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Longitudinal Study on the Characteristics of Traditional Chinese Medicine (TCM) Constitutions and Related Influencing Factors in Women in Hong Kong

Li Guo[1], Yanhua He[2], Youzhi Sun[2,3], Jessie Suet Mui Chan[2], Jieshu You[2], Lei Jia[2], Qi Wang[4], Kumar Ganesan[2], Jianping Chen[1,2,5*]

[1] The Second Affiliated Hospital of Guangzhou University of Traditional Chinese Medicine, Haizhu, Guangzhou, Guangdong Province, China.
[2] School of Chinese Medicine, LKS Faculty of Medicine, The University of Hong Kong, 10 Sassoon Road, Hong Kong.
[3] School of Basic Medical Sciences, Jiangxi University of Traditional Chinese Medicine, Nanchang, China.
[4] National Institute of Traditional Chinese Medicine Constitution, School of Basic Medical Sciences, Beijing University of Chinese Medicine, Beijing, China.
[5] Hong Kong Breast Cancer Association of Traditional Chinese Medicine, Hong Kong.

*E-mail ✉ abchen@hku.hk

Abstract

Traditional Chinese Medicine Constitution (TCMC) provides valuable insights into an individual's physical, mental, and overall health profile. Gaining a deeper understanding of TCMC types and their influencing factors may help promote health and prevent disease. While previous cross-sectional studies have identified common characteristics of TCMC and their associated factors, there remains a lack of longitudinal research tracking these changes over time. This follow-up study aimed to investigate how TCMC types evolve and identify the factors influencing their development from baseline to a 4-year follow-up. A cohort of Chinese women in Hong Kong participated in the study, with their TCMC profiles and associated variables assessed at both time points. Of the 249 participants, 81.5% had unbalanced constitutions. Most of the unbalanced constitution types showed a significant increase over time. Stepwise logistic regression showed that poor health conditions (OR = 1.37–2.56), negative effects on body-mind health (OR = 2.70–4.06), and negative emotions (OR = 2.57) were positively associated with specific types of unbalanced TCMC. Conversely, advancing age (OR = 0.91–0.93), consistent physical activity (OR = 0.71), habitual use of TCM practices (OR = 0.12), and menopause (OR = 0.37–0.39) were negatively associated with some types of unbalanced constitution. These findings suggest that various factors can contribute to imbalances in TCMC, while regular exercise and habitual use of TCM practices may help maintain a balanced constitution.

Keywords: Traditional Chinese Medicine Constitution, Influencing factors, Chinese women, Longitudinal study

Introduction

The original theory of the Traditional Chinese Medicine Constitution (TCMC) is rooted in *The Yellow Emperor's Inner Classic*. TCMC describes an individual's comprehensive and dynamic state, encompassing physical appearance, physiological functions, and psychological traits, shaped by both innate qualities and life experiences [1, 2].

According to this theory, constitutions are generally categorized into two main types: the balanced constitution, known as the *Normality constitution*, and the unbalanced (or biased) constitution. The unbalanced types are further classified into specific subtypes, including Yang-deficiency, Yin-deficiency (ND), phlegm-wetness (PW), qi-deficiency (QDF), wetness-heat, blood-stasis (BS), and qi-depressed (QDP) [2–4].

While TCMC is largely shaped by congenital factors, it is also significantly influenced by acquired elements such as lifestyle, diet, emotional well-being, disease history, and environmental conditions. Although TCMC types tend to remain relatively stable, they are also adjustable—particularly under the influence of acquired factors over time [5–7].

From a TCM perspective, individuals with unbalanced constitutions are considered more prone to developing certain diseases compared to those with balanced constitutions. This association has been supported by several studies [8–10]. Therefore, understanding TCMC and its influencing factors is essential for guiding health promotion and disease prevention.

To date, many cross-sectional studies have examined the distribution and influencing factors of TCMC in Chinese adults at a single point in time [10–13]. However, longitudinal research in this area is limited. A more in-depth investigation is needed to explore how TCMC characteristics and influencing factors evolve, especially to prevent and manage unbalanced constitutions.

In 2012–2013, a cross-sectional study of 944 Chinese women in Hong Kong identified the distribution of TCMC types and their associated factors [14]. The present follow-up study builds upon that work, aiming to:
1. Investigate changes in participants' health status, socio-demographic background, lifestyle, and TCMC types over 4 years;
2. Examine and predict the key factors that contribute to changes in TCMC types over time.

