Chinese women's health and wellbeing in middle life: Unpacking the influence of menopause, lifestyle activities and social participation

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Highlights

- Factor analysis of 16 menopausal symptom items yielded four dimensions of Chinese perimenopausal women's health.
- The four dimensions were named 'negative mood', 'positive emotions', 'musculoskeletal pain', and 'sleep and memory problems'.
- Musculoskeletal pain, as well as sleep and memory problems, were positively associated with menopausal biological factors.
- Keeping socially active and engaged contributes to wellbeing.

Abstract

Objectives: To examine Chinese middle-aged women's health and wellbeing and the associated biosocial correlates.

Study design: This study used a cross-sectional design, including selected retrospectively collected information on the final menstrual period, drawn from the 2013 wave of the China Health and Retirement Longitudinal Study (CHARLS). Women aged 45 to 59 were selected.

Main outcome measures: Factor analysis of 16 menopausal symptom ratings yielded four different and independent measures of pre/peri and early postmenopausal women's health, namely: negative mood (feel frustrated, sad, lonely, worried, bored, angry, tired and stressed), positive emotions (feel enthusiastic, content and happy), musculoskeletal pain (shoulder neck pain, knee and other joint pain, and back pain), and sleeping and memory problems (trouble sleep and poor memory).

Results: Menopausal status was positively associated with sleeping and memory problems, whilst the number of years around a woman's final menstruation was positively associated with musculoskeletal pain. In contrast, lifestyle activities and social participation link to positive emotions. The association between selected biosocial factors and negative mood was not significant after controlling for other demographic and social background factors.

Conclusions: Musculoskeletal health as well as sleeping and memory problems are positively associated with menopausal biological factors amongst Chinese mid-life women. Keeping active social engagement patterns contributes to positive wellbeing among middle-aged women.

Keywords: menopause, health, wellbeing, lifestyle activities, social participation, China Health and Retirement Longitudinal Study

1. Introduction

In 2010, there were over 130 million women aged 45 to 59 in China [1]. Women's midlife represents a critical life stage encompassing a range of physiological and psychosocial changes that require adaptions to optimize health and functioning [2]. However, the overall health and wellbeing of midlife women has received relatively little attention in many Low and Middle-Income Countries [3], including in China.

The majority of mid-life women experience some menopausal symptoms, such as hot flushes, night sweats, difficulty sleeping, fatigue, memory problems, depressed mood and decreased sexual desire [4, 5]. The menopause often occurs in parallel alongside other psychosocial changes during midlife, therefore, menopausal symptoms might be the result of the shared influences of biological, psychological, and interpersonal factors, and the social context, and the dynamics between these domains [6, 7]. Within the literature, the intensity of 'menopausal symptoms' has been found to vary according to the menopausal stage, perceived meaning of, and attitudes towards, menopause, socioeconomic and demographic variables, lifestyles, as well as roles and stressful life events [6, 8–13].

Much of the earlier research into menopause has used small clinical samples and has focused on the negative aspects of aging [5]. Most population-based studies have mainly focused on western countries [14], and less research has been conducted in developing countries. This study aims to examine Chinese women's health and wellbeing during pre/peri and early postmenopausal period, and the associated biosocial correlates, particularly menopausal stage, lifestyle activities and social participation.

2. Methods

2.1 Data and sample

This study uses data from the China Health and Retirement Longitudinal Study (CHARLS), a nationally representative population-based longitudinal study conducted by the National School of Development at Peking University. The CHARLS has been conducted nationwide every two years from 2011–2012, covering 28 out of 31 provinces, 150 districts/counties and 450 communities/villages [15]. Signed informed consent is obtained from all participants by the CHARLS survey team before the data are collected. The response rate of Wave 2011–2012 was 80.5%, and amongst 91.0% of respondents were participated in the Wave 2013 [15, 16]. The wave 2013 of CHARLS was used for this particular study because some menopause-related information such as the respondents' mood was available only from this wave.

The inclusion criteria of the analytical sample were women, aged 45-59 years and during pre/peri and early postmenopausal period. The exclusion criteria were respondents who had

undergone chemotherapy for any cancer treatment (22 women). Women with other chronic diseases such as arthritis or rheumatism, stomach or other digestive diseases, hypertension and heart problem were not excluded. The final study sample size was 4,803.

