



# An experimental study on psychosocial Interventions for Chinese bank employees during the COVID-19: a cognitive-behavioral therapy based on Confucian cultivation ethics

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## Abstract

The sudden change in the economic situation due to COVID-19 has altered the working conditions of bank employees in China and affected their psychological well-being. At this stage, there needs to be localized psychological intervention methods for this population. Confucianism has the most extended and profound influence on Chinese people, so we designed this intervention method based on Confucian culture to compensate for the above shortcomings. The four cooperating banks were randomly divided into an intervention group and a control group, with the intervention group receiving a 10-week intervention activity and the control group having no intervention. The PSQI, SAS, and CPSS scales were administered to the participants during the baseline (T1), postintervention (T2), and 8-week follow-up (T3) of the program, and the data were analysed to obtain the effect of the intervention. The intervention model designed in this study had a good effect. Specifically, the intervention group showed insignificant improvement in anxiety and sleep quality and significant improvement in stress from T1 to T2. However, all three improvements were significant in the T2 to T3 stage. Furthermore, the control group improved insignificantly in all stages. The culturally appropriate treatment model is a novel intervention for treating the psychological problems of bank employees in China. It is worth promoting and giving to the Chinese population with similar symptoms.

**Keywords** COVID-19 · Bank employees · Psychological intervention · Confucian meditation · Cognitive behavioural therapy

## Introduction

The novel coronavirus pandemic has significantly impacted economic production, social development, and public health worldwide as a sudden public crisis event (Hagger & Hamilton, 2022), with multiple negative impacts. For example, both the physical and mental health of the public have been damaged (Cheng et al., 2021). Further, the public's psychological problems during a novel coronavirus pandemic are counterproductive to individual health (Favieri et al., 2021), creating a vicious cycle. A study from China also showed that the public was under tremendous stress during this period (Qi et al., 2020). This high level of stress is accompanied by many psychological problems, such as anxiety, depression, and sleep disorders (Rahim, 2010), which pose significant health risks to the public. More importantly, some occupational groups will have more significant health problems due to the novel coronavirus pandemic. Researchers

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have already found that bank employees are under immense stress during this period (Shaheen et al., 2022), with potential mental health risks.

Due to the specific nature of the banking profession, bank staff already have higher workloads and lower returns on their work under normal circumstances (Khalid et al., 2020), as well as excessive work pressure (Wei et al., 2023). At the same time, this occupational group is also exposed to the potential risk of robbery (Mannocci et al., 2018) and everyday acts of violence (Maran et al., 2022), which have an impact on their mental health, leaving them with psychological problems such as anxiety and depression (Dutt & Moray, 2021). However, the new coronavirus pandemic has further exacerbated mental health issues among bank staff. Compared to the world economy before the epidemic, global GDP will decline by 3.2% in 2020, with GDP declining by 4.6% in developed and 2% in developing markets (Kozak, 2021). It has also led to inflation and unemployment in various countries (Long et al., 2022), resulting in difficulties in social financing and lower bank profits. Whereas China, the largest developing country, derives all of its bank profits from branch deposits and loans (Yan & Jia, 2022), the new coronavirus pandemic has led to a recession in demand, a weakening of the economy (Funke & Tsang, 2020), and a decrease in financial stability (Elnahass et al., 2021), which has caused Chinese banks to begin to tighten their branch numbers (Yan & Jia, 2022). In 2022 alone, the number of bank branches in China was reduced by more than 2,500 (China Banking and Insurance Regulatory Commission, 2023), leading to massive layoffs in the banking sector. As a result, bank employees in China face the risk of layoffs, multiple performance appraisals, potential infections, lower salary returns, and even more severe mental health problems. While no psychological interventions have yet been developed for bank employees, particularly in China, this group is now characterized by anxiety, depression, and other mental health risks that require attention and treatment.

Notably, cognitive-behavioural therapy has been influential in the treatment of mental health problems such as anxiety, depression, and stress (Hofmann, 2021). It has also been demonstrated to be effective during the novel coronavirus pandemic with populations such as COVID-19 patients (Li et al., 2020a), essential workers (Benhamou & Piedra, 2020), and medical students (Hanani et al., 2022) during the novel coronavirus pandemic, demonstrating the effectiveness of cognitive-behavioural therapy. However, such cognitive-behavioural therapy interventions need to focus on the cultural background of the patient, and the standard form of cognitive-behavioural therapy is a product of Western cultural values and is not suitable for individuals from non-Western backgrounds (Naeem et al., 2023). Therefore, it needs to be adapted for patients from different backgrounds

to realize the therapy's potential (Naeem, 2019), maximizing patient therapeutic benefits. Cognitive-behavioural therapies, such as culturally adapted cognitive-behavioural therapy (Naeem et al., 2023) and religiously integrated cognitive-behavioural therapy (Pearce et al., 2015), have demonstrated good therapeutic outcomes when adequate attention is paid to the patient's cultural background. Unfortunately, these culturally competent cognitive-behavioural therapies have not been able to enrich the technical means of treatment to reduce the problems that arise when therapists work face-to-face with patients (Cuijpers et al., 2008).

Therefore, this study adopts the Confucian ethical framework of meditation and cultivation to respond to many of the above issues. First, traditional cognitive behaviour itself needs more cultural adaptation. For China, it has long been heavily influenced by Confucian ethics (Ye, 2023). Confucian ethics is the core of Chinese ethics and permeates all aspects of Chinese life (Ya, 2007). Moreover, Chinese people are deeply influenced by Confucian cultural concepts (Liu, 2018) and focus on the quality virtues of cultivating the body (Cheng, 2014). Thereby, traditional cognitive-behavioural therapy is guided by the Confucian ethical framework of cultivating one's body, and its treatments are culturally adapted and more readily accepted by Chinese people. Second, Confucian values are compatible with cognitive-behavioural therapy (Hodges & Oei, 2007), so the combination of Confucian ethics and cognitive-behavioural therapy contributes to the therapeutic effect. Thirdly, Confucian ethics and related concepts have been applied in clinical interventions with specific effects. For example, scholars have already adopted Confucian meditation intervention therapy for college students' sleep quality and shown positive effects (Wen et al., 2023). Specifically, Confucian mediocrity has favourable effects on the improvement of mental health among Chinese young people (Yang et al., 2016). However, regarding the practical use of Confucian ethical aspects, it is still in its infancy and has much room for improvement.

While adopting the ethical framework of Confucian meditation and body cultivation, this study focuses on running emerging technologies to overcome the lack of technology in traditional cognitive-behavioural therapy. By adopting Virtual Reality (VR) technology and taking advantage of its intuitive, three-dimensional visualization (Pinter et al., 2020) and remote intervention, customized treatment (Smits et al., 2020), a virtual scene integrating elements of Confucian concepts was constructed to enhance the patient's attention (Karacan et al., 2010) and optimize learning (Zhang et al., 2021), thus improving the intervention effect.