This longitudinal analysis provides scientific evidence to support the role of TCMC theory in promoting health and preventing disease.

Materials and Methods

Participants

This follow-up study was based on an original cohort of 944 local women in Hong Kong who participated in a baseline survey. Over a 4-year interval, we were able to reconnect with 785 individuals (IRB reference: UW12-010). However, only 249 women completed the full follow-up questionnaire, resulting in a 59.0% response rate.

Loss to follow-up was primarily due to reasons such as invalid or outdated contact details, participants having relocated abroad, or call blocking. Importantly, those who completed the follow-up and those who did not were

largely comparable in terms of age, marital status, occupation, reproductive history, and menopausal status. The only statistically significant difference was found in educational attainment, with follow-up participants tending to have higher education levels (P < 0.05).

Ethics Approval and Consent

The study protocol received ethical approval from the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (IRB No. UW 16-236). All study activities were conducted following the principles of the Declaration of Helsinki (1964) and its subsequent revisions. Informed consent was obtained from all participants before data collection.

Data Collection Procedures

To ensure consistency with the original baseline survey [14], we implemented standardized protocols. Participants were invited via email, phone, SMS, and WhatsApp, and provided consent through an online form. The follow-up questionnaire was administered both online and in written form, depending on participant preference.

Each returned questionnaire was reviewed for completeness, and any missing data were clarified via follow-up phone calls to minimize information gaps.

Measurement Tools

The follow-up survey instrument was adapted from the earlier study [14], itself modified from the original validated version [15]. This updated version included newly collected socio-demographic information and variables potentially influencing changes in TCMC type. To assess instrument reliability, both digital and paper formats of the questionnaire were tested and validated before data collection.

Statistical Analysis

Data analysis was performed using SPSS version 19.0. Consistent with the baseline study methodology [14], statistical tests included:
• Student's t-tests
• Chi-square tests
• One-way ANOVA
• Two-sample t-tests

These were used to compare demographic and baseline variables between those who participated in the follow-up and those who did not. Variables with p-values less

than 0.25 were entered into stepwise logistic regression models to identify significant predictors of changes in TCMC types over the follow-up period.

Results and Discussion

Follow-Up Rate and Participant Characteristics

Out of 944 individuals surveyed at baseline, 785 were reachable after four years. We were unable to contact 169 women, largely due to incorrect phone numbers, international relocation, or call filtering. Among those contacted, 422 expressed willingness to participate, and 249 ultimately completed the questionnaire, yielding a response rate of 59.0% (see **Figure 1a**).

Table 1 summarizes the baseline characteristics of both the follow-up group (n = 249) and those who did not complete the follow-up. The two groups were statistically similar in terms of age, occupation, marital status, reproductive history, and menopausal status (P > 0.05). The only significant variation was in education level, with follow-up respondents showing a higher proportion of university-educated individuals compared to non-respondents (P < 0.05).

Table 1. Comparison of characteristics of baseline and follow-up between the women who participated and those who did not participate in the follow-up study.

Characteristic	Baseline Participants (n = 249) N (%)	Non-Participants (n = 695) N (%)	*P*-values [a]	Follow-up Participants (n = 249) N (%)	*P*-values [b]
[Ψ] **Mean age (years (SD))**	49.21 ± 7.71	49.62±8.46[Ψ]		53.21 ± 7.71	
30-44	43 (17.27%)	91 (13.09%)		33 (13.67%)	
45-59	158 (63.05%)	415 (59.71%)	0.437	165 (66.27%)	0.050
60-65	28 (11.26%)	106 (15.25%)		26 (10.44 %)	
> 65	21 (8.43%)	83 (11.94%)		24 (9.64%)	
Educational level					
PS	4 (1.61%)	56 (8.06%)		N/A	N/A
LS	32 (12.85%)	149 (21.44%)			
US/SS	103 (41.36%)	256 (36.83%)	< 0.001		
UG/SD	74 (29.72%)	148 (21.29%)			
PG	36 (14.46%)	75 (10.79%)			
State of health					
Good	93 (37.35%)	243 (34.96%)	0.216	82 (32.93%)	0.050
Poor	156 (62.65%)	452 (65.04%)		167 (67.07%)	
Emotional status					
Happy	84 (33.73%)	264 (37.9%)		70 (28.57%)	
Unhappy	36 (14.46%)	63 (9.07%)	0.906	25 (10.00%)	0.001
Ordinary	95 (38.15%)	248 (35.68%)		114 (45.45%)	
Blank	34 (13.65%)	110 (15.83%)		32 (12.85%)	
Occupation					
Full-time working	146 (59.62%)	359 (51.62%)		125 (50.20%)	
Part-time working	26 (10.44%)	64 (9.21%)	0.097	11 (4.41%)	0.001
Housewife/no working	77 (30.93%)	268 (38.56%)		111 (44.58%)	
Marital status					
Never married	55 (22.08%)	136 (19.56%)		47 (18.88%)	
Married/committed	167 (67.07%)	485 (69.78%)	0.437	168 (67.47%)	0.491
Divorced/widowed	27 (10.84%)	73 (10.50%)		34 (13.84%)	
Reproductive history					
Never	85 (34.14%)	204 (29.35%)	0.160	69 (27.71%)	0.124
Yes	164 (65.86%)	491 (70.64%)		180 (72.29%)	
Menopause status					
Yes	111 (44.57%)	328 (47.19%)	0.478	184 (73.89%)	0.001
No	138 (55.42%)	367 (52.81%)		65 (26.10%)	
[c] **Exercise regular**					
Yes	127 (51.00%)	360 (51.80%)	0.786	160 (64.30%)	0.003
No	122 (49.00%)	335 (48.20%)		61 (24.50%)	