2.2. Measures

The CHARLS collects information on a range of indicators of health and well-being (**Table 1**). Factor analysis based on principal component analysis (PCA) not using any rotation procedure was performed on the 16 self-reported signs of menopause (symptoms). All factors in the structure had eigenvalues of at least 1. Variables with a loading of 0.50 or higher were retained in the factor structure. Symptom dimensions were calculated based on factor scores of items with significant loading on each factor. This method revealed four domains of women's mid-life health and wellbeing: negative mood (feel frustrated, sad, lonely, worried, bored, angry, tired and stressed), positive emotions (feel enthusiastic, content and happy), musculoskeletal pain (shoulder neck pain, knee and other joint pain, and back pain), and sleeping and memory problems (trouble sleep and poor memory) (**Table 1**). The factor scores [17] were saved as four dependent variables for multiple regression analysis, with a higher score indicating more severe in this dimension. It should be noted that the CHARLS dataset lacks information about some other commonly reported and relevant symptoms used in international studies of midlife women's health, such as hot flushes, night sweats, sexual desire and urogenital symptoms.

A range of independent variables were constructed. In order to capture biological factors, the independent variables included self-reported menopause status and years around the final menstrual period. Menopause status had two categories. Respondents who reported that they reached menopause defined as post-menopause and coded as 1; and those who not yet reached menopause defined as pre-menopause and coded as 0. The years around the final menstrual period were measured as continues variable by the number of interval years between the last menstruation and the year of 2013 (the survey year). For those women who had not stopped menstruating, this variable used a proxy estimate as to the respondents' age minus the sample mean age of menopause (49 years old). For instance, if the respondent's age was 45 years and the woman reported that she was still menstruating, the years around the final menstrual period was 45-49 = -4 years. Respondents aged over 49 years but not yet reached menopause, the years around the final menstrual period proxied to -1 year.

Social factors included lifestyle activities and social participation, reflected by participation in social activities and providing informal care to a family member respectively. A summary measure of social activity participation was calculated as the sum of self-reported participation in ten listed social activities during the last month. These included interacting with friends, playing Ma-jong/chess/cards or going to the community club, going to a sport, social, or other kinds of a club, taking part in a community-related organization, attending an educational or training course, using the

internet and others. Providing informal care to a family member was coded as 1 if the respondent had provided any care to their parents/parents-in-law or to grandchildren in the past year; and if no informal care had been provided, the respondent was coded as 0. Other control variables included the respondents' socio-demographic background, behaviour variables and health status.

The mean age of respondents was 52.0 (SD=4.3). 63.5% of Chinese women aged 45-59 had reached their menopause. Amongst postmenopausal women, the reported mean age of menopause was 48.5 (SD=4.9). Lifestyle activities and social participation data show that 60.0% of women had participated in at least one activity last month, with interacting with friends mostly reported (42.6%), followed by playing Ma-Jong/Cards (20.1%). The prevalence of each lifestyle activities and social participation presented in Appendix Table 1. More than half of the sample had provided care either to their parents, or their parents-in-law, or both (Table 2). Other socio-demographic characteristics show that 93.7% were currently married and nearly all respondents had at least one child. Nearly half of the respondents were engaged in agricultural work, one-quarter was engaged in non-agricultural work and another quarter had already retired. Only 5% of the respondents had ever smoked, and 35% had at least 10 minutes of exercise (light, moderate or vigorous) every week (Appendix Table 2).

2.3 Analysis

Multiple regression analyses were then performed to assess the independent variables that were associated with each of factor scores, reflecting one of the four summary dimensions of women's health and wellbeing in mid-life. Each dimension was analysed separately.

3. Results

Table 2 shows the mean scores for each of the composite health outcomes compared between subgroups with different biosocial characteristics. One-way analysis of variance showed that there was a difference between menopausal status groups. Those women who were post-menopausal scored higher on negative mood symptoms, musculoskeletal pain, and sleeping and memory problems than their pre-menopausal counterparts. The scores were also compared between the four groups of women according to the number of years since their last period. The analysis showed that there were significant overall differences between the four groups in terms of negative mood, musculoskeletal pain, and sleeping and memory problems. In order to compare the group means, we performed post hoc tests. The results provided further indication that even before the menopause, the closer women were to the menopause, the higher the score of musculoskeletal pain (Appendix Table 3). Moreover, social activities were associated with all four symptom dimensions, while care provision towards one's parents/ parents-in-law was related to positive emotions and to sleeping and memory problems.

Multiple regression analyses were performed to assess the covariation with biosocial variables which would help to explain the symptom dimensions after controlling for other demographic and

social background factors. Table 3 shows the results of the multiple regression analyses for each dimension of the respondents' mid-life health. The association between selected biosocial factors and the negative mood was explained away after taking into consideration other demographic and social characteristics, such as marital status, the number of chronic conditions and health problems limiting one's work. Positive emotions were significantly associated with social activities participation and providing informal care to a family member. Musculoskeletal pain was significantly associated with the number of years since the final menstrual period. Sleeping and memory problems were associated only with menopause status.

