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Running head: Stress management for teaching professionals

Psychosomatic and physical responses to a multi-component stress management program among teaching professionals: A randomized study of cognitive behavioral intervention (CB) with complementary and alternative medicine (CAM) approach

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Abstract

Background: The present study aims to assess psychosomatic and physical responses to a multi-component stress management program with the use of CAM and CB approaches among teaching professionals in Hong Kong.

Method: A random controlled trial (RCT) was used to compare between CB group (n =26) and the CAM-CB group (n =30). Interventions were administered for 1.5 hours once a week for eight consecutive weeks. A self-administered questionnaire including perceived stress scale (PSS) and frequency of psychosomatic symptoms were measured at baseline (T1), immediate after the program (T2), and 4 weeks after the program (T3). Physical parameters were measured at T1 and T2.

Results: A reduction of 23% in PSS was observed in the CB group, while the CAM-CB group yielded 18% reductions in PSS from T1 to T3 [$F(2,108)= 3.099$; $p=.049$]. No significant interactions were observed in the frequency of psychosomatic symptoms and physical parameters. However, a significant downward time trend was observed ($p<.001$) and larger percentage changes in physical responses were shown in the CAM-CB group than CB group.

Conclusion: Clinical evidence of both the CAM-CB and CB program has been demonstrated in the current study and both approaches are easy to be self-implemented. The CAM technique might serve as an alternative choice for self-administered stress management to replace the additional time needed for professional follow-up contacts. It might further improve some physical responses such as handgrip strength and resting heart rate, which are associated with better psychosomatic health and better occupational stress management. (Word Count: 246)

1. Introduction

The work of teaching professionals is beyond the transfer of knowledge which involves dynamic interactions with students, parents, colleagues, and school authorities. Of the 26 occupations, teaching has been ranked as the most stressful occupation and the stressful nature is applicable to all professional teaching roles (Johnson et al., 2005). Stress from work is characterized as a symptom of unpleasant emotional responses in the workplace (Hakanen, Bakker, & Schaufeli, 2006). A local study has found that over 35% of secondary teachers had experienced strong maladaptive stress responses due to vocational strain (S. S. K. Leung, Mak, Chui, Chiang, & Lee, 2009). Several research reports have consistently documented mental and physical fatigue experienced by teaching professionals. Perception of adverse psychosocial factors in the workplace such as effort-reward imbalance, undesirable work events and organizational injustice are shown to have an elevated risk of subsequent mental health problems (Bonde, 2008). Tiredness, eyestrain, anxiety, sleep problems, voice disorder, shoulder and neck pain, headache, cold/flu, and lower back pain are common physical complaints and psychosomatic symptoms faced by teaching professionals (Chong & Chan, 2010; Seibt, Spitzer, Druschke, Scheuch, & Hinz, 2013). The stress-induced problems are widespread phenomenon encountered by teachers in the world, predominantly in Asian and European countries (Klassen et al., 2013). The problems reflected either they have insufficient knowledge on ways of properly handling their stress or there are very limited self-administered stress management techniques available to them.

1.1.Stress coping using cognitive behavioral (CB) approaches

CB approaches adopted in stress management or resilience programs have become popular among employers over the last decade (Mok, Chau, Chan, & Ip, 2014; Patterson, Chung, & Swan, 2014). Considerable evidence exists to support the efficacy of cognitive behavioral therapy (CBT) in the management of common mental health problems such as mild or moderate depression and anxiety

(Clarke, Kuosmanen, & Barry, 2015; Sockol, 2015). A review summarized the beneficial impacts of CBT on physical illness and psychosomatic symptoms such as pain, headache, tinnitus, and insomnia, but the effect sizes were slightly below what were previously reported for depression and anxiety (Cuijpers, van Straten, & Andersson, 2008). Most of the stress management programs with CB component are tailored to suit the employee group with the addition of particular challenges faced in their working contexts. However, a recent review has evaluated that the use of CBT alone as a self-help technique with no further follow up support from persons produced a much lower effect in improving mental health conditions than those with minimal contact of persons (Farrand & Woodford, 2013). This has led to an increased focus on alternative approaches which consist mainly of easier self-help techniques to widen access for oneself stress management.