Note: *P*-values are from student's T-tests (*P* < 0.05) (age) and chi-square tests (P < 0.05) for education, state of health, occupation, marital status, reproductive history, and menopausal status; all tests are two-sided; data marked with $^\Psi$ are presented as mean (standard deviation) and the others are presented as frequency (%); [a] comparison of baseline characteristics between those women who participated and those who did not participate; [b] comparison of characteristics of baseline and follow-up among those women participated; [c] definition for regular exercise was those had exercised at least once per week with total time over 60 minutes.
Abbreviations: PS: primary school or below; LS: lower secondary; US/SS: upper secondary/specialized secondary; UG/SD: undergraduate/sub-degree course; PG: postgraduate or above.

Changes in General Health and Lifestyle Characteristics

Table 1 presents the longitudinal comparison of general health and lifestyle characteristics between the baseline and the follow-up assessments. Overall, participants reported a decline in perceived general health, with the proportion of individuals describing their health as "good" decreasing from 37.35% to 32.93% over the 4 years [14].

In contrast, emotional well-being showed signs of improvement. The percentage of participants reporting an "unhappy" emotional state declined from 14.46% to 10.00%, while those reporting a "neutral" or "ordinary" emotional status increased from 38.15% to 45.45%.

A noticeable shift was also seen in employment status: the proportion of housewives or retirees increased from 30.93% at baseline to 44.58% at follow-up. Additionally,

29.32% (n = 73) of the participants transitioned into menopause during the study period.

Engagement in regular physical activity also improved, with 64.3% of participants reporting consistent exercise habits at follow-up—an increase from 51.00% at baseline.

As part of the study, all participants received individualized reports, which included their diagnosed TCMC type and personalized TCM dietary recommendations. **Table 2** summarizes the adherence to these lifestyle suggestions. Despite receiving guidance, 75.10% of participants did not follow the recommended TCM diet plan. Only 16.47% adhered to it for approximately two years.

Furthermore, 94 participants (37.75%) reported regular use of TCM-based regimens during the follow-up period, although 68.09% of them used such treatments less than once per week.

Table 2. Lifestyle characteristics with a 4-year interval at follow-up (n = 249)

Items	Follow-up N (%)
$^\Psi$ **Follow to TCM regimen diet to improve health**	
Yes	41 (16.47%)
No	187 (75.10%)
Blank	21 (8.43%)
Follow to diet regimen duration	
Yes (0.5 -2 years)	24 (9.64%)
Yes (2 -4 years)	17 (6.83%)
No	187 (75.10%)
Blank	21 (8.43%)
[a] **Usage TCM habit**	
Yes	94 (37.75%)
No	133 (53.41%)
Blank	22 (8.84%)
Using TCM duration	
≥ 7/week	4 (4.26%)
3~6/week	13 (13.83%)
1-2/week	13 (13.83%)
≤ 1week	64 (68.09%)

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Ψ All the participants had an assessment report which included diagnosed TCMC types and diet regimens of TCM to improve their health or adjust their unbalanced TCMC type individuals, here were those who self-reported and followed this diet regimen.
ᵃ Definition for using TCM habits included those who took Chinese herbal prescriptions or received Chinses acupressure massage regularly or before, with a duration from less than once a week to one time per day.