4. Discussion

Using a nationally representative sample, we examined the association between Chinese middle-aged women's health and wellbeing and selected biosocial correlates, including the respondents' menopausal stage, lifestyle activities and social participation. The factor analysis of the signs of menopause yielded very clear-cut results regarding the factor structure. The interpretation of these factors, including a positive dimension, is in broad agreement with findings from other research [14]. Barth Olofsson and Collins (2000), for instance, identified ten independent factors among Swedish perimenopausal women, including negative mood, memory problems, sleep-related symptoms, musculoskeletal pain, vaginal dryness, urogenital problems, vasomotor symptoms, decreased sexual desire vitality and increased sexual desire.

Findings from the present study confirm that biosocial factors contribute to different aspects of menopausal symptoms experienced by mid-life women. First, musculoskeletal pain was associated with the menopausal stage, and appeared even before the menopause. In the literature, joint pain and other musculoskeletal symptoms are common complaints among women during pre/peri and early postmenopausal period [18, 19]. This is probably due to the decrease in oestrogen levels. Oestrogen is thought to attenuate inflammation and promote cartilage turnover. It also contributes to muscle mass and strength [20]. Moreover, oestrogen and testosterone both reduce pain, activating inhibitory pain pathways. The relatively lower level of sex hormones may accelerate the spine and other joints degeneration, which causes back pain and other musculoskeletal pain among middle-aged women [21].

Second, sleeping and memory problems were associated only with the respondents' menopause status. Research to date has suggested that oestrogen itself may have a direct sleep effect [22]; and the effects of oestrogen on the structure and function of brain regions which are central to memory may explain the deterioration in memory in some menopausal women [23]. Nevertheless, some studies also found that the primary predictor of disturbed sleep is the presence of vasomotor symptoms such as hot flushes and night sweats [4]. Unfortunately, this study couldn't include these confounders due to the data restriction.

Lastly, in line with earlier studies [24], the physiological aspects of menopause were not associated directly with the respondents' negative moods or positive emotions. During the pre/peri and early postmenopausal period, mood or emotions are more likely to be the result of the interaction of oestrogen imbalance and many life and environmental factors, such as stress, life events, relationship issues, or women's changing roles with children becoming independent [5, 23]. Previous studies have found a negative attitude towards menopause, and stress in life was associated with individuals' negative mood [14]; self-compassion and feeling in control of one's menopause was more strongly linked to women's overall wellbeing than their menopausal stage [25]. Future studies should include these menopause-related attitudes as confounding factors. Interestingly, the present study found that for middle-aged Chinese women, positive emotions were better explained by social engagement, such as lifestyle activities and providing informal care to family members. Although it is well established in the literature that social engagement, i.e. women's involvement in meaningful activities and maintaining close relationships, benefits health and successful ageing among older people [26], relatively little is known about how this operates among middle-aged individuals. One plausible explanation is that a well-established social network may positively influence how women are able to adapt to the many changes occurring in the menopausal years. Moreover, the provision of informal care to family members in need of care is a critical and common social role for middle-aged Chinese women 'sandwiched' between older and younger generations [27]. Such support may enhance the good quality of family relationships [28] and, in turn, promote wellbeing through increased self-esteem, which involves more positive views of oneself [29].

A number of limitations should be considered when interpreting our study results. As this is based on a cross-sectional sample, no causal links can be inferred between the selected biosocial factors and self-reported signs of menopause. Future studies require prospective observations (a cohort study) on a large number of respondents followed during the pre, peri, and post-menopausal periods to estimate the trajectories on variables of interest in order to distinguish better between the effects of time-varying social attributes and those of the menopause. Moreover, the CHARLS lacks information on a number of common menopausal related symptoms such as hot flushes and night sweats. According to a recent survey in Shanghai, China [11], a small group of women experienced urogenital symptoms and sexual dysfunction problems, and up to one third had hot flushes and night sweating. Lastly, the CHARLS does not contain information on whether respondents were taking Hormone Replacement Treatment (HRT) or other healthcare treatments such as traditional Chinese medicine [30] to manage the menopausal symptoms, which may cause some bias. From the literature, though HRT usage is limited among the majority middle-aged Chinese women [31–32], some symptomatic women do seek alternative healthcare including traditional Chinese medicine. The community-based survey in Shanghai city [11] shows that one-quarter of the women with menopausal symptoms sought healthcare services, amongst, 3.8% received HRT, and 43.6% were prescribed

traditional Chinese medicine, though they did not necessarily visit menopausal clinics but other hospital departments.

