

Effects of Postpartum Exercise Program on Fatigue and Depression During “Doing-the-Month” Period

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ABSTRACT: This study explored the effectiveness of an exercise program on reducing levels of fatigue and depression among postpartum women who were “doing-the-month” in a maternity center in Taiwan. Previous studies related to postpartum have focused on depression rather than women’s feelings of fatigue, and no study related to exercise has previously been conducted in a Taiwan maternity center. A low-intensity exercise program was specifically designed and administered to 31 subjects in the study’s intervention group. Another 30 subjects (the control group) followed a traditional, non-physically active postpartum care regimen. Those in the intervention group were required to participate in at least 6 exercise program sessions during their one month postpartum stay. All subjects were asked to fill out a fatigue and depression questionnaire before and after the program. A Fatigue Symptom Checklist (FSC) was used to measure fatigue, and the Center for Epidemiological Studies Depression (CESD) was used to confirm the development of depression. Results showed statistically significant differences between the two groups in terms of fatigue levels, with statistical improvements ($p < .05$) registered by the intervention group in terms of levels of physical and psychological fatigue and fatigue symptoms. However, no significant changes in depression between the two groups were found. Study results demonstrate that a low-intensity exercise program can offer a good platform for clinicians and researchers to help reduce fatigue in postpartum women.

Key Words: postpartum exercise, fatigue, depression, maternity center, Taiwanese women.

Introduction

The postpartum period is a critical transition time for women, affecting significantly the physical and mental health of mothers after childbirth. Postpartum fatigue and depression are the two major psychological problems occurring during the postpartum period reported and emphasized in the literature (Albright, 1993; Gardner & Campbell, 1991; Lee & Zaffke, 1999; Troy, 2003). Research found that 44% to 95% of postpartum mothers in the United States experience postpartum fatigue (Atkinson & Baxley, 1994; Milligan, Parks, Kitzman, & Lenz, 1997) and 10–15% suffer from postpartum depression (Albright, 1993). In Taiwan, postpartum fatigue and depression also represent common problems (Chen, Wang, Chung, Tseng, & Chou, 2006; Ko, 2004). Postpartum fatigue is a predictor

of postpartum depression (Bozoky & Corwin, 2002; Ko 2004). Postpartum psychological problems can interfere with a new mother’s ability to care for her infant and may adversely affect her quality of life (Ko, 2004; Milligan, Lenz, Parks, Pugh, & Kitzmon, 1996).

The promotion of postpartum health has been emphasized by many health care providers (Walker & Wilging, 2000). Sichel and Driscoll suggested a “N*U*R*S*E” approach to relieving postpartum depression. The “E”, short for (physical) exercise, can improve postpartum women’s sense of wellbeing (Sichel & Driscoll, 2002). “Mad for Fitness” was developed by a healthcare team to reduce postnatal depression in the belief that exercise can reduce depression (Wilkinson, Phillips, Jackson, & Walker, 2003). Also, three review articles indicate exercise is beneficial to the physical and psychological health of postpartum

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women (Daley, Macarthur, & Winter, 2007; Larson-Meyer, 2002), with significant benefits including increased lactation, reduced bodyweight, less severe levels of depression, and enhanced mothering abilities and capacity to implement regular physical activity regimens for herself and her child. Published studies have established the general importance of regular exercise during the postpartum period. In order to promote postnatal care, both the Society of Obstetricians and Gynecologists of Canada, Clinical Practice Obstetrics Committee/Canadian Society for Exercise Physiology (SOGC/CSEP) in Canada (Davies, Wolfe, Mottola, & MacKinnon, 2003) and American College of Obstetricians and Gynecologists (ACOG) in the United States (Artal & O'Toole, 2003) have published guidelines for exercise during pregnancy and the postpartum period.