Diagnoses and Changes in the Distribution of TCMC Types

Table 3 displays the distribution and longitudinal changes in Traditional Chinese Medicine Constitution (TCMC) types among the 249 participants. Over the 4 years, the proportion of individuals with a normality (balanced) constitution declined from 21.7% to 18.5%, while the prevalence of unbalanced constitutions increased from 78.3% to 81.5%.

Among the unbalanced types, qi-deficiency (QDF), phlegm-dampness (PD), and phlegm-wetness (PW) remained the most common both at baseline and follow-up, with frequencies of 51.8%, 45.4%, and 38.6%, respectively. Notably, several constitution types demonstrated a marked increase during follow-up: Yin deficiency (ND) rose from 28.1% to 37.6%, blood-stasis (BS) from 32.5% to 36.5%, and qi-depressed (QDP) from 30.5% to 34.5%.

Certain constitution types exhibited strong consistency over time. For example, individuals who initially exhibited QDF, PD, PW, or QDP types retained the same classification in 76.57%, 75.70%, 70.45%, and 75.00% of cases, respectively.

The transition between constitution types was observed. Approximately 30 participants with a Normality constitution at baseline developed unbalanced TCMCs at follow-up, while 24 participants with unbalanced types at baseline transitioned to a normality constitution (**Figure 1b**).

The complexity of unbalanced constitutions also changed over time. The proportion of individuals with 1–2 unbalanced TCMC types decreased from 30.9% to 26.9%, whereas those with 3–6 concurrent unbalanced types increased from 47.4% to 58.2%.

To better understand co-occurring unbalanced constitutions, association rule mining was applied (Table 4). The most frequently coexisting unbalanced TCMC type pairs at follow-up were:
• Qi-depressed (QDP) + Qi-deficiency (QDF) = 93.75%
• Phlegm-wetness (PW)+Qi-deficiency (QDF) = 85.42%
• Phlegm-dampness (PD) + Qi-deficiency (QDF) = 81.65%
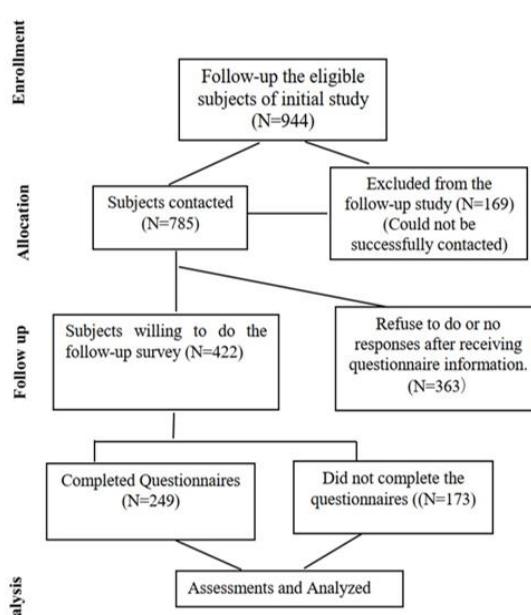
a)
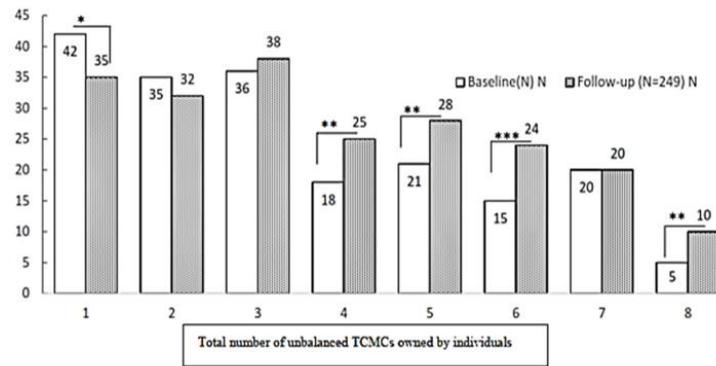
b)

Figure 1. a) flow diagram of participants' response rate, and b) changes in the distribution of the total number of unbalanced TCMC types owned by individuals between baseline and follow-up; * P < 0.05; ** P < 0.01; *** P < 0.001 from T-Tests for comparing the total number of unbalanced TCMC types owned by individuals (at the same time) between baseline and follow-up.