Notwithstanding these limitations, the study provides important first insights into the role of the menopause and social participation in influencing the mental and physical health and well-being of 130 million Chinese women in mid-life. Results highlight that the transition to menopause is a complex physiological process, often accompanied by the additional effects of changing social roles. Improved understanding of the menopausal transition, its symptoms, and biosocial attributes would support better awareness and knowledge amongst middle-aged Chinese women, permitting an early identification and management of the menopausal symptoms.

Table 1. Factor loading for each item, based on factor analysis of 16 common self-reported signs of menopause .

Factor dimension	Factor loading
Negative mood (Yesterday)	
Feel frustrated	0.70
Feel sad	0.72
Feel lonely	0.65
Feel worried	0.69
Feel bored	0.59
Feel angry	0.63
Feel tired	0.59
Feel stressed	0.59
Positive emotions (Yesterday)	
Feel enthusiastic	0.62
Feel content	0.79
Feel happy	0.77
Musculoskeletal pain (Yesterday)	
Shoulder neck pain	0.65
Knee and other joint pain	0.62
Back pain	0.59
Sleeping and memory problems (Last week)	
Trouble sleep	0.56
Poor self-rated memory	0.74

Source: Authors' own analysis, China Health and Retirement Longitudinal Study (CHARLS Wave 2013). N= 4803.

Table 2. Means of symptom dimensions by biosocial factors.

	Negative mood	Positive emotions	Musculoskeletal pain	Sleeping and memory problems
Menopausal status	*******	**NS**	*****	*******
Premenopause	-0.069	-0.029	-0.047	-0.087
Postmenopause	0.039	0.017	0.026	0.049
Years around final menstrual period	******	**NS**	******	*******
Two or more years before menopause	-0.075	-0.064	-0.110	-0.082
1 year before menopause	-0.056	-0.012	-0.009	-0.088
3 years after menopause	0.026	0.033	-0.011	0.057
4+ years after menopause	0.046	0.010	0.056	0.048
Social activities	***	***	**	***
No	0.410	-0.144	0.045	-0.006
1 activity	0.032	0.069	0.008	0.037
2 activities	-0.046	0.099	-0.037	0.021
3 activities	-0.159	0.248	-0.147	-0.016
4+ activities	-0.252	0.176	-0.152	-0.306
Providing informal care to a family member	**NS**	*******	**NS**	*****
No	0.002	-0.064	0.032	-0.026
Care for either older parent or grandchild	0.005	0.044	-0.034	0.040
Care for both	-0.062	0.156	0.018	-0.116

***p<0.001,**p<0.01,*p<0.05, NS (not significant) p>0.05.
Source: Authors' own analysis, China Health and Retirement Longitudinal Study (CHARLS Wave 2013).
N= 4803.

Table 3. Multiple regression analyses of symptom dimensions

	Negative mood		Positive emotions		Musculoskeletal pain		Sleeping and memory problems	
	β	P Value	β	P Value	β	P Value	β	P Value
Menopausal status								
Premenopause (ref)								
Postmenopause	0.04	0.270	<-0.001	0.978	-0.03	0.537	0.10	**0.013**
Years around final menstrual period	<0.001	0.354	<-0.001	0.601	0.01	**0.023**	<-0.01	0.558
Social activities								
No (ref)								
1 activity	0.01	0.756	0.22	**<0.001**	-0.03	0.356	0.06	0.108
2 activities	-0.04	0.335	0.26	**<0.001**	-0.08	**0.049**	0.09	0.073
3 activities	-0.08	0.165	0.43	**<0.001**	-0.18	**0.004**	0.10	0.134
4+ activities	-0.11	0.180	0.39	**<0.001**	-0.20	**0.016**	-0.09	0.160
Providing informal care to a family member								
No (ref)								
Care for either older parent or grandchild	-0.02	0.591	0.09	**0.002**	-0.08	**0.008**	0.03	0.195
Care for both	-0.06	0.334	0.19	**0.003**	-0.01	0.909	-0.11	0.060

Note: All four multiple regression models were controlling for age, marital status, education, working status, residence, number of children, living with children or nearby, smoking, exercise, health problem limit work and number of chronic conditions.
Source: Authors' own analysis, China Health and Retirement Longitudinal Study (CHARLS Wave 2013).
N= 4803.