While most postpartum exercise programs focus on relieving depression, relief of fatigue is often neglected (Daley et al., 2007; Dennis, 2004). Although some interventions for depression have been better studied, methodological limitations render their efficacy equivocal for postpartum depression (Dennis, 2004). One survey study found that women who are physically active during pregnancy earn better (lower) scores on a test designed to measure depressive symptoms during pregnancy and the postpartum period (Nordhagen & Sundgot-Borgen, 2002). Another aerobic exercise intervention program was found to reduce anxiety and depression significantly ($p < .05$) following exercise and quiet rest (Koltyn & Schultes, 1997). Although limited to a small number of studies, current evidence supports a relationship between participation in exercise and a reduction in postpartum depression. Given the reluctance by some postpartum women to use antidepressant medication and the limited availability of appropriate psychological therapies, exercise as a therapeutic approach deserves further exploration. Further research using well-designed, randomized and controlled trial methodologies is warranted (Daley et al., 2007; Larson-Meyer, 2002; Mottola, 2002).

The prevalence rate of fatigue, a possible predictor of depression, was found by Bozoky & Corwin (2002) to be higher than that of depression. In Taiwan, many women express their postpartum psychological problem as fatigue rather than depression (Ko, 2004). Some studies have shown that regular exercise can reduce fatigue in healthy women, women with a chronic disease (fibromyalgia) (Karper & Stasik, 2003; Valkeinen, Hakkinen, Hannonen, Hakkinen, & Alen, 2006), women suffering from breast

cancer (Headley, Ownby, & John, 2004), and sedentary women (Annesi, 2002).

Annesi proposed theories of exercise-induced affective change and conducted a series of studies to examine the effectiveness of different exercise programs on mood (Annesi, 2004, 2005; Annesi & Westcott, 2004). Articles in exercise psychology literature indicate that exercise imparts a feeling of well-being to most persons who participate in such. However, any negative changes which may take place between pre- and post exercise may be overlooked (Backhouse, Ekkekakis, Bidle, Foskett, & Williams, 2007). Moderate aerobic exercise can improve the affective response of people. Recently, the Cochrane system has reported the positive effects of exercise therapy on patients with chronic fatigue syndrome (Edmonds, McGuire, & Price, 2004). They also mentioned that exercise that is overly strenuous tends to increase dropout rates and undermine program effectiveness. As postpartum fatigue differs significantly from chronic fatigue syndrome the study of the effectiveness of low-intensity exercise on reducing the symptoms of postpartum fatigue is necessary.

Chinese culture places great importance on "postpartum preservation" as critical to the overall wellness of women who have given birth. Traditional Chinese custom mandates that women be confined to the home and assisted with tasks during the first month after childbirth. This restrictive regimen is referred to as "Tso-Yueh-Tzu," which has been translated into English as "doing-the-month" (Callister, 2006; Chien, Tai, Ko, Huang, & Sheu, 2006; Heh, Fu, & Chin, 2001; Leung, Arthur, & Martinson, 2005). As the process of pregnancy and delivery is believed exhausting to the physical health of a woman, Chinese tradition holds that she should follow established doing-the-month practices, get plenty of bed rest and reduce physical activity in order to regain her strength (Chen & Wang, 2000). Although modernization has changed many facets of traditional life in Taiwan, the idea of doing-the-month remains highly esteemed, and a significant majority of women still follow these practices to some extent. The benefits associated with doing-the-month may reduce physical discomfort and depression (Chien et al., 2006).

As no research has yet examined the effect on the health of postpartum women of instructor-led postpartum exercise programs held in a doing-the-month maternity center, this study was designed to evaluate fatigue and depression before and after subjects participated in a series of six exercise sessions. The session was designed by study

authors following well-established international guidelines and conducted by an experienced aerobics coach.

Methods

Sample

A control group pre-/post-program design was used in this study. Participants were recruited from a maternity center located in metropolitan Taipei and data were collected from April 2006 through June 2006. Selection criteria required that participants be able to speak and read Mandarin, married, free of obstetrical complications and over 20 years of age.

During the study period, a total of 79 potential participants were recruited during their first day of registration at the maternity center and signed the consent form to engage in this study. After research assistants' explanation, a total of 49 women agreed to participate in the low-intensity exercise program. As 18 of the 49 did not complete the program due to personal reasons, 31 women in total finished the full six sessions. The 30 women recruited who expressed disinterest in joining the exercise program were assigned to the control group. The Institutional Review Board (IRB) at the maternity center approved this study.