Table 3. Changes in the distribution of TCMC types among the participants at baseline and follow-up

TCMC type	Baseline		Follow-up		Unchanged TCMC types (Matched by individuals)	Unchanged rate
	N	%	N	%		
QDF	119	47.8	129	51.8	91	76.47%
PD	107	43.0	113	45.4	81	75.70%
ND	70	28.1	93	37.6	46	65.71%
PW	88	35.3	96	38.6	62	70.45%
WH	80	32.1	87	34.9	47	58.75%
BS	81	32.5	91	36.5	56	69.14%
QDP	76	30.5	86	34.5	57	75.00%
ISC	54	21.7	50	20.1	37	70.37%
N	54	21.7	46	18.5	24	44.44%

Abbreviations: QDF = qi-deficiency constitution; PD = Yang-deficiency constitution; ND = Yin-deficiency constitution; PW = phlegm-wetness constitution; WH = wetness-heat constitution; BS = blood-stasis constitution; QDP = qi-depressed constitution; ISC = inherited Special constitution; N = normalityconstitution.
*P from chi-square tests (P < 0.05) comparing the distribution of TCMC types in baseline and follow-up.

Table 4. Using association rules mining explored the pairs of unbalanced TCMC Types (Follow-up participants, n = 249)

TCMC types (X)	Amount of TCMC type (X)	→	TCMC	Amount of TCMC Type (Y)	Support (X) (%)	Confidence (X=> Y) (%)
	N			N		N
QDP	80	→	QDF	75	30.12%	93.75%
QDP	80	→	PW	63	25.30%	78.75%
QDP	80	→	PD	62	24.90%	77.50%
PW	96	→	QDF	82	32.93%	85.42%
PD	109	→	QDF	89	35.74%	81.65%
BS	89	→	QDF	68	27.31%	76.40%

The minimum amount of TCMC type is 80, minimum support of 0.2, and minimum confidence of 0.75.

Determinants of Shifts in Unbalanced TCMC Types

The outcomes from the multifactorial ANOVA analysis highlighted a range of elements that played a role in shaping both the prevalence and progression of

unbalanced Traditional Chinese Medicine Constitutions (TCMCs) across the study period (see **Table 5**). Key variables such as participant age, exercise routines, self-reported health condition, emotional stability, menopausal transition, changes in marital status, psychological and physical distress, and the frequency of TCM usage emerged as statistically significant influences on the number of unbalanced TCMC types observed at follow-up.

Compared to baseline figures, participants exhibited a noticeable rise in the average number of unbalanced constitutions after four years, reflecting a deterioration in constitutional balance over time. This trend underscores the dynamic nature of TCMC types and the potential impact of lifestyle and health-related transitions on their development.

Table 5. Changes in the total number of unbalanced TCMC types in sub-groups with significant influencing factors between baseline and follow-up

Variables	Baseline Total number of unbalanced TCMC types		Pa	Follow-up group Total number of balanced TCMC types		Pb	Pc
	Mean	SD		Mean	SD		
Age (years)			0.062			0.032	0.018
30-44	3.51	2.05		3.85	2.30		
45-59	3.21	2.01		4.09	2.08		
≥ 60	3.5	2.31		3.28	2.03		
Occupation							
Full-time working	3.15	1.96	0.359	4.19	2.13	0.281	0.034
Part-time working	3.07	2.09		3.21	2.43		
House wife/retire	2.94	2.1		3.78	2.10		
Emotional status							
Unhappy	3.25	2.14	0.044	3.77	2.15	0.029	0.04
Ordinary	3.75	1.81		3.65	2.19		
Happy	2.84	2.12		3.42	2.02		
Blank	3.83	2.12		4.26	2.25		
State of health							
Good	2.09	2.13	0.001	3.27	2.17	0.007	0.02
Poor	3.42	2.54		3.97	2.11		
Exercise habit							
Yes	3.02	2.09	0.038	3.56	2.16	0.407	0.096
No	3.58	1.99		3.98	2.13		
Marital changed							
Yes	N/A	N/A		3.87	2.39	2.39	
No				3.71	2.07	2.07	
[d] Menopause changed							
Yes	N/A	N/A		3.58	2.03		0.247
No				4.08	2.19		
[e] Suffering negative effects on body-mind health							
Yes	N/A	N/A		4.05	2.11		0.028
No				3.03	1.97		
Usage TCM habit							
Yes	N/A	N/A		3.76	2.26		0.011
No				3.25	2.05		0.048