Based on this, this study designed a VR-based cognitive-behavioural intervention therapy within the ethical framework of Confucian meditation and cultivation of the body

in the hope of solving the psychological problems of bank employees and verifying the therapeutic validity of the cognitive-behavioural therapy by emphasizing the patient's background in Confucianism and combining it with the VR technology to provide society with a set of localized interventions for the psychological problems of bank employees in China.

## Cognitive-behavioural therapy model and Confucian ethics of meditation and body cultivation

### Theoretical framework: the cognitive-behavioural therapy model

Cognitive-behavioural therapy is based on Albert Ellis' ABCDE model (David & Szentagotai, 2006), a multi-component psychological and behavioural therapy (Woodward, 2011), including cognitive, behavioural, and affective elements, where cognition refers to the individual's perceptions, thinking, and awareness; behaviour refers to the individual's action responses and their performance; emotions refer to the individual's feelings about a situation, condition, or event and the emotions they experience, while the three elements form a dynamic multiple influence system (Early & Grady, 2017). The mechanism of action of cognitive-behavioural therapy is to change the individual's negative beliefs, thoughts, and perceptions (Vittorio et al., 2022), thereby reducing the patient's discomfort, emotions, and behaviours.

Cognitive-behavioral therapy (CBT) has gone through three stages of development. It has shown corresponding developmental characteristics, i.e., from the early focus on patients' behaviours, to the emphasis on patients' cognition (Hayes, 2016), and then to the current stage of the third wave, which focuses on the relationship between the patient and their thoughts and emotions (Dijkstra & Nagatsu, 2022). However, in the third wave, CBT is still dominated by face-to-face treatment, which has limitations such as triggering patient shame (Leavey & Hawkins, 2017) and being limited by geospatial constraints (de Gier et al., 2023). This problem is particularly acute in the context of the novel coronavirus pandemic. However, in the absence of face-to-face treatment, cognitive-behavioral therapy has achieved good therapeutic outcomes by incorporating emerging technological tools such as the telephone (Meichsner et al., 2019), the internet (Ying et al., 2021), and VR (Orskov et al., 2022). For example, there was a cognitive-behavioural therapy (CBT)-based online stress recovery intervention for a group of shocked healthcare workers during the COVID-19 on an Internet platform, which effectively reduced patients' stress,

anxiety, and depressive symptoms (Dumarkaite et al., 2023). Meanwhile, a meta-analysis also found that behavioral therapy based on a telephonic technology approach had greater efficacy than conventional face-to-face cognitive-behavioral therapy for specific psychological treatments for anxiety, depression, and worry (Altieri et al., 2023).

In the third wave of CBT, there is excellent potential to further integrate VR into cognitive-behavioral therapy, given the promising results demonstrated by integrating emerging technologies into CBT, represented by VR technology (Orskov et al., 2022). In the three-dimensional virtual world generated by VR, individuals can be simulated through the senses of vision, touch, and hearing, making them feel immersed in the virtual world (Wu et al., 2020), and allowing more individuals to interact in the virtual world (Bryant et al., 2019). Therefore, VR technology can not only overcome the geospatial limitations of traditional CBT by constructing a virtual world; at the same time, the immersive experience of patients in this virtual world helps them to be in a state of relaxation, which can lead to a more realistic expression of their feelings (Li et al., 2020a, b), and help to overcome the problem of shame that may exist in some patients. In addition, situated learning theory emphasizes the importance of the learning environment, which suggests that theoretical learning should be interconnected with real-world scenarios and that knowledge should be applied in real situations (Zurita et al., 2014). In this regard, immersive virtual environments constructed by VR have, to some extent, enabled patients to maintain a high level of acceptance, adherence, and motivation in CBT treatment, which potentially contributes to enhancing patient learning and reducing patient dropout rates (Orskov et al., 2022; Wu et al., 2020).

However, at this stage, there is a lack of cognitive-behavioural interventions specific to the Chinese population, especially Chinese bank employees. For Chinese people, the influence comes more from Confucian culture than from religion. Confucian culture focuses on cultivating virtues such as honesty, cooperation, loyalty, and justice (Cheng, 2014), and this cultural concept has been rooted in Chinese values (Liu, 2018), which makes Chinese people focus on ethical values such as the cultivation of the body, conduct, benevolence, unity, and harmony, as well as personal integrity and social prestige. In addition, scholars have confirmed the interventional value of Confucian ethics, such as the fact that Confucian meditation intervention therapy has a positive effect on improving the sleep quality of college students (Wen et al., 2023). Meanwhile, Chinese Confucian values are compatible with cognitive-behavioural therapy (Hodges & Oei, 2007). Therefore, this study incorporated Confucian ethics of meditation into cognitive-behavioural therapy, using Confucian ethical concepts of character, cultivation,

and benevolence as a measure to evaluate patients' thinking through meditation rituals and using moral judgment to correct inner irrational beliefs (Oh & Yoo, 2016), making patients aware of deviations from the paths of virtuousness, unity, and benevolence, refuting their irrational thinking and behaviour, and making them face up to their responsibilities and social identities, and to actively fulfill their social responsibilities, social values, and social virtues, promoting changes in patients' cognition, behaviour, and emotions.

In addition, this study absorbed elements of Confucian culture. It drew on Seo and Chang's (2021) cognitive-behavioural group art therapy strategy to design a VR-based cognitive-behavioural intervention therapy within the ethical framework of Confucian meditation and body cultivation. By creating a virtual environment, the constructed cultural scene of the Confucian Academy gives patients a sense of participation and immersion in the art environment, which puts patients in a more natural state and let's go of their psychological defences in order to help social workers observe the patients' behaviours and assist them in therapy (Li et al., 2020a, b). On the one hand, the cultural elements of meditation in the virtual environment, such as incense burners, shimmering light, and futons, increase the patient's meditation experience and strengthen the effect of meditation to internalize Confucian ethical concepts deeply. Patients' visual, cognitive, and social associations are formed in the virtual environment, associating individuals with their living places (Hatta et al., 2022). This virtual environment, which incorporates elements of traditional Chinese Confucian culture and local regional environments, reconfigures the negative associations of patients and realizes their cognitive changes. Incorporating Confucian meditation and body cultivation ethics completes the deficiencies in ethical concepts in cognitive-behavioural therapy.

On the other hand, using Confucian meditation and body cultivation ethics as intervention ethics fits Chinese people's daily ethical and moral requirements, which is conducive to patient acceptance and avoids the negative consequences of ethical conflicts with patients. This scenario, which is in line with the patient's cultural background, helps activate the patient's inner sense of familiarity with the field, which in turn leads to an increase in the observer's attention in the familiar environment (Karacan et al., 2010), forming a mechanism of learning-by-experiencing and optimizing the learning effect (Zhang et al., 2021). More importantly, under the role of Confucian meditation and cultivation ethics, patients pay more attention to the establishment of their conduct and cultivation so that in the future, they will continue to modify their thoughts, behaviours, and cognition and adopt a positive approach to life, realizing the long-term mechanism of the intervention. Based on this, we hypothesized that at the end of the intervention, participants in the

intervention group would show more significant improvement in sleep, anxiety, and stress than participants in the control group.