Intervention

The goal of the low-intensity exercise program, which incorporated Pilates, yoga movements and music, was to improve cardiac-pulmonary functions, enhance muscle strength and pliancy and achieve 50–60% maximal heart-beat. Subjects were instructed by a professional aerobic coach for one hour (10:30–11:30 am), three days each week (Monday, Tuesday, and Friday). All the participants were required to finish six sessions during their three week stay in the maternity center. Program design was adopted from the cornerstone textbook by Noble (1995), which makes specific recommendations regarding appropriate exercise principles for postpartum women.

Nurses invited mothers to join the low-intensity exercise (intervention) group during the latter's first week of stay in the maternity center (April 2006). Those accepting the invitation (the intervention group) participated 3 times a week in a postpartum exercise session at the maternity center lasting approximately one hour. The second author, a professor of dancing and a registered aerobic exercise coach, designed and planned the exercise program, with a key goal to help participants achieve 60% maximal heart-

beat. Exercise intensity gradually increased over the 60-minute program through three phases. The first focused on breathing and full body stretching; the second combined yoga and Pilates aerobic exercises; and the third focused on doing muscle training exercises. After each exercise session, researchers made themselves available to subjects for 30 minutes for counseling and answering questions. For validity, this intervention was approved by obstetric physicians, women's health experts and rehabilitation physicians to assure its safety and suitability for postpartum women.

At the start of the first session, researchers asked subjects in the intervention group to fill out an initial (pre-program) questionnaire, which gathered subjects' demographic data as well as information on experienced levels of fatigue and depression. After participating in six classes during the 3-week maternity center stay, the researcher asked subjects to complete a final (post-program) questionnaire and presented to participants a yoga mat as an appreciation gift. A research assistant visited control group subjects at their bedside, with the initial questionnaire administered during their first week of stay at the maternity center and the final questionnaire administered just before discharge from the maternal center.

Measurements

Fatigue was measured using the Fatigue Symptom Checklist (FSC), which was first developed to measure fatigue in Japanese industrial workers (Yoshitake, 1971). The FSC and its revisions were subsequently used in the United States to measure levels of fatigue in new mothers of full-term infants (Milligan et al., 1997). It is a thirty-item scale with dichotomous (yes/no) responses and a total score range of 0 to 30. There are three subscales in FSC, include a 10-item physical fatigue subscale (items 0–10), 10-item psychological fatigue subscale (items 11–20), and 10-item fatigue symptom subscale (items 21–30). FSC scores correlate positively with level of fatigue. Milligan et al. (1997), which used FSC to measure postpartum fatigue among 285 mothers, found internal consistency to range between .82 and .95 at three time periods (immediately postpartum, during hospitalization, and 6-weeks postpartum). Construct validity was demonstrated through the positive association in all three time periods between fatigue scores and depression, multiparity, infant difficulty and reduced sleep (Milligan et al., 1997). Internal consistency of the FSC was .91 in this study, as assessed using

Cronbach's α . Demographic variables included mother's age, body weight, obstetric history, number of pregnancies, education level, work status, pattern of delivery and exercise habit.

Depression was measured using the Chinese version of the Center for Epidemiologic Studies Depression Scale (CES-D Scale), with a score of 15 or above signaling depression (Chien & Cheng, 1985). Individuals with high CES-D scores (≥ 15) were viewed as having probable postpartum depression. The CES-D contains 20 Likert's-scale items with scores ranging from 0 to 60. The CES-D was designed to assess level of depression symptoms present in a general population, with emphasis on the affective component of depressed mood. Depression symptoms, while among the considerations used in diagnosing clinical depression, may also be present to some degree in other diagnoses (including "normal") (Radloff, 1977). The CES-D has been used extensively to measure depression in postpartum women (Beeghly et al., 2002; Walker, Timmerman, Kim, & Sterling, 2002). The reliability and validity of the Chinese version of the CES-D has been demonstrated previously in a Taiwanese population (Chien & Cheng, 1985; Fu, Lee, & Chen, 2003). Based on a cut-off score of 15, sensitivity, specificity, and misclassification rates were 92.0%, 91.0%, and 8.2%, respectively, when CES-D findings were compared to cases detected by the Clinical Interview Schedule (Chien & Cheng, 1985). In this study, CES-D internal consistency was .81, as assessed by Cronbach's α .