Note: Data are listed only *P*-values from one-way-ANOVA or 2 samples *t*-test less than 0.25 when compared at baseline against follow-up over 4 years; [a]comparison of those sub-groups variables of baseline; [b]comparison of those sub-groups variables of follow-up; [c]comparison of those sub-

groups variables of baseline against a follow-up; [d]menopause is defined as the time in most women's lives when menstrual periods stop permanently due to the natural depletion of ovarian oocytes from aging and missed menses for 12 months; menopause changed to refer to those women who had experienced menopause; [e]a definition for suffering negative effects on body-mind health were those who self-reported suffering new and/or old diseases, working/living stress, frustration with family members' health problems and/or accidents, or financial problem.

Predictive Factors for the Development and Progression of Specific TCMC Types

Eight stepwise logistic regression models were conducted (Table 6) to determine the key factors contributing to the development of specific Traditional Chinese Medicine Constitution (TCMC) types. The analysis revealed several significant predictors. Age, adverse effects on physical and mental health, and regular use of TCM were found to be strongly associated with the occurrence of qi deficiency (QDF). For the phlegm-wetness (PW) type, overall health condition and engagement in TCM practices emerged as major influencing factors. Similarly, the presence of physical deficiency (PD) was significantly linked to age, health status, and TCM usage. The formation of the Yin-deficiency (ND) constitution was mainly affected by an individual's health status and menopausal state. In the case of blood stasis (BS), the most relevant variables included age, emotional well-being, and menopause. Qi-depressed (QDP) was associated with older age, poor emotional state, and menopausal transition. Wetness-heat (WH) appeared to be influenced by regular physical activity, menopausal status, and occupational background. Lastly, the shift to a Normality constitution was significantly associated with better general health, emotional balance, and use of TCM habits.

Additional stepwise regression models (Table 6) were used to identify predictors related to the change patterns in TCMC types—specifically, the progression to more complex unbalanced types versus those that remained stable or improved over the follow-up period. Participants who reported poorer health conditions had a 3.52 times greater likelihood of developing more intricate combinations of unbalanced TCMC types than those with good health. Negative emotional experiences during the follow-up were also strongly associated with a 5.66-fold increased risk of complex TCMC profiles. On the other hand, those who had reached menopause or engaged in regular exercise had notably reduced risks (odds ratios of 0.34 and 0.63, respectively) compared to individuals who were either pre-menopausal or did not maintain an active lifestyle.

Table 6. Association of TCMC types and significant influencing factors at follow-up (results of stepwise logistic regression)

Variables	OR	S.E.	95%CI	*P*-value
Model 1: Outcome: Qi-deficiency (QDF) constitution				
Log-likelihood = 259.29, chi-square = 53.56 (3 d. f.), P < 0.05				
Age	0.93	0.02	0.89-0.96	0.001
Suffering negative effects on body-mind health	2.70	0.41	1.21-6.02	0.000
Usage TCM habit	3.56	0.37	1.73-7.25	0.000
Model 2: Outcome: Phlegm-wetness (PW) constitution				
Log-likelihood = 297.30, chi-square = 12.53 (2 d. f.), P < 0.05				
State of health	1.37	0.39	1.17-1.80	0.001
usage TCM habit	3.28	0.35	1.65-6.50	0.001
Model 3: Outcome: Yang-deficiency (PD) constitution				
Log-likelihood = 271.53, chi-square = 38.30 (3 d. f.), P < 0.05				
Age	0.94	0.02	0.90-0.97	0.001
State of health	1.93	0.67	1.03-3.60	0.038
Usage TCM habit	3.28	0.35	1.65-6.50	0.001
Model 4: Outcome: Yin-deficiency (ND) constitution				
Log-likelihood = 178.02, chi-square = 4.7(2 d. f.), P < 0.05				
State of health	2.21	0.37	1.08-4.54	0.001
Menopause	0.39	0.32	0.21-0.71	0.003
Model 5: Outcome: Blood-stasis (BS) constitution				