### Confucian ethics of meditation and body cultivation

Confucianism, as China's indigenous culture, has been present throughout the history of the Chinese people and has had a deep-rooted influence on their thinking and behaviour (Xiong & Wei, 2020). Confucianism attaches particular importance to the cultivation of the body, in other words, the improvement of character and morality, the achievement of the ideal character of "gentleman" and "virtuous man," and the development of moral consciousness, emotional consciousness, and law utilizing meditation (Peng, 2021), thus achieving the goal of body cultivation.

Meditation has been practiced in ancient China. For example, Buddhism and Taoism, which play an essential role in traditional Chinese culture, have long been practiced in meditation. The Confucian tradition of meditation emerged from both of them. During the Song and Ming dynasties, Confucianism absorbed the meditation methods of Buddhism and Taoism and formed its way of meditation cultivation (Feng, 2016), which became a method of physical and spiritual exercise (Peng, 2021). On the surface, the Confucian way of meditation does not look very different from Buddhism and Taoism, but there is a fundamental difference in substance. This difference is that Buddhist meditation aims to achieve spiritual liberation, and Taoist meditation aims to pursue the transcendence of life. In contrast, Confucian meditation abandons the mystery of religion and is a way to enhance moral cultivation and personal qualities, restraining interests, developing wisdom, sharpening willpower, and enhancing thinking, and has a distinctly present character (Feng, 2016).

Chinese bank employees face severe challenges of mental health problems due to a variety of factors, such as fierce market competition in the Chinese banking industry and immense internal assessment pressure in banks. Specifically, Chinese bank employees have higher mental health risks, such as stress and depression (Kan & Yu, 2016), and lower personal accomplishment (Li et al., 2015). Therefore, there is an urgent need for bank managers to develop and implement effective psychological interventions to improve the mental health of bank employees (Kan & Yu, 2016). In mainland China, the basic concepts of Confucian ethics are deeply rooted in people's minds and profoundly impact their perceptions and behaviours (Wen et al., 2023). Specifically, Confucian ethics emphasises individuals' social roles and moral responsibilities (Feng, 2023), focuses on refining one's willpower, and stresses the spiritual qualities of personal self-improvement and robustness (Cui & Li, 2023).

Its rich spiritual connotation has significant practical value for solving the mental health problems caused by the lack of spirituality in modern people (Guo, 2018).

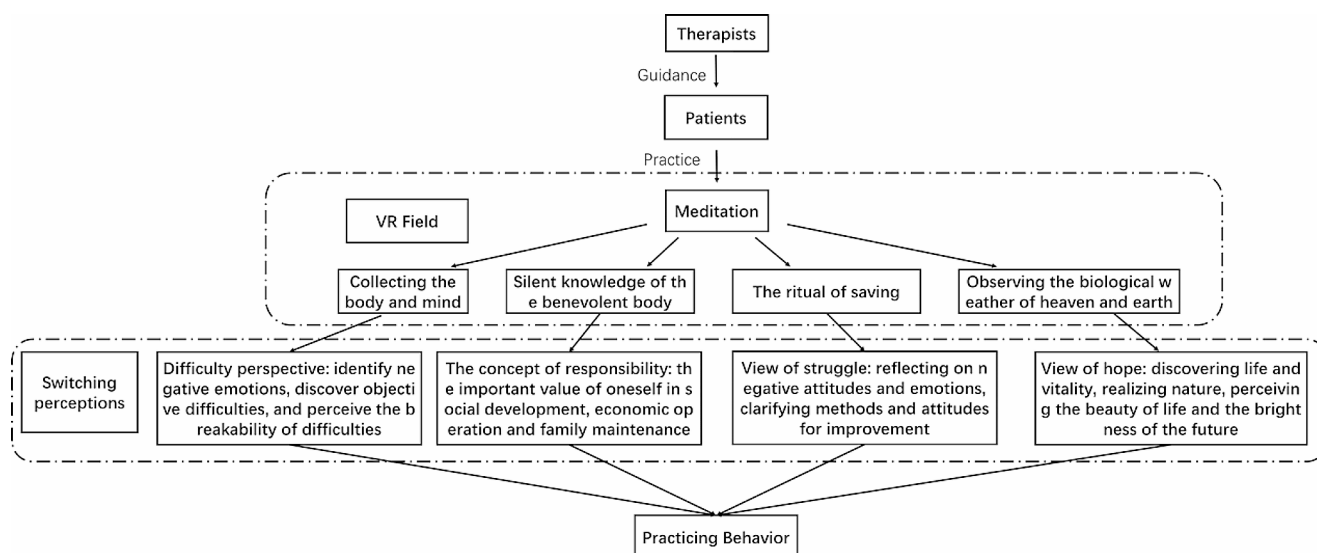
Therefore, the presentational features of Confucian ethics of cultivation may be more in line with the current stage of social development in China and may also be more in line with the intrinsic psychological needs of bank employees in Western China. Specifically, Confucian ethics' emphasis on social roles and moral responsibilities helps bank employees perceive their sense of significance and thus find a sense of personal belonging in the face of enormous competitive pressures and severe mental health challenges (Guo, 2018); Furthermore, Confucian ethics has better cultural adaptability in China, crucially because bank employees are more likely to understand the localized technique of Confucian meditation when applying its based ethical guidelines, thus contributing to their personal willpower and character development, and weakening the negative consequences of adverse emotional reflections (Wen et al., 2023). There are two categories of Confucian meditation. One is the meditation of Xinxue, the core teaching of which is "the main meditation," which focuses on meditation without desire and the return to the natural state of human nature. The other is the meditation of science, the core doctrine of "master respect," which focuses on the solemn and respectful handling of things. However, the former has the problem of differentiation from Buddhist and Taoist meditation, as well as some "dangers," i.e., practitioners pursue the physical and mental pleasure of meditation, experiencing the happiness, pleasure, and nobility of it while deviating from the goal of improving morality and developing character (Feng, 2016). Thus, the "main respect" meditation method complements and corrects the deficiencies of the "main quiet" meditation. "Respect" is used throughout the movement and stillness. So that the body and mind are always in states such as "awakening," "relaxation," and "calm". In addition, it focuses on cultivating emotion, consciousness, and morality. Therefore, meditation is a part of "master respect" (Chen, 2014), and "master respect" includes "master stillness." According to the functions and uses of meditation, it contains four types: (1) meditation as the meditation of silent knowledge of the benevolent body; (2) meditation as the meditation of collecting the body and mind; (3) meditation as the meditation of observing the biological weather of heaven and earth; and (4) meditation as the meditation of the ritual of saving (Chen, 2014). Further, the meditation of collecting the body and mind, the meditation of silent knowledge of the benevolent body, and the meditation of the ritual of saving are also the meditation of watching the mind and the meditation of watching the physical meteorology of heaven and earth is the meditation of watching things. Both internal

and external perceptions achieve the purpose of improving character and morality in many aspects.