Data Analysis

Statistical analyses were performed using SPSS 12.0 software (SPSS Inc, Chicago, Ill). Individual variables were examined by percentage, mean, and standard deviation. Bi-variable analyses were conducted using χ^2 statistics, *t*-test, and repeated measures analysis of variance. A two-tailed *p* value of $< .05$ was considered significant.

Results

Participant Characteristics

A total of 61 postpartum women (intervention group = 31, control group = 30) completed fatigue and depression questionnaires. Table 1 shows the characteristics of control and intervention groups. Mean age was 34.3 and 34.2 years, respectively, and the mean gravida was 1.73 and 1.52, respectively, for control and intervention groups. Fifteen

(50%) and 22 (71%) in control and intervention groups, respectively, were primipara. Eight (26.7%) and 14 (45.2%), respectively, received cesarean section; and 18 (60%) and 13 (41.9%), respectively, breastfed their infants exclusively. Most subjects worked (range 83–87%) outside of the home and were classified in the upper-middle and upper socioeconomic classes. Most mothers belonged to nuclear families (80% in the control group vs. 67.7% in the intervention group). Most subjects did not regularly exercise (66.7% in the control group vs. 74.2% in intervention group). There were no significant differences noted in the family patterns of these two groups. Before intervention, mothers in both groups showed mild fatigue and moderate depression.

No significant pre-intervention difference between groups was noted. As illustrated in Table 2, no significant difference was identified in fatigue and depression levels between the groups from answers given on the initial (pre-program) questionnaire.

While fatigue levels differed significantly between the two groups (fatigue $p = .048$) and over time ($p = .001$), no interaction was identified between group and time. A significant mean change in fatigue level of -3.36 (9.23 pre-program vs. 5.87 post-program) was identified in the intervention group. The mean change of -1.53 (11.40 pre-program to 9.87 post-program) identified in the control group was also significant. Level of depression did not differ significantly between the two groups ($p = .115$), although there was significant mean change over time ($p = .033$), with no interaction identified between group and time. There was a borderline significant mean change in depression level for the intervention group ($p = .06$), with a mean score change of -1.71 (14.13 pre-program to 12.42 post-program), and a significant mean score change in the control group, with a mean score change of -1.67 (16.20 pre-program to 14.53 post-program).

Comparing Fatigue Subscale Changes Within the Two Groups

The intervention group experienced significant mean changes in the three FSC subscales as follows: physical fatigue ($p < .05$), with a mean change of -1.39 ; psychological fatigue ($p < .05$); fatigue symptoms ($p < .01$), with a mean change of -1 .

The control group realized a significant change only in the FSC physical fatigue subscale ($p < .05$), with a mean change of -0.77 . No significant differences in psychological fatigue and fatigue symptoms were noted (Table 3).

Table 1.
Demographic Data for Control and Intervention Groups

Characteristics	Control group (n = 30)		Intervention group (n = 31)		t/ χ^2	p
	M ± SD	n (%)	M ± SD	n (%)		
Age (year)	34.33 ± 3.53		34.17 ± 3.20		-0.188	.852
Gravida						
1		13 (43.3)		21 (67.7)		
2		13 (43.3)		6 (19.4)	4.980	.173
3		3 (10.0)		2 (6.5)		
≥ 4		1 (3.3)		2 (6.5)		
Primipara		15 (50.0)		22 (71.0)	-1.830	.072
Education Level						
University or higher		24 (80.0)		23 (74.2)	0.291	.069
College or lower		6 (20.0)		8 (25.8)		
Work Status						
Full-time job		23 (76.7)		25 (80.6)	0.144	.710
Others		7 (23.3)		6 (19.4)		
Pattern of Delivery						
NSD		22 (73.3)		17 (54.8)	2.262	.137
C/S		8 (26.7)		14 (45.2)		
Breastfeeding						
Exclusive		18 (60.0)		13 (41.9)	1.991	.164
Mix		12 (40.0)		8 (58.1)		
Exercise						
Yes		10 (33.3)		8 (25.8)	0.415	.527
No		20 (66.7)		23 (74.2)		
Family Pattern						
Nuclear family		24 (80.0)		21 (67.7)	1.184	.284
Others		6 (20.0)		10 (32.3)		
Fatigue (pre-program)	11.40 ± 6.80		9.23 ± 6.46		-1.281	.205
Depression (pre-program)	16.20 ± 6.17		14.13 ± 5.12		-1.428	.159