Appendix Table 1 The prevalence of lifestyle activities and social participation.

	Percentage (sample weights applied)	Number of respondents
Interacted with friends	42.6	2007
Played Ma-Jong, Chess, Cards	20.1	939
Provided help to family, friends or neighbours who do not live with you and who did not pay you for the help	15.7	753
Went to a sport, social or other kind of club	12.8	533
Took part in a community-related organization	2.5	87
Done voluntary or charity work	1.7	50
Cared for a sick or disabled adult who does not live with you and who did not pay you for the help	2.2	103
Attended an educational or training course	0.5	23
Stock investment	1.7	33
Used the internet	8.6	254

Source: Authors' own analysis, China Health and Retirement Longitudinal Study (CHARLS Wave 2013). N= 4803.

Appendix Table 2 Sociodemographic background and health behaviour of the respondents.

Characteristics	Percentage (sample weights applied)	Number of respondents
Total	100.0	4803
Age		
45-49	35.4	1635
50-54	30.7	1459
55-59	33.9	1709
Marital status		
Married and live together	85.9	4122
Married not live together	7.6	385
Not married	6.5	296
Education		
Less than lower secondary	83.8	4167
Upper secondary and vocational training	13.6	573
Tertiary	2.6	63
Type of work		
Agricultural work	43.7	2414
Non-agricultural work	27.3	1126
Retried	25.0	1090
Unknown	4.0	173
Number of children		
1 child	30.0	1203
2 more children	68.3	3529
No children	1.7	71
Whether live close to at least one child		
No	16.2	788
Yes	83.8	4015
Residence		
Urban	49.1	1955
Rural	50.9	2848
Smoke		
Never smoke	94.7	4507
Ever smoke	5.3	296
Exercise		
No exercise	65.0	3144
Light exercise	8.6	379
Moderate exercise	13.7	641
Vigorous exercise	12.8	639
Long-lasting illness		
No	75.8	3525
Yes	24.2	1278
Chronic illness		
None	52.2	2361
1	23.4	1141
2	13.3	698
3	6.6	355
4	4.5	248

Source: Authors' own analysis, China Health and Retirement Longitudinal Study (CHARLS Wave 2013). N= 4803.

Appendix Table 3. Multiple comparaisons table

Test	Mean difference	P-value
Negative mood		
Two or more years before menopause vs. 1 year before menopause	-0.019	0.699
Two or more years before menopause vs. 3 years after menopause	-0.100	0.035
Two or more years before menopause vs. 4+ years after menopause	-0.121	0.007
1 year before menopause vs. 3 years after menopause	-0.082	0.050
1 year before menopause vs. 4+ years after menopause	-0.102	0.008
3 years after menopause vs. 4+ years after menopause	-0.021	0.577
Positive emotions		
Two or more years before menopause vs. 1 year before menopause	-0.052	0.282
Two or more years before menopause vs. 3 years after menopause	-0.097	0.040
Two or more years before menopause vs. 4+ years after menopause	-0.075	0.093
1 year before menopause vs. 3 years after menopause	-0.045	0.276
1 year before menopause vs. 4+ years after menopause	-0.023	0.552
3 years after menopause vs. 4+ years after menopause	0.023	0.543
Musculoskeletal pain		
Two or more years before menopause vs. 1 year before menopause	-0.101	0.037
Two or more years before menopause vs. 3 years after menopause	-0.099	0.038
Two or more years before menopause vs. 4+ years after menopause	-0.166	<0.001
1 year before menopause vs. 3 years after menopause	0.002	0.960
1 year before menopause vs. 4+ years after menopause	-0.65	0.090
3 years after menopause vs. 4+ years after menopause	-0.067	0.071
Sleeping and memory problems		
Two or more years before menopause vs. 1 year before menopause	0.006	0.904
Two or more years before menopause vs. 3 years after menopause	-0.139	0.003
Two or more years before menopause vs. 4+ years after menopause	-0.130	0.003
1 year before menopause vs. 3 years after menopause	-0.145	<0.001
1 year before menopause vs. 4+ years after menopause	-0.136	<0.001
3 years after menopause vs. 4+ years after menopause	0.009	0.804

Source: Authors' own analysis, China Health and Retirement Longitudinal Study (CHARLS Wave 2013). N= 4803.

Contributors

All authors made substantial contributions to the design and conduct of the study, the statistical analysis, and drafting the manuscript. All authors commented on drafts and approved the final version of this paper.

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Data Statement

Due to the sensitive feature of the questions asked in this study, respondents were assured raw data would remain confidential and would not be shared.

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