Specifically, through the meditation of collecting the body and mind, bank employees can internalise the basic ethics of Confucianism while reaching a state of psychological peace, laying the foundation for them to perceive negative emotional states such as difficulties and worries (Chen, 2020); through the meditation of silently recognising the benevolence of the human body, bank employees can realise the Confucian "benevolence" mind in the process of meditation, so as to Through the meditation on the silent awareness of the Ren body, bank employees are made aware of the Confucian "benevolence" in the process of meditation, thus becoming aware of their own values, meanings, morals, and responsibilities, and are encouraged to start identifying negative emotions and mental states (Tian & Wang, 2021); through the meditation on the ritual of saving the past, bank employees are guided to reflect on their daily behaviours and negative concepts while understanding the process of "introspection" in the Confucian cultivation of the human body and are encouraged to The reasons for negative emotions and psychological states are summarised (Chen, 2020); through the meditation of observing the living creatures of heaven and earth, bank employees are made to understand the concept of the unity of life value between human beings and all things in heaven and earth in the Confucian meditation ethic, and are guided to challenge the negative emotions and psychological problems, and to perceive the essence of the real life and the bright hope for the future (Xue & Ma, 2015) (Fig. 1).

Guided by the four types of meditation techniques mentioned above, on the one hand, the combination of Confucian values with the technical goals of behavioural cognitive therapy, thereby enhancing the ability of bank employees to perceive and identify negative emotions and psychological states, exerts an excellent therapeutic effect in improving the occupational mental health of bank employees (Hitt et al., 2018); on the other hand, since the introspection process advocated by the Confucian meditation ethic can help bank employees to categorise the causes of negative emotions or psychological problems and to challenge the above negative emotions or psychological issues to perceive the nature of real life. In this sense, Confucian meditation ethics is compatible with cognitive-behavioral therapy (Hodges & Oei, 2007). It is important to emphasise that culturally adapted modifications of behavioural cognitive therapy in a cross-cultural context can enhance the effectiveness of psychological interventions (Wen et al., 2023); moreover, VR technology can enhance the immersive experience of the patients and further improve their cognitive functioning and psychological well-being (Galperin et al., 2023). Therefore, using VR technology to construct a virtual scenario





**Fig. 1** Confucianism meditation ethics technology roadmap

of Confucian meditation enhances bank employees' immersion in a cross-cultural context but also helps to improve their mental health status further (Wen et al., 2023; Galperin et al., 2023).

## Research methodology

### Study design

This study was a single-anonymized, grouped, randomized controlled trial that included an intervention group and a control group. The intervention group received VR-based cognitive-behavioural therapy within the ethical framework of Confucian meditation practice. The intervention lasted for a total of 10 weeks, with weekly intervention activities. Conversely, the control group only underwent the intervention for a short amount of time. Participants in both subgroups received information collection at three time points: baseline (T1) (August 13, 2022), postintervention (T2) (October 22, 2022), and the 8-week follow-up (T3) (December 18, 2022), which professionally trained social workers and educators assessed.

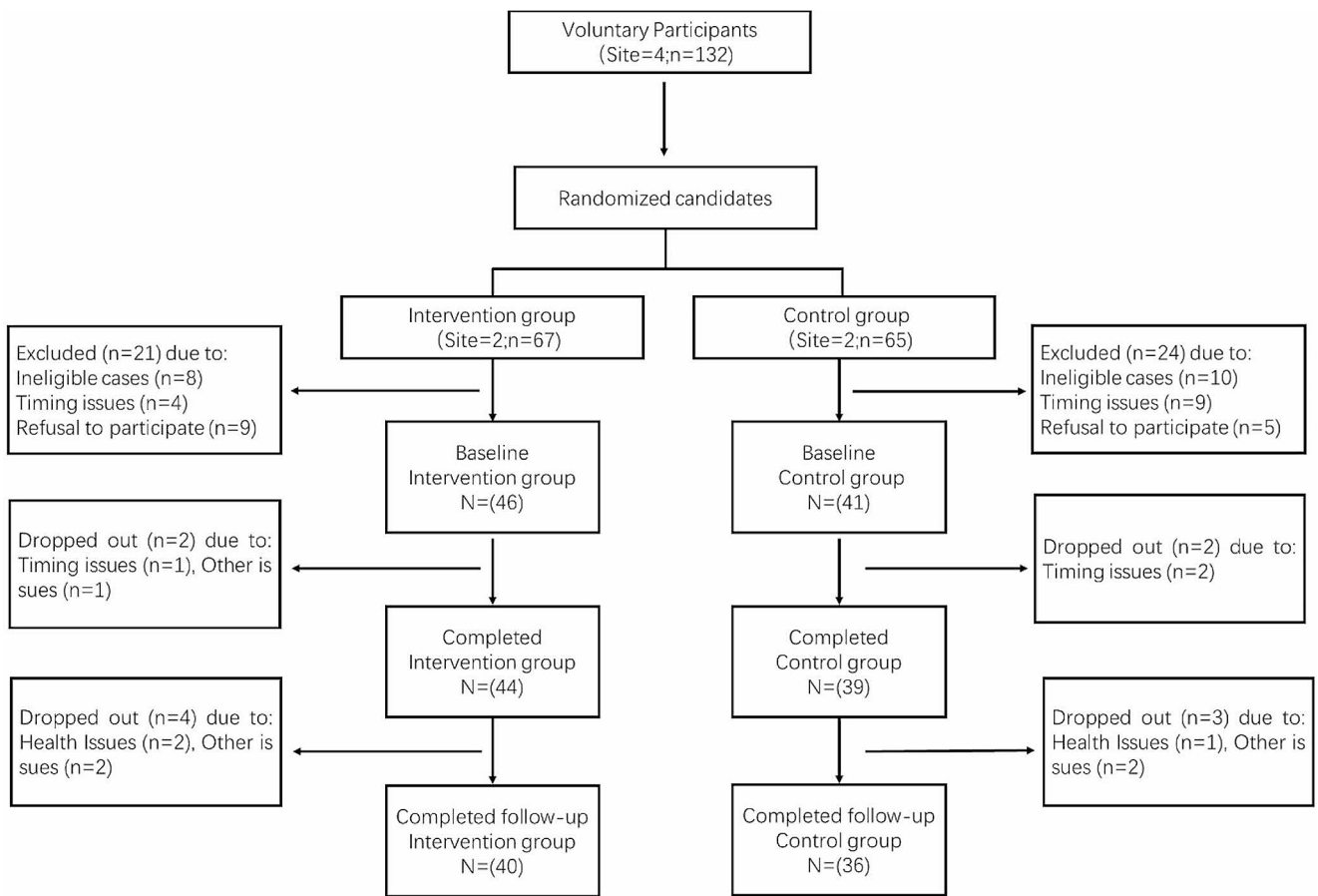
### Recruitment process

This study obtained a list of 12 banks in the city (6 state-owned banks and 6 local banks) after applying to the city's Banking Commission and then coded the state-owned banks and regional banks as 1, 2, 3, 4, 5, and 6, respectively, and randomly selected 2 of each of them through a random lottery machine (<https://cn.piliapp.com/random/number/>) banks as participant recruitment sites for this study. Sec-