Log-likelihood = 261.56, chi-square = 31.36 (3 d. f.), P < 0.05				
Emotional status	2.56	0.34	1.33-4.94	0.005
Menopause	0.37	0.35	0.19-0.73	0.004
Age	0.91	-0.1	0.88-0.95	0.001
Model 6: Outcome: Qi-depressed (QDP) constitution				
Log-likelihood = 231.84, chi-square = 52.52(3 d. f.), P < 0.05				
Suffering negative effects on body-mind health	3.64	0.42	1.59-8.31	0.003
Menopause	0.43	0.34	1.25-4.72	0.009
Age	0.92	0.02	0.88-0.96	0.001
Model 7: Outcome: Wetness heat (WH) constitution				
Log-likelihood = 253.20, chi-square = 20.86 (3 d. f.), P < 0.05				
Exercise regularly	0.71	0.35	0.49-0.98	0.004
Occupation	0.69	0.37	0.47-0.93	0.004
State of health	2.56	0.34	1.32-4.94	0.005
Model 8: Normality (N) constitution				
Log-likelihood = 196.56, chi-square = 19.64(3 d. f.), P < 0.05				
Suffering negative effects on body-mind health	4.06	0.38	1.90-8.68	0.000
State of health	0.42	0.39	0.20-0.91	0.028
Usage TCM	0.12	-2.09	0.03-0.55	0.006
Unbalanced TCMC types increased (became more complex) and stable or decreased by individuals				
Log-likelihood = 362.068, chi-square = 64.160 (4 d. f.), P < 0.05				
Suffering negative effects on body-mind health	5.66	0.98	1.92-88.00	0.009
State of health	3.52	0.52	1.26-9.85	0.010
Menopause status	0.34	0.47	0.14-0.86	0.022
Exercise regularly	0.63	0.16	0.46-0.86	0.004

* Those factors with *P*-values less than 0.25 (including state of health, occupation, emotional status, menopause status, exercise habit, and using TCM habit) between these two groups were entered into multiple stepwise logistic regression analysis to explore the significant influencing factors related to the changes of unbalanced TCMC types over the 4-year follow-up period.

This study is, to the best of our knowledge, the first to use 4-year longitudinal data to examine the changes in characteristics of TCM constitutions and the factors that influence the development of TCMC types over time. The findings reveal several key insights.

A large portion of the study's participants (83.14%) were over the age of 45, and many had been suffering from chronic or dysfunctional dystrophic diseases for a long period, even before the baseline of the study and continuing through the 4-year follow-up. The data showed an increase in the percentage of participants exhibiting unbalanced and more complex TCMC types during the follow-up compared to the baseline. A local survey revealed that 75% of people aged 65 or older and 45% of those aged 45 to 64 suffer from one or more chronic diseases [16, 17]. The core theory of Traditional Chinese Medicine (TCM) is the idea of "treating disease before it occurs," which emphasizes the prevention of diseases before their onset. This underlines the effectiveness of TCM in helping to protect health and prevent aging, particularly in the elderly population.

The study further demonstrates that the distribution of TCMC types is relatively stable but also adaptable over time, influenced by acquired factors and changes in the individual's constitution. At both the baseline and follow-up, the most common unbalanced TCMC types were QDF, PD, and PW. However, there was a significant increase in ND, BS, and QDP constitutions, particularly among women undergoing menopause. Many of the participants' acquired factors, such as their social demographics, living environment, and lifestyle, remained unchanged, which contributed to the consistency of some TCMC types over the follow-up period. The development of the QDF constitution, in particular, was linked to the high-stress levels, lack of sleep, and fast-paced lifestyle common among Hong Kong residents, which negatively impacts healthy Qi. Additionally, emotional stress was found to be a contributing factor in the development of QDF. QDF is typically associated with a morbid state where the smooth flow of Qi is obstructed, which can lead to conditions like QDP, phlegm blockage, dampness, and stagnant blood. Prolonged consumption of cold drinks, waking up at

night, and excessive use of air conditioning throughout the year were key factors contributing to the development of PD [18, 19].

The significant increase in ND, BS, and QDP among participants, particularly those experiencing menopause, suggests that hormonal changes during this life stage are closely linked to these types. Previous studies have shown that Yin deficiency, BS, and QDP are common TCMC types in women undergoing menopause. The liver, which is crucial for blood storage and Qi flow, often experiences disharmony during menopause, leading to the development of these unbalanced TCMC types. Menopausal women are thus more susceptible to unbalanced TCMC types like ND, QDP, and BS, as well as the discomfort of high menopausal syndrome. Proper adjustments to health and lifestyle can help alleviate or even avoid these symptoms [20-22].