Table 2.
Effect of the Intervention on Fatigue and Depression Change

Dimensions and Subscales	Control group (n = 30)		Intervention group (n = 31)		F (p)		
	Pre-program	Post-program	Pre-program	Post-program	Group	Time	Group × time
	M ± SD	M ± SD	M ± SD	M ± SD			
Fatigue							
Physical	5.00 ± 2.88	4.23 ± 3.06	3.97 ± 3.14	2.58 ± 2.54	4.060 (.048)*	10.361 (.002)**	0.860 (.358)
Psychological	3.17 ± 2.76	2.70 ± 3.14	2.35 ± 2.74	1.39 ± 1.63	3.230 (.077)	5.078 (.028)*	0.620 (.434)
Symptoms	3.23 ± 2.24	2.93 ± 2.78	2.90 ± 2.10	1.90 ± 1.70	1.743 (.192)	6.838 (.011)*	1.938 (.164)
Total scores	11.40 ± 6.80	9.87 ± 8.11	9.23 ± 6.46	5.87 ± 4.54	4.062 (.048)*	11.858 (.001)**	1.647 (.204)
Depression	16.20 ± 6.17	14.53 ± 6.94	14.13 ± 5.12	12.42 ± 5.37	2.553 (.115)	4.794 (.033)*	0.001 (.978)

*p < .05. **p < .01.

Table 3.
Comparison of Fatigue Symptom Checklist (FSC) Subscale Changes Within Two Groups

FSC subscales	Pre-program	Post-program	<i>t</i>	<i>p</i>
	<i>M ± SD</i>	<i>M ± SD</i>		
Fatigue				
Physical fatigue				
Control group	5.00 ± 2.88	4.23 ± 3.06	2.340	.026*
Intervention group	3.97 ± 3.14	2.58 ± 2.54	2.405	.023*
Psychological fatigue				
Control group	3.17 ± 2.76	2.70 ± 3.14	1.039	.307
Intervention group	2.35 ± 2.74	1.39 ± 1.63	2.147	.040*
Physical symptoms				
Control group	3.23 ± 2.24	2.93 ± 2.78	0.781	.441
Intervention group	2.90 ± 2.10	1.90 ± 1.70	3.145	.004**

p* < .05. *p* < .01.

Discussion

Postpartum exercise has been promoted, relatively unsuccessfully, to Taiwanese women primarily through handouts and booklets available in obstetric wards. “Doing-the-month,” a highly valued traditional birth recuperation strategy in Taiwan, restricts postpartum mothers to one month of bed rest and limited physical activity. Such traditional mores conflict with Western principles that encourage postpartum women to accept exercise as critical to their healthy lifestyle. As Taiwan continues to search for accommodation between the traditional and modern, it is appropriate that proven modern concepts on postpartum health be integrated into traditional care concepts. The postpartum exercise in this study represents a newly designed exercise program that incorporates yoga, Pilates and music into a “package” that should be culturally acceptable to postpartum Taiwanese mothers. Increasing urbanization and other factors are increasingly replacing the traditional custom of doing-the-month at home, with help from the mother or mother-in-law, with doing-the-month at maternity centers, assisted by trained professionals. Such changes provide a good opportunity to advocate modern exercise opinions to postpartum women.

Results indicated that the women in the intervention group did not reduce their depression significantly. Both groups decreased levels of fatigue and depression after one month of care. However, women in the control group improved only in their physical fatigue; not in their emotional fatigue or physical symptoms. Women in the inter-

vention group not only achieved a significant reduction in physical fatigue, but also in emotional fatigue and physical symptoms (Table 3). Several possible reasons that may explain these findings include: (1) women staying in the maternity center were rested and cared for by nurses, which reduced overall fatigue – especially physical fatigue. This finding is consistent with a description given by Chien et al. (2006) that doing-the-month may reduce physical and depression symptoms; (2) the low-intensity exercise program may improve emotional fatigue and physical symptoms. The significant improvement found in participant emotional status is in line with previous study results (Klotyn & Schultes, 1997). By integrating Pilates, yoga activities and music into an aerobic postpartum exercise program positively affected the mental health of perperiums (Watson, Milat, Thomas, & Currie, 2005). These results are also consistent with those achieved by exercise programs designed for women with breast cancer (Headley et al., 2004), and for sedentary women (Annesi, 2002). Significant reductions in depression were very difficult to achieve in the brief time allowed for this study. As postpartum fatigue was the predictor of postpartum depression employed in previous studies, reductions in depression are predictable once fatigue is relieved (Bozoky & Corwin, 2002; Ko, 2004). As achieving significantly reduced depression levels may require longer periods of physical intervention, a long-term exercise program should be designed and assessed in the future.