ondly, the researchers conducted self-recruitment in the above 2 state-owned banks and 2 local banks, respectively, after obtaining the consent of the bank's branch leaders, and the participants signed the informed consent form after the researchers told them of the content information and precautions of the intervention program. Finally, the researchers randomly grouped the participants who signed the informed consent form into randomised groups after random coding (intervention group = 67, control group = 65). The screening criteria for the project participants were as follows: (a) bank staff aged 22 years and above; (b) had been in the job for more than one year; (c) had not participated in a similar mental health intervention program at the same time; (d) had fully volunteered to participate in the intervention program; and (e) had obtained the consent of the bank manager.

### Participant

Project participants were 132 bank employees from four banks in a city in the western part of Gansu Province, including 51 (38.6%) males and 81 (61.4%) females aged between 23 and 53 years ( $M = 35.01$ ,  $SD = 6.475$ ). Participants were required to complete assessments at three time periods: baseline (T1), postintervention (T2), and 8-week follow-up (T3). The 132 participants who signed the informed consent form were randomly assigned to the intervention (67) and control (65) groups. Before the project's official start, 18 participants withdrew due to not meeting the participation criteria, 13 declined to participate in the follow-up due to time reasons, and 14 changed their intention to participate before the baseline measurements due to personal reasons (Fig. 2). Therefore, finally, 76 participants completed the baseline measurements, of which 32 (36.78%) were male,



**Fig. 2** Study CONSORT diagram

and 55 (63.22%) were female, aged between 23 and 53 years old ( $M = 35.18$ ,  $SD = 7.092$ ). The demographic characteristics of the intervention and control groups are shown in Table 1, and there were no significant differences in the variables of the baseline measurements between the two groups ( $p > .05$ ). The Ethical Review Committee of the Lanzhou University Aging Research Base approved this intervention project.

### Power analysis

In addition, we specified PASS 15, which is ten weeks of follow-up after completing the assessment. Based on this study's mean PSQI, CPSS, and SAS scores, calculate the power of the intervention group = 0.99 and the control group = 0.99. Therefore, this study's sample size meets the study's requirements.

### Immersion mode

Regarding the immersion mode, this paper uses Twinmotion2022 for modelling to construct an immersive VR scene of Confucian school culture. The patient wears

an HTC VIVE head-mounted display (HMD), while the headset, left controller, and suitable controller are used as three stable tracking points to calculate the user's pose. In addition, two separate scenes were constructed to make the patient feel the meditation with two themes: the meditation of watching the mind and the meditation of watching things. According to Fig. 3, the first scene is in an indoor area with elements consisting of screens, futons, and shimmering light to carry out the mind-viewing meditation, perceive the presence of the self, and be aware of the emotions and attitudes of the self. According to Fig. 4, the second scene was outdoors. It consisted of elements such as a porch, courtyard, door plaque, and futon with the soothing sound of the lyre so that the patient could feel the outdoor landscape, experience the vibrancy of nature, and feel the hope of life in order to carry out the meditation of watching things. In addition, since meditation is required during the intervention, the project provided comfortable meditation facilities with elements of Confucian meditation culture, such as aromatherapy, futon, and soft backrests, to enhance the immersion of the group members and enhance the therapeutic effect while reducing their physical stress.

**Table 1** Demographic information and sample characteristics

Characteristics	Total sample ( <i>n</i> = 87)	Intervention ( <i>n</i> = 46)	Control ( <i>n</i> = 41)	Comparison (t or $\chi^2$ )
Age (mean)	35.18	34.41	36.05	-1.08
Gender(%)				
Female	55(63.22%)	29(63.04%)	26(63.41%)	0.001
Male	32(36.78%)	17(36.96%)	15(36.58%)	
Academic Level(%)				
College	43(49.43%)	21(45.65%)	22(53.66%)	0.556
Undergraduate	44(50.57%)	25(54.35%)	19(46.34%)	
Marital Status(%)				
Married	61(70.11%)	30(65.22%)	31(75.61%)	1.117
Unmarried	26(29.89%)	16(34.78%)	10(24.39%)	
Type of work(%)				
Agency	22(25.29%)	12(26.09%)	10(24.39%)	0.033
Network	65(74.71%)	34(73.91%)	31(75.61%)	
Political Appearance(%)				
Communist Party	18(20.69%)	10(21.74%)	8(19.51%)	0.066
Crowd	69(79.31%)	36(78.26%)	33(71.74%)	
Family size(%)				
1–2 people	63(72.41%)	34(73.91%)	29(70.73%)	0.312
3–4 people	17(19.54%)	8(17.39%)	8(19.51%)	
More than 4 people	7(8.05%)	4(8.70%)	3(6.98%)	
Health Status(%)				
Physical health	54(62.07%)	29(63.04%)	25(60.98%)	-0.491
Occasional illnesses	16(18.39%)	9(19.57%)	7(17.01%)	
Frequent minor illnesses	14(16.09%)	7(15.22%)	7(17.01%)	
Suffer from chronic diseases	3(3.45%)	1(2.17%)	2(4.88%)	
Emotional support from family(%)				
Frequently	62(71.26%)	34(73.91%)	28(68.29%)	1.728
Occasionally	21(24.14%)	9(19.57%)	12(29.27%)	
Never	4(4.60%)	3(6.52%)	1(2.44%)	
Number of new crown views per week(%)				
None	15(17.24%)	8(17.39%)	7(17.07%)	0.320
1–3	56(64.37%)	30(65.22%)	26(63.41%)	
4–6	9(10.34%)	5(10.87%)	4(9.76%)	
7 times or more	7(8.05%)	3(6.52%)	4(9.76%)	
Mean (SE) of behavioural measures at baseline				
PSQI	6.94(0.30)	6.91(0.40)	6.98(0.44)	-0.105
CPSS	26.21(0.31)	26.02(0.48)	26.41(0.37)	-0.644
SAS	49.12(0.68)	48.72(0.98)	49.57(0.94)	-0.622

Continuous variables were compared using one-sample t tests; categorical variables were compared using the  $\chi^2$  test. All differences were  $p > .05$