1.2.Stress coping using complementary and alternative medicine (CAM)

The use of CAM such as mind-body exercises and acupressure has recently gained an increased popularity among a wide range of professionals in various fields. It has been established in healthcare settings and shown to have positive effects in reducing stress-related physical and psychosomatic responses such as insomnia and musculoskeletal pain (Raman, Zhang, Minichiello, D'Ambrosio, & Wang, 2013; Sarris & Byrne, 2011). A meta-analytical review suggested that multiple component interventions focusing on both well-being and behavioral training were more effective than either focus on behavioral training or cognitive behavioral training (Singer, Ethridge, & Aldana, 2007). We, therefore, combined the two approaches, CB and CAM, for stress management purposes among teaching professionals to maximize its potential beneficial effects in relieving the stress-related responses.

1.3.A theoretical model

The present stress management program was developed based on the theoretical model of stress process by Cohen et al.(S. E. Cohen, Kessler, & Gordon, 1995). A culturally relevant self-help components, qigong and acupressure, were chosen aiming to cultivate the awareness of the unity of mind and body which in turn control physiological stress reactivity and ventilate negative emotions (Au et al., 2015; H. W. Tsang, Lee, Au, Wong, & Lai, 2013). The CB technique was used to facilitate the benign appraisal of stress and transform negative automatic thoughts into positive thinking (Claire et al., 2008; Reinholt & Krogh, 2014). The efficacy of the cognitive behavioral intervention with the additional training of CAM techniques (CAM-CB) has received preliminary support in our earlier publication (H. W. H. Tsang et al., 2015). In our earlier study, significant reductions in the levels of depression, anxiety, and stress have been demonstrated using a quasi-experimental design. Methodological improvements in the present study included randomized control trial (RCT) with an active control (i.e., CB alone), as well as psychosomatic and physical stress-related indicators.

1.4.Objectives and hypotheses

The aims of the present study are to (1) assess psychosomatic and physical responses to the multi-component stress management program with the use of CAM and CB approaches; and (2) compare the effectiveness of the CAM-CB intervention to CB intervention on stress related parameters among teaching professionals. We hypothesized that the multi-component stress management intervention would be associated with more pronounced reductions in perceived stress levels and the associated stress-related physical and psychosomatic parameters than CB intervention. In addition, more improvements in personal wellbeing would be observed in the CAM-CB intervention group than CB intervention group.

2. Methods

2.1.Study design

A randomized controlled trial (RCT) was conducted to examine the effectiveness of CAM-CB intervention for teaching professionals in comparison to CB intervention. The effects on perceived stress levels, frequency of psychosomatic symptoms they encountered, as well as physical and personal wellbeing were examined.

2.2.Participants and settings

Participants with teaching qualifications at either primary or secondary schools in Hong Kong were invited to join the public lectures on stress and wellness in May 2013. A total of 77 teaching professionals were recruited from the public lectures for joining the study from June to August 2013. Eventually, a total of 56 eligible participants with written consent were randomly assigned to either the intervention group (CAM-CB) or the active control group (CB) using a computer random number generator. A CONSORT flowchart is shown in Figure 1 for the recruitment and randomization details.

2.3.Cognitive-behavioral intervention (CB)

Table 1 provides an overview of the 8-week stress management program. The CB intervention was constructed based on the CB model of Aaron Beck (Beck, 1995) and split into eight 1.5-hr sessions. The content of the first four sessions included identification of sources of work-related stress at schools, introduction of the CB model such as identification of the activating event and their automatic thoughts, as well as cognitive restructuring techniques. The last four sessions were added as a control to neutralize the effect of additional time due to CAM sessions implemented in the CAM-CB group. Participants were asked to record negative automatic thoughts and their use of acquired cognitive restructuring techniques as homework exercises and shared the experiences in the last four sessions.

2.4.CAM and CB stress management program (CAM-CB)

CAM-CB intervention was developed based on our previously pilot-tested model using a quasi-experimental design(H. W. H. Tsang et al., 2015). The first four sessions adopted the CAM approach with the first two sessions on acupressure and the subsequent two sessions on health qigong exercise. Participants were then attended the four CB sessions with contents matched exactly that of the CB group.

