勾選「是」者，請列舉建議可提供施政參考之業務主管機關)

本研究具影響公共利益之重大發現： 否 是

說明：(以 150 字為限)

科技部補助計畫衍生研發成果推廣資料表

日期:2017/01/04

科技部補助計畫	計畫名稱: 企業職場女性的周產期憂鬱的相關研究(A01)
	計畫主持人: 蔡夙穎
	計畫編號: 104-2629-B-214-001- 學門領域: 性別主流科技計畫
無研發成果推廣資料	

104年度專題研究計畫成果彙整表

計畫主持人：蔡夙穎			計畫編號：104-2629-B-214-001-				
計畫名稱：企業職場女性的周產期憂鬱的相關研究(A01)							
成果項目			量化	單位	質化 (說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等)		
國內	學術性論文	期刊論文		0	篇		
		研討會論文		0			
		專書		0	本		
		專書論文		0	章		
		技術報告		0	篇		
		其他		0	篇		
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			
		積體電路電路布局權		0			
		著作權		0			
		品種權		0			
		其他		0			
	技術移轉	件數		0	件		
		收入		0	千元		
	國外	學術性論文	期刊論文		1	篇	期刊論文發表中
			研討會論文		0		
			專書		0	本	
專書論文			0	章			
技術報告			0	篇			
其他			0	篇			
智慧財產權及成果		專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			
		積體電路電路布局權		0			
		著作權		0			
		品種權		0			
其他		0					

	技術移轉	件數	0	件	
		收入	0	千元	
參與計畫人力	本國籍	大專生	2	人次	
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)		無			

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以100字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）

論文： 已發表 未發表之文稿 撰寫中 無

專利： 已獲得 申請中 無

技轉： 已技轉 洽談中 無

其他：（以200字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）

Most Taiwan women continue to work throughout pregnancy. Pregnant employees with antenatal depression had lower Family APGAR scores and lower scores on all scales of the HRQoL. Work-related feelings of stress and distress were associated with an increased risk of antenatal depression. Additional significant predictors for antenatal depression were feeling tired at work and lack of support from colleagues.

4. 主要發現

本研究具有政策應用參考價值： 否 是，建議提供機關

（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現： 否 是

說明：（以150字為限）