## Interventions

The intervention group underwent a four-stage therapeutic intervention, aiming to perform four themes of meditation exercises: “Collecting the body and mind,” “silent knowledge of the benevolent body,” “the ritual of saving,” and “observing the biological weather of heaven and earth” through VR scenes showing the Confucian school and cultural elements. The meditation exercises aim to change the students’ thinking, perceptions, values, and opinions so that negative feelings can be reduced and willpower can

be increased, thus forming positive attitudes, behaviours, and lifestyles. A total of 10 weeks of intervention training were conducted over three months. The first phase was the first week, which focused on the pre-measurement of the two groups as well as the introduction of the intervention content, purpose, and process for the intervention group members, the establishment of the group model and order, and the overall presentation of the Confucian philosophy of body cultivation. From weeks 2 to 5, the second phase aims to explain and practice convergence and silent knowledge of the benevolent body. The third phase, from weeks 6 to 8,



**Fig. 3** Immersion mode screen: in which participants conduct a mindfulness-themed meditation



**Fig. 4** Immersive mode screens: in which participants conduct object-viewing-themed meditations



aimed to conduct the explanation and practice of the ritual of saving and the meditation of viewing the biological weather of heaven and earth. The fourth phase, from weeks 9 to 10, aimed to consolidate the treatment effect, practice the four meditations as a whole, conduct the post-measurement of the two groups, and deal with the emotion of separation. The specific intervention themes are shown in Table 2.

## Data measurement and statistical analysis

### Data measurement

The SAS Anxiety Scale, Pittsburgh Sleep Quality Index (PSQI), and Stress Perception Scale (Chinese PSS, CPSS) assessed participants' anxiety, sleep quality, and stress perception. As an assessment tool for anxiety, the SAS has 20 items and is scored on a 4-point Likert scale, with 1 point

for none or minor, 2 points for little, 3 points for quite a lot of time, and 4 points for most of the time, with higher scores indicating more anxiety. In addition, the Chinese version of the SAS also has strong internal consistency and test validity (Wang et al., 1999). In addition, Cronbach's  $\alpha$  values in this study were 0.722. The PSQI consists of 19 self-rated items and is a valid instrument for measuring sleep quality (Zhang et al., 2020). The PSS-14 is widely used to assess individuals' perceived stress levels (Huang et al., 2020) and has been introduced into China as the CPSS (Chinese PSS), which uses a 5-point Likert scale ranging from no score of 0, occasionally 1, sometimes 2, often 3, and always 4, with a total of 14 items. Meanwhile, Cronbach's  $\alpha$  values in this study were 0.713. In addition, the threshold distribution of the three is 50 (Wang & Zhao, 2020), 7 (Kong et al., 2018), and 26 (Chen et al., 2021).

**Table 2** Summary of intervention therapy topics

Time	Specific Topics	Components	Goals	Details
Weeks 1	Building groups Forming order	<ol style="list-style-type: none"> <li>1. Baseline measurements.</li> <li>2. Overall Introduction.</li> <li>3. Setting goals and rules.</li> <li>4. Establishing patterns and order.</li> <li>5. Explaining treatment methods.</li> <li>6. Explaining the philosophy of bodywork.</li> </ol>	<ol style="list-style-type: none"> <li>1. To establish the culture and rules of the group to improve the effectiveness of follow-up treatment.</li> <li>2. To establish the patient's initial understanding of the treatment and reduce the patient's psychological defense mechanism.</li> <li>3. Establish the relationship between the therapist and the patient.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ice-breaker game.</li> <li>2. Group members introduce themselves and form a mutual understanding.</li> <li>3. Initial introduction of the treatment model, treatment time and requirements.</li> </ol>
Weeks 2–5	Meditation and clarity of responsibility Awareness	<ol style="list-style-type: none"> <li>1. Introduction to astringent meditation and related matters.</li> <li>2. Conducting VR scenario meditation practice.</li> <li>3. Introducing meditation for silent awareness of benevolence and related matters.</li> <li>4. Meditation practice with VR scenes.</li> <li>5. Discussion and exchange among group members.</li> <li>6. Review of the practice of benevolent meditation and convergence meditation.</li> </ol>	<ol style="list-style-type: none"> <li>1. To make patients aware of their own inner feelings and to clarify the mechanisms of psychological operation.</li> <li>2. To enhance the patient's perception of Confucian ethics.</li> <li>3. To clarify the root cause of the problem, perceive the separability of the problem, and increase the confidence to cope with it.</li> <li>4. Transform patients' irrational cognition and motivate them to pay attention to self-improvement.</li> <li>5. Enhance patients' social values and sense of responsibility.</li> </ol>	<ol style="list-style-type: none"> <li>1. To make patients aware of their own inner feelings and to clarify the mechanisms of psychological operation.</li> <li>2. To enhance the patient's perception of Confucian ethics.</li> <li>3. To clarify the root cause of the problem, perceive the separability of the problem, and increase the confidence to cope with it.</li> <li>4. Transform patients' irrational cognition and motivate them to pay attention to self-improvement.</li> <li>5. Enhance patients' social values and sense of responsibility.</li> </ol>
Weeks 6–8	Reflection and Action Revitalize	<ol style="list-style-type: none"> <li>1. Introduction to ritual meditation and related matters.</li> <li>2. VR meditation practice.</li> <li>3. Introduce the biometeorological meditation of heaven and earth and related matters.</li> <li>4. Conducting a meditation practice on the biological meteorology of heaven and earth in VR scenes.</li> <li>5. Discussion and exchange among group members.</li> <li>6. Reviewing the practice of the ritual meditation.</li> </ol>	<ol style="list-style-type: none"> <li>1. strengthen the patient's Confucian ethical cultivation.</li> <li>2. Guide patients to reflect on negative perceptions, attitudes and behaviours from their past lives.</li> <li>3. Motivate patients to change.</li> <li>4. Enhance patients' confidence to change and revise their dysfunctional beliefs.</li> </ol>	<ol style="list-style-type: none"> <li>1. an explanation of the content and philosophy of the Rites of Passage.</li> <li>2. Through meditation in VR scenes and viewing the ink stains on the door plaques and screens, it is derived that negative perceptions, behaviours and feelings are retained as long as the ink stains.</li> <li>3. Lead the group to think about the negative consequences of negative perceptions and develop their ability to accept emotions.</li> <li>4. Explain the concept and relevance of the Book of Rites.</li> <li>5. Conducting meditation in VR scenarios and viewing external good things will enable patients to build positive perceptions and beliefs and change negative behaviours.</li> </ol>
Weeks 9–10	Reflection and Action Revitalize	<ol style="list-style-type: none"> <li>1. Overall review and practice of the four modes of meditation.</li> <li>2. Revisit the relationship between the Confucian ethics of body cultivation and life.</li> <li>3. Introduce techniques for relieving stress in daily life</li> <li>Group exchange and discussion.</li> <li>4. Handling of parting emotions.</li> <li>5. post-measurement and scheduling of follow-up interviews.</li> </ol>	<ol style="list-style-type: none"> <li>1. To internalize the ethical concepts and behaviours of Confucianism in the patients.</li> <li>2. Reinforce the group members' practice of the four types of meditation.</li> <li>3. To enable patients to understand the relationship between cognition, behaviour and emotion.</li> <li>4. To reduce the patient's dependence on the group and therapist.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explanation of the content and philosophy of the Ersatzta.</li> <li>2. Group activities to lead patients to practice the four meditation styles.</li> <li>3. Educational activities lead the group to recognize the combined effects of the psychological elements.</li> <li>4. Conduct emotional de-escalation work and make patients aware of the follow-up arrangements.</li> </ol>