Both the CB and CAM-CB groups were administered for 1.5 hours once a week for eight consecutive weeks. The CB techniques were instructed by the first author trained in psychology while acupressure sessions were instructed by the second author with extensive experiences in the field. The qigong sessions were instructed by the third author who has been certified as a qigong master in our pilot study. All sessions were coached by the same instructors for content fidelity and instructors were blinded to the group assignment.

2.5.Measures

A set of questionnaire included the 10-item perceived stress scale (S. Cohen, Kamarck, & Mermelstein, 1983), the Chinese version of Personal Well Being Index – Adult (Lau, Cummins, & McPherson, 2005), and the frequency of ten psychosomatic symptoms including persistent irritability, persistent anxiety, period of high blood pressure, headache, insomnia, bruxism, heart palpitations, unusual heart rhythms, inability to concentrate, and forgetfulness commonly experienced by teachers in Hong Kong (Jin, Yeung, Tang, & Low, 2008) and demographic data. All the scales have consistently been demonstrated to have good psychometric properties using local populations in previous published studies (Chan & Hui, 1995; Lau et al., 2005; D. Y. Leung, Lam, & Chan, 2010). Physical parameters such as resting heart rate, and systolic and diastolic blood pressure were measured by the OMRON electronics blood pressure monitor (Model: HEM-7051). Maximum grip strength of both hands of each subject was measured by Takei grip dynamometer (Model: T.K.K 5001 Grip-A).

2.6.Data collection

The questionnaire was self-administered at baseline (T1), immediate after the program (T2), and 4 weeks after the program (T3). Completed questionnaires were returned to the project team in sealed envelopes by regular mail or collected by research assistants at the intervention venue. Physical parameters were collected at T1 and T2 by a blinded trained research assistant. Informed consent was obtained before intervention. This study was approved by the Human Ethics Committee of The Hong Kong Polytechnic University.

2.7.Statistical analysis

Data was analyzed with Predictive Analytics Software Statistics 20. The categorical and continuous demographics of participants were respectively summarized with descriptive and frequency statistics. Independent t-test and chi-squared test were used to detect group differences in baseline demographics and outcome measures. The obtained score in perceived stress scale (PSS) was regarded as primary outcomes, whereas other measures were regarded as secondary outcomes for evaluation. The intervention effects on PSS, psychosomatic symptoms and other physiological parameters were analyzed by repeated measures analysis of variance (ANOVA) with post hoc analysis using Bonferroni correction was adopted if significant difference occurred at different points in times of the study. Baseline measures were treated as covariates if significant group differences existed. The missing data of dropout participants was replaced with 'last-observation-carried-forward' following the 'Intent-to-treat' principle.

3. Results

3.1. Demographics Characteristics

The demographic information of the participants is summarized in Table 2. Both the CB and CAM-CB groups did not reveal significant differences in demographic characteristics (*ps* = .072-.653), showing

the homogenous characteristics in nature before intervention. The average weekly working hour was in the range of 47 and 50. Over 70% of the participants had more than 15 years of teaching experience. The mean level of perceived stress (the total PSS score) at baseline was 18.64 (*SD*=3.39), which was higher than a local sample of cardiac patients (mean=15.3) (D. Y. Leung et al., 2010) and the norm score in the US population (mean=15.83) (S. Cohen & Janichi-Deverts, 2012).

3.2. Perceived stress, psychosomatic responses, personal wellbeing

A significant group by time interaction was indicated in the perceived stress levels [$F(2,108)= 3.099$; $p=.049$; $\eta p2=.054$] from T1 to T3 (Table 3). A reduction of 23% in perceived stress level was observed in the CB group, while the CAM-CB group yielded 18% reductions in perceived stress level. No significant group by time interaction was observed in the frequency of psychosomatic symptoms but a significant downward time trend was observed in both groups ($p<.001$). Reductions of 19% and 10% in the frequency of psychosomatic symptoms were observed in the CB group and the CAM-CB group from T1 to T3, respectively. No significant group by time interaction was found in personal well-being score but significant improvement trends were observed in both groups ($p<.046$).