Health status was identified as one of the most significant factors influencing the development of TCMC types in both the baseline and follow-up periods. It was found that participants with chronic diseases that imbalance Yin and Yang were more likely to develop unbalanced TCMC types. Furthermore, the total number of unbalanced TCMC types per individual increased during the follow-up period, indicating that a person's health status plays a critical role in the development of these types. This study also supports the idea that TCMC types can influence the progression of certain diseases. For example, a pilot study involving 218 participants with hepatic disease showed that early-stage liver issues could lead to phlegm and dampness in the meridians, which ultimately altered their constitutions [23, 24].

The role of aging as a protective factor against unbalanced TCMC types remains a subject of debate. While both baseline and follow-up studies suggest that aging might protect against QDF, Yang-deficiency, BS, QDP, and wetness-heat types, some studies have found that elderly individuals exhibit higher rates of these unbalanced types compared to younger people. Overstrain and physical strain can lead to a depletion of Qi and blood, causing an imbalance that results in unbalanced TCMC types. A study of 1,546 individuals aged 21 to 99 years showed that happiness and well-being follow a U-shaped curve, dipping in middle age and rising again in older age, though further research is needed to confirm whether aging is indeed a protective factor against TCMC types [25-30].

Emotional health was another crucial factor influencing the development of TCMC types. The study found that negative emotions, such as unhappiness, had a detrimental impact on both body and mind, contributing to the formation of QDF, BD, and QDP constitutions, as well as more complex unbalanced TCMC types. Emotional fluctuations were particularly harmful, as they were linked to the frequent occurrence of QDP and QDF. Qi stagnation, which can occur as a result of emotional distress, was also found to contribute to the development of BS. Stable mental health, positive activities, and emotional balance were identified as key factors in preventing the disruption of Qi flow and the development of unbalanced TCMC types [31, 32].

Finally, lifestyle factors such as physical exercise and dietary habits were found to play significant roles in the development of TCMC types. Proper exercise is essential for moving Qi and blood, improving the function of internal organs, and contributing to better overall health. On the other hand, insufficient or excessive exercise can lead to weakened circulation of Qi and blood, contributing to conditions like a damp-greasy constitution. Regular exercise was found to help protect against the wetness-heat constitution but not against QDF, PD, and BS. Dietary habits also influenced the development of TCMC types, with many participants receiving TCM dietary regimens based on their diagnosed TCMC types at baseline. However, low adherence to these regimens and short durations of use meant that no significant changes in TCMC types were observed. Participants who used regular TCM treatments were found to have a more balanced constitution compared to those with unbalanced TCMC types. Interestingly, those with poorer health tended to use TCM to improve their well-being. Today, many people in Hong Kong accept TCM medications, particularly for cancer patients seeking to alleviate side effects or improve their quality of life. The study found that complex and unbalanced TCMC types were more common among individuals with poorer health and greater reliance on TCM as an alternative treatment. However, long-term adherence to a healthy diet and TCM regimen is necessary to observe significant effects in managing unbalanced TCMC types [16, 17, 33-37].

Study Limitations

The first limitation of the study is the relatively high attrition rate during the follow-up, which could have resulted in a skewed assessment of TCMC types and their characteristics over time. The second limitation is that

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participants in the follow-up study did not have a higher level of education.

Study Implications

This study is the first to reassess participants' TCMC types and the factors influencing them over 4 years. It offers valuable insights into the development of TCMC theory and the creation of new health protection regimens for individuals. The study identifies significant factors related to unbalanced TCMC types and provides scientific evidence to help manage them. Additionally, this research contributes to the advancement of TCMC and guides health protection and disease prevention efforts. Consequently, it is important and valuable to conduct further studies on TCMC with larger sample sizes, gender diversity, and extended age ranges, as this will help establish scientifically-backed ways of living to improve individuals' TCMC.

Conclusion

Based on the longitudinal data from the follow-up study, several key conclusions can be drawn, offering a new perspective on health protection through TCMC theory. First, the study found that the proportion of women with unbalanced and more complex TCMC types was higher during the follow-up than at baseline. Second, the distribution of TCMC types was confirmed to be both stable and adjustable, influenced by acquired factors that affect the development of an individual's TCMC over time. Third, the follow-up data revealed that women experiencing menopause were at a higher risk of developing unbalanced TCMC types, including ND, BS, and QDP. Furthermore, poor health, negative emotions, and the challenges of menopause may be key factors in the development of unbalanced TCMC types. However, regular exercise and the habit of using TCM appear to be potential protective factors in maintaining a balanced constitution.

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