## Statistical analysis

This study used SPSS 26.0 software for the overall analysis of the data. All 87 participants who consented met the inclusion criteria and participated in the baseline measurements. They were included in the analysis, regardless of whether

they subsequently withdrew from the study. Missing data resulting from individual group members dropping out was processed using wholly conditional multiple interpolations, with 20 interpolations and 50 iterations. Participant background variables (participant's gender, age, marital status, education level, number of visits to new crowns, job type,

family size, physical status, family support) and behavioural variables (PSQI, SAS, CPSS scores at all three-time points) were included in the model used to interpolate the missing data. After interpolation was completed, paired-sample t-tests were used to compare scores at the baseline (T1) (August 13, 2022), postintervention (T2) (October 22, 2022), and 8-week follow-up (T3) of the program (December 18, 2022) to assess the effect of change for both cohorts, as well as repeated measures obtained between the different groups' effect sizes and Cohen's d was used to assess the size of the utility measure with criteria 0.2, 0.5, and 0.8 for small, medium, and large effect sizes, respectively (Cherubini & MacDonald, 2021). The effects of the longitudinal intervention were then measured using a linear mixed model that incorporated a categorical random effect (participants), a categorical fixed effect (intervention group vs. control group), a sequential fixed effect (time: baseline (T1) vs. postintervention (T2) vs. follow-up (T3), and a group\*time interaction. Differences in intervention effects between the two groups were assessed by F-tests for group\*time fixed effects. Finally, we compared the effects of the intervention methods by changes in scores at the baseline (T1) (August 13, 2022), postintervention (T2) (October 22, 2022), and 8-week follow-up (T3) of the program (December 18, 2022) in the intervention and control groups, and used one-sided, two-sample t-tests to assess the experimental group and control groups for differences between intervention methods.

### Results

The intention-to-treat participant data analysis showed that the intervention group significantly decreased CPSS scores at T1 and T2. At the same time, there was no significant decrease in PSQI and SAS but a significant decrease in PSQI, CPSS, and SAS scores at T2 versus T3 and their T1 to T3 phases (e.g., Table 3). In contrast, there was no significant change in the PSQI, CPSS, and SAS scores in the control group at all periods. In addition, score improvements in the intervention group were all statistically more significant than in the control group from T1 to T2, with small effect sizes for PSQI score improvements in the intervention group (Cohen's  $d=0.21$ ) and CPSS (Cohen's  $d=0.40$ ), while none of the overall improvements in the control group had an effect size. Score improvement in the intervention group was also more statistically significant than in the control group from T2 to T3, with medium effect sizes for PSQI score improvement in the intervention group (Cohen's  $d=0.51$ ), small effect sizes for CPSS (Cohen's  $d=0.41$ ), and large effect sizes for SAS (Cohen's  $d=1.47$ ). In contrast, only SAS had small effect sizes (Cohen's  $d=0.21$ ) in the control group. In addition, score improvements in the

**Table 3** Means, SEs, and effect sizes for the intention-to-treat and completed assessment analysis

	Intention-to-treat (N=87)						Completed assessment (N=76)											
	PSQI			CPSS			SAS			PSQI			CPSS			SAS		
	Total	IG	CG	Total	IG	CG	Total	IG	CG	Total	IG	CG	Total	IG	CG	Total	IG	CG
Baseline (T1)	6.94	6.91	6.98	26.21	26.02	26.41	49.12	48.72	49.57	6.83	6.85	6.81	26.38	26.25	26.53	49.42	49.50	49.34
Mean (SE)	(0.30)	(0.40)	(0.44)	(0.31)	(0.48)	(0.37)	(0.68)	(0.98)	(0.94)	(0.31)	(0.42)	(0.47)	(0.32)	(0.49)	(0.40)	(0.72)	(1.04)	(0.99)
Postintervention (T2)	7.00	6.74	7.30	26.00	25.71	26.33	49.09	48.42	49.83	6.95	6.78	7.14	26.16	25.90	26.44	49.28	49.16	49.41
Mean (SE)	(0.27)	(0.36)	(0.41)	(0.29)	(0.45)	(0.36)	(0.64)	(0.90)	(0.91)	(0.29)	(0.38)	(0.43)	(0.30)	(0.46)	(0.37)	(0.66)	(0.94)	(0.93)
Follow-up (T3)	6.62	6.16	7.14	25.73	25.21	26.31	47.83	46.35	49.48	6.63	6.25	7.06	25.84	25.38	26.36	47.96	46.94	49.10
Mean (SE)	(0.26)	(0.31)	(0.43)	(0.28)	(0.42)	(0.35)	(0.63)	(0.83)	(0.89)	(0.26)	(0.30)	(0.43)	(0.28)	(0.42)	(0.36)	(0.66)	(0.87)	(0.95)
T1-T2 T score	-0.58	1.45	-1.92	2.37	2.73	0.64	0.22	1.27	-1.04	-1.03	0.57	-1.75	2.51	3.00	0.62	0.79	1.30	-0.26
T1-T2 Effect size (d)	-0.62	0.21	-0.30	0.25*	0.40**	0.10	0.02	0.18	-0.16	-0.12	0.09	-0.29	0.29*	0.48**	0.10	0.09	0.21	-0.04
T2-T3 T score	3.22	3.46	0.97	2.23	3.73	0.15	6.65	8.88	1.33	2.76	3.28	0.53	2.40	2.72	0.49	6.87	11.23	1.25
T2-T3 Effect size (d)	0.35**	0.51**	0.15	0.24*	0.41**	0.02	0.71****	1.47****	0.21	0.32****	0.52****	0.09	0.28*	0.43**	0.81	0.79***	1.78***	0.21
T1-T3 T score	2.05	3.56	-0.82	3.33	2.76	0.64	5.41	9.94	0.30	1.27	2.93	-1.16	3.51	3.60	1.03	5.92	9.17	0.77
T1-T3 Effect size (d)	0.22*	0.52***	-0.13	0.36**	0.55***	0.10	0.58***	1.31***	0.05	0.15	0.46***	-0.19	0.40***	0.57***	0.17	0.68***	1.45***	0.13
Group*Time (F)	6.95**			4.63**			20.96****			5.68**			4.08*			22.09****		

IG Intervention group, CG Control group. The Condition\*Time interactions were estimated as a fixed effect in the linear mixed model

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

intervention group were also statistically more significant than the control group from T1 to T3, with improvements in PSQI scores in the intervention group having medium effect sizes (Cohen’s  $d=0.52$ ), as well as medium effect sizes for the CPSS (Cohen’s  $d=0.55$ ) and large effect sizes for the SAS (Cohen’s  $d=1.31$ ). In contrast, improvements in the control group did not have effect sizes. In addition, there were condition\*time effects for PSQI ( $F(2,170)=6.95, p=.01$ ), CPSS ( $F(2,170)=4.63, p=.011$ ), and SAS ( $F(2,170)=20.96, p<.001$ ).