3.3.Physical responses

Results of physical responses from T1 to T2 are summarized in Table 4. The interaction effects of group over time were not significant in all cases. Significant improvement in handgrip strength and resting heart rate were however observed in both groups from T1 to T2 ($p=.008$ and $p=.016$, respectively), with better responses revealed in the CAM-CB group over CB group. In general, both groups showed improvements in physical responses immediately after intervention with larger percentage changes present in the CAM-CB group than CB group.

4. Discussion

This study is the first attempt in Hong Kong to examine the physical and psychosomatic responses to the multi-component stress management program among teaching professionals. A meticulously designed RCT was implemented and showed that both the multi-component program using CB and CAM approaches and the CB alone program yielded similar effects in reducing perceived stress levels and alleviating psychosomatic symptoms of participants. Participants in both groups showed better physical responses immediately after intervention. There is no evidence that the multi-component stress management intervention would be associated with more pronounced reductions in perceived stress levels and the associated stress-related physical and psychosomatic parameters than CB alone intervention. However, given that CB approach would produce best results while having a follow-up contact with persons (Farrand & Woodford, 2013), self-administered CAM techniques might serve as an alternative choice for sustaining effects of stress management to replace the additional time needed for follow-up contact with persons. As a result, it may improve the sustainability of the effects produced by CB approach but at the same time save the additional resources needed from the counseling and rehabilitation professionals.

In line with the findings from previous meta-analytical studies (Montgomery & Rupp, 2005; Richardson & Rothstein, 2008), active coping strategies using CB approach are more effective in relieving stress than any other single intervention such as relaxation techniques and passive coping strategies such as resignation. The present study further demonstrated that the addition of CAM techniques to CB intervention would yield similar effects as CB alone in relieving perceived stress levels with possibilities of further improving some of the stress-related physical responses such as handgrip strength and resting heart rate. Such notable observations in this study are in line with the literature on the causal link between physical function and psychosomatic health. For example, one study has concluded that lower hand grip strength predicted persistence of depressive and/or anxiety

disorders after 2 years (van Milligen, Vogelzangs, Smit, & Penninx, 2012). Another study has demonstrated the inverse relationship between resting heart rate and emotional regulation (Williams et al., 2015). Given that more obvious percentage changes in physical responses were observed in the CAM-CB group than the CB group, we believe that participants of the CAM-CB intervention are more likely to be associated with better psychosomatic health and better occupational stress management in the long run than the participants in the CB group. Further investigation is recommended to clarify this plausible relationship among the teaching professionals in the long run.

Several areas are still crucial for further empirical examinations with consideration of the study limitations as follows: First, this study was conducted in summer time as this was the only available period of time that teaching professionals were free to join the program. The stress level of teachers might have relieved during this period of time as teaching demands were minimal. Second, only a sub-sample of participants agreed to join the physical tests due to additional individual appointment needed for the examination. Although more sophisticated physical outcome measurement would further enhance the knowledge, duration of the physical examination should be considered in the future protocol. Lastly, the non-significant findings might be due to the small sample size even though the number of participants exceeded our a priori sample size estimation. The enhancement effect of CAM on CB program may be more readily manifested if participants are limited to those with high perceived stress levels.

Whilst many recent studies continue to put efforts in exploring other contributing factors to teacher stress such as self-esteem, school support and social support (Collie, Shapka, Perry, & Martin, 2015a, 2015b; Edwards, 2015; Ho, 2015; Jeon, Buettner, & Hur, 2015), the present study has utilized the fundamental theoretical stress model to put focus on improving both psychological and physical well-beings among teaching professionals to better manage their stress. The clinical evidence of both the

CAM-CB and CB program has been clearly demonstrated in the current study. Both approaches are easy to be self-implemented among teaching professionals.

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Conflict of interest

None.