In Chinese culture, people typically describe discomfort as a problem of the physical rather than psychological



(Chen & Liu, 1995; Chien et al., 2006; Tseng & Hsu, 1969). As such, most women describe their psychological problem postpartum as “fatigue” rather than depression (Chen & Liu, 1995). Chronic fatigue without resolve is highly likely to turn into postpartum depression if not properly addressed. Although exercise may not fit into the rubric of traditional doing-the-month mores, which focus on maintaining and restoring energy levels during the postpartum period, an appropriately designed light exercise regimen may be acceptable for implementation among postpartum women. The light exercise program designed as part of this study is easy and safe, and encourages women to adopt a more active lifestyle soon after delivery. Results show that the light exercise program was not only accepted by postpartum women, but also promoted their psychological health. Further research to assess the long-term effects of exercise is still necessary.

The increasing number of women who choose to stay in maternity centers to receive total doing-the-month care and complete rest highlights the evolution away from traditional family mores. The birth rate in Taiwan has dropped significantly over the past two decades. According to the Population Reference Report Bureau (PRB), the average fertility rate in Taiwan was just 1.1 in 2006, the lowest in the world. Modern Taiwanese women seek significantly greater independence than that enjoyed by earlier generations. Our study found that more than 70% of families were nuclear. Currently, some one-quarter of postpartum Taiwanese women elect to “do the month” in a maternity center rather than at home or elsewhere (Chien et al., 2006). Good quality care provided by such centers may help relieve physical and psychological stresses because of the reduced strains and conflicts that doing-the-month traditionally causes in families. Incorporating an appropriate exercise program into maternity center care should make a center more attractive to women comparing maternity center options. In order to improve both the long-term psychological and physiological health of the mother, nurses should teach proper postpartum exercise techniques to new mothers before their discharge from the hospital.

Although quantitative data found no significant decrease in fatigue and depression between the two groups, qualitative interviews conducted during the data collection found that intervention group mothers enjoyed a feeling of relatively greater support, better sleep quality, and an abatement of constipation and lower back pain problems. Mothers participating in the exercise program had more

opportunity to interact with others and share breastfeeding and personal experiences, which helped them better adjust to their new role as a mother.

Conclusions

Results indicated that levels of fatigue and depression do not differ significantly between the two groups. However, scores for the intervention group improved in terms of psychological fatigue and physical symptoms, as compared with the control group. This low-intensity postpartum exercise program is viable for application in practice.

Study Limitations

Exercise effectiveness requires longitudinal follow up. The time period of this study was only two months, and the small sample size did not permit a broad-based assessment of statistically significant differences. The randomized trial, while an important design, was very difficult to implement in the practical setting of this study.

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坐月子期間執行產後運動對改善 產婦疲憊和憂鬱感之成效

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摘要：本研究目的在探討於坐月子中心運動介入對產婦疲憊與憂鬱之影響，採用類實驗設計，實驗組 31 位，控制組 30 位產婦。實驗組接受低衝擊之有氧運動介入方案六次，而控制組只接受一般常規的產後運動衛教，並於產後第 1 週與第 4 週各以疲勞症狀檢核表 (Fatigue Symptom Checklist, FSC) 與憂鬱傾向量表 (Center for Epidemiological Studies Depression, CESD) 測量其疲憊與憂鬱。結果顯示：有氧運動介入組比控制組產婦在產後第 4 週，其身體疲憊、心理疲憊與疲憊症狀都有顯著減輕，但在憂鬱方面兩組無顯著差異。坐月子期間護理人員可提供低衝擊有氧運動以協助產婦減輕疲憊感。

關鍵詞：產後運動、疲憊、憂鬱、坐月子中心、台灣婦女。

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