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Figure 1 A CONSORT flow chart of the study

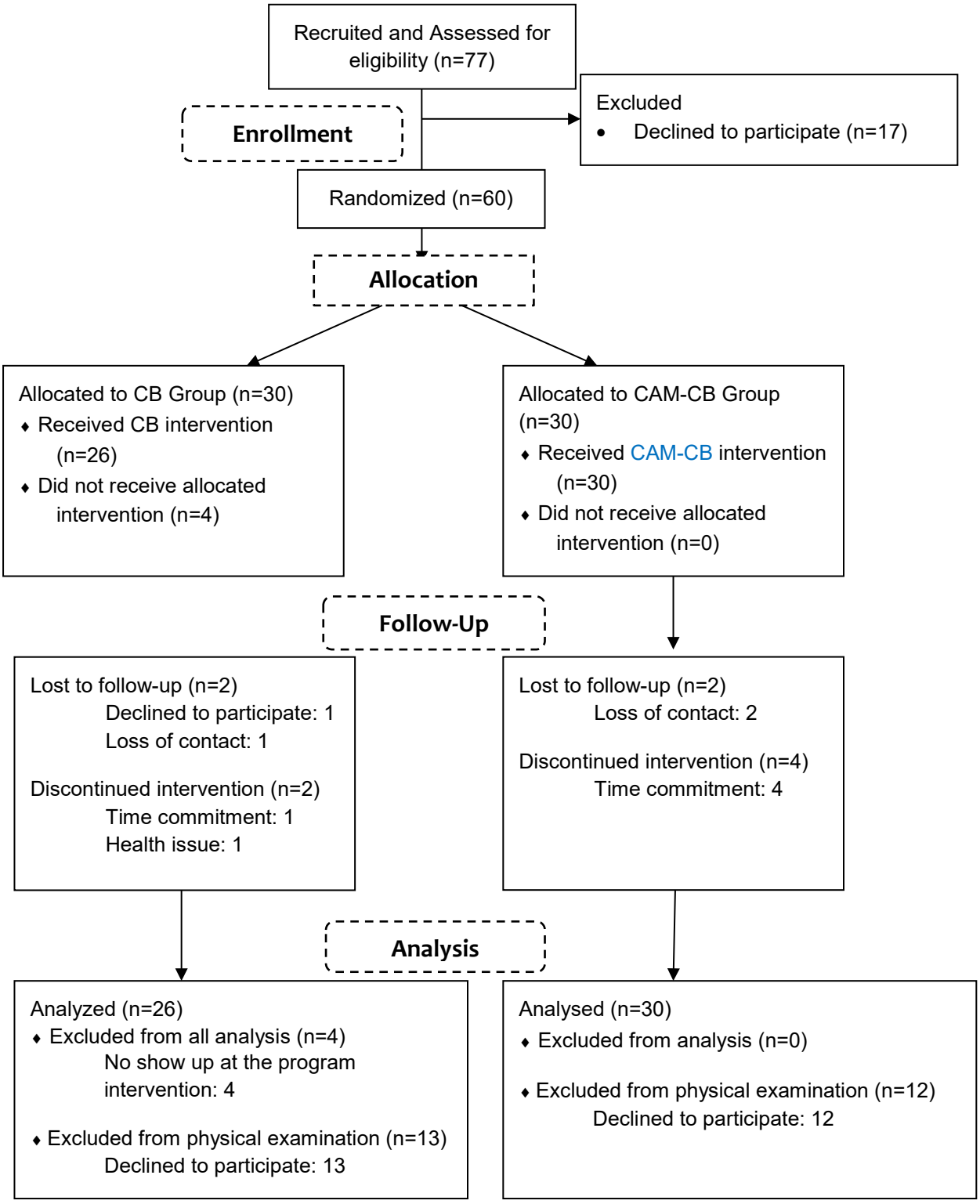

Table 1. An overview of the 8-sessions program content

	CB group	CAM-CB group
Sessions	Content	
1	CBT I	Acupressure I
2	CBT II	Acupressure II
3	CBT III	Health Qigong I
4	CBT IV	Health Qigong II
5	Assignment sharing	CBT I
6	Assignment sharing	CBT II
7	Assignment sharing	CBT III
8	Assignment sharing	CBT IV

Table 2. Baseline demographics of participants

Variables	CB (N=26)		CAM-CB (N=30)			
	n	%	n	%	$\chi 2$	p-value
Gender						
Male	4	15.40%	6	20.00%	0.202	0.653
Female	22	84.60%	24	80.00%		
Age						
25-34	2	7.70%	1	3.30%	8.465	0.076
35-44	13	50.00%	9	30.00%		
45-54	4	15.40%	14	46.70%		
55-59	5	19.20%	6	20.00%		
60-64	2	7.70%	0	0.00%		
Marital status						
Single/Widow	12	46.20%	7	23.30%	3.236	0.072
Married	14	53.80%	23	76.70%		
Monthly household income						
<$30, 000	3	11.50%	2	6.70%	1.672	0.643
$30, 000 - $39, 999	5	19.20%	3	10.00%		
$40, 000 - $59, 999	11	42.30%	14	46.70%		
>$59, 999	7	26.90%	11	36.70%		
School type						
Primary schools	9	34.60%	6	20.00%	2.857	0.24
Secondary schools	9	34.60%	17	56.70%		
Special schools	8	30.80%	7	23.30%		
Teaching experience						
Less than 1 year	1	3.80%	0	0.00%	7.921	0.244
6-9 years	1	3.80%	1	3.30%		
10-15 years	6	23.10%	4	13.30%		
16-19 years	6	23.10%	5	16.70%		
20-25 years	4	15.40%	7	23.30%		
26-30 years	3	11.50%	11	36.70%		
>30 years	5	19.20%	2	6.70%		
	Mean	S.D.	Mean	S.D.	t	p-value
Average weekly working hour	47.4	18.27	49.62	13.81	0.515	0.609
Perceived Stress Level	19.08	3.14	18.2	3.63	-0.959	0.342
Personal Wellbeing	68.79	9.68	70.71	8.89	0.775	0.442

Table 3. Perceived stress, psychosomatic responses, personal wellbeing for the stress management programs

	Baseline (T1)				Post-intervention (T2)				Follow-up assessment (T3)				Repeated Measured ANOVA					
	CB (n=26)		CAM-CB (n=30)		CB (n=26)		CAM-CB (n=30)		CB (n=26)		CAM-CB (n=30)		Group		Time		Group * Time	
Variables	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	F	*p*	F	*p*	F	*p*
PSS	19.08	3.14	18.2	3.63	15.5	3.81	16.73	4.1	14.73	4.2	14.97	4.25	0.046	0.831	41.391	**0.0001**	3.099	**0.049**
Frequency of psychosomatic symptoms -total	20	5.15	19.21	6.6	16.98	4.21	18.33	5.1	16.13	4.67	17.31	5.83	0.217	0.643	11.12	**0.0001**	1.825	0.166
PWI	68.79	9.68	70.71	8.89	70.99	10.44	71.62	8.12	70.49	11.63	72.86	8.73	0.47	0.496	3.164	**0.046**	0.617	0.494

Note: Bold p-values are significant at the 0.05. PSS: perceived stress level; PWI: personal wellbeing index

Table 4. Physical responses to CB and CAM-CB interventions

	Baseline (T1)				Post-intervention (T2)						Repeated Measured ANOVA					
	CB (n =13)		CAM-CB (n=18)		CB (n =13)		CAM-CB (n=18)		% changes (T2-T1)		Group		Time		Group* Time	
Variables	M	SD	M	SD	M	SD	M	SD	CB	CAM-CB	F	*p*	F	*p*	F	*p*
Handgrip strength, kg	45.58	12.2	53.94	13.52	47.04	11.02	56.17	15.49	3.20	4.13	3.27	0.081	8.176	**0.008**	0.349	0.559
Resting Systolic Blood Pressure, bpm	122.77	15.78	114.22	17.26	119.31	15.42	109.72	15.1	(2.82)	(3.94)	2.912	0.099	2.861	0.101	0.049	0.827
Resting Diastolic Blood Pressure, bpm	74.38	7.77	72.28	9.58	75.77	11.41	70.33	8.65	1.87	(2.70)	1.338	0.257	0.074	0.788	2.603	0.117
Resting Heart Rate	73.15	5.7	74.61	12.998	70.69	5.11	71.72	11.57	(3.36)	(3.87)	0.126	0.725	6.507	**0.016**	0.042	0.84

Note: Bold *p*-values are significant at 0.05. Negative values are in brackets.