The completed assessment participant data analysis also yielded the same results (e.g., Table 3). The intervention group had a significant reduction in the scores of CPSS from T1 to T2 with no significant reduction in PSQI, SAS, or similarly in the scores of PSQI, CPSS, and SAS from T2 to T3 and its T1 to T3 phase. On the contrary, for the control group, there was no significant change in any of the corresponding scores. In addition, the improvements in scores in the intervention group were all more statistically significant than in the control group from T1 to T2. The improvements in the CPSS in the intervention group had small effect sizes (Cohen’s  $d=0.48$ ) and in the SAS (Cohen’s  $d=0.21$ ), whereas none of the improvements in the control group had effect sizes. Score improvement in the intervention group was likewise more statistically significant overall than in the control group from T2 to T3, with improvement in PSQI scores in the intervention group having medium effect sizes (Cohen’s  $d=0.52$ ), CPSS having small effect sizes (Cohen’s  $d=0.43$ ). SAS has large effect sizes (Cohen’s  $d=1.78$ ). In contrast, only SAS had small effect sizes (Cohen’s  $d=0.21$ ) in the control group. In addition, score improvement in the intervention group was also statistically more significant than in the control group from T1 to T3, with PSQI score improvement in the intervention group having small effect sizes (Cohen’s  $d=0.46$ ), as well as medium effect sizes for the CPSS (Cohen’s  $d=0.57$ ) and large effect sizes for the SAS (Cohen’s  $d=1.45$ ). In contrast, none of the control group improvements had effect sizes. In addition, there were condition\*time effects for PSQI ( $F(2,148)=5.68, p=.004$ ), CPSS ( $F(2,148)=4.08, p=.019$ ), and SAS ( $F(2,148)=22.09, p<.001$ ).

The difference in the effect sizes of PSQI, CPSS, and SAS score changes between the intervention and control groups at the T1 to T3 stages can be seen according to Table 4. According to the data from the Intention-to-treat analysis, there was a statistically significant improvement in PSQI scores in the intervention group compared to the control group from T1 to T2 (Cohen’s  $d=0.53$ ). In the T1 to T3 phase, the intervention group had a statistically significant improvement in PSQI (Cohen’s  $d=0.67$ ), CPSS (Cohen’s  $d=0.54$ ), and SAS (Cohen’s  $d=1.17$ ) scores compared to the control group, with moderate effect sizes for PSQI and

**Table 4** Change scores for each group and comparisons of the differences in effect size

	Intention-to-treat (N=87)						Completed assessment (N=76)											
	PSQI			CPSS			SAS			PSQI			CPSS			SAS		
	IG mean (SE)	CG mean (SE)	Effect size	IG mean (SE)	CG mean (SE)	Effect size	IG mean (SE)	CG mean (SE)	Effect size	IG mean (SE)	CG mean (SE)	Effect size	IG mean (SE)	CG mean (SE)	Effect size	IG mean (SE)	CG mean (SE)	Effect size
Baseline(T1)	0.17 (0.12)	-0.32 (0.17)	0.53**	0.32 (0.12)	0.04 (0.13)	0.29 (0.13)	0.47 (0.22)	-0.40 (0.25)	0.35 (0.13)	0.08 (0.13)	-0.33 (0.19)	0.41*	0.35 (0.12)	0.08 (0.13)	0.35 (0.26)	0.34 (0.26)	-0.07 (0.26)	0.25
Postintervention (T2)	0.76 (0.21)	-0.11 (0.19)	0.67**	0.76 (0.23)	0.09 (0.17)	0.54**	2.44 (0.26)	0.04 (0.34)	1.17***	0.6 (0.21)	-0.25 (0.22)	0.66**	0.88 (0.24)	0.17 (0.16)	0.54**	2.56 (0.28)	0.24 (0.31)	1.27***
Follow-up (T3)	0.58 (0.17)	0.15 (0.16)	0.39*	0.44 (0.19)	0.05 (0.16)	0.42*	1.97 (0.22)	0.44 (0.27)	1.10***	0.53 (0.16)	0.08 (0.16)	0.45*	0.53 (0.19)	0.08 (0.17)	0.39*	2.22 (0.20)	0.31 (0.25)	1.39***
Follow-up (T3)																		

Cohen’s  $d$  (Effect size) was obtained by dividing the difference in change by the pooled baseline standard deviation.  $p$ -values are for one-sided tests of the intervention effect, i.e., Hypothesis: change in IG > change in CG

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$



CPSS and more significant effect sizes for SAS. Not only that, the same conclusion was reached based on the data analyzed in the completed assessment, where the intervention group had a statistically significant improvement in PSQI scores with a smaller effect size (Cohen's  $d=0.41$ ) than the control group from T1 to T2. In addition, the intervention group still had a statistically significant improvement in PSQI (Cohen's  $d=0.66$ ), CPSS (Cohen's  $d=0.54$ ), and SAS (Cohen's  $d=1.27$ ) scores with moderate effect sizes for PSQI and CPSS and a more significant effect size for SAS than the control group from T1 to T3.

## Discussion

This research endeavoured to scrutinize the impact of an intervention model on banking sector personnel, explicitly examining the efficacy of CBT within the context of the cultural background of the subjects and the advent of novel technological applications. The results of our inquiry indicate that the intervention model yields positive outcomes. Nonetheless, the potency of psychological interventions via CBT in ameliorating symptoms of anxiety, depression, fatigue, and insomnia has been rigorously explored and debated across a multitude of RCTs (Smith et al., 2015; Danhauer et al., 2022; Drake et al., 2022). Nevertheless, an ethical framework informed by Confucian meditative practices and somatic cultivation was meticulously developed. Under this schema, a VR-enhanced cognitive behavioural intervention was administered, which demonstrably diminished the prevalence of anxiety, improved sleep quality, and alleviated stress-related maladies amongst banking personnel amid the unprecedented COVID-19 pandemic.

It is worth noting that the members of the intervention group, although their mental health improved after the 10-week intervention, showed different intervention effects at various phases. The above finding is similar to the results of some existing studies (Agako et al., 2021), which may be related to the participants' competence enhancement (Touyz et al., 2013), behavioural changes (Sundquist et al., 2017) and other factors. More specifically, based on the results of Intention-to-treat data analyses, the PSQI, CPSS, and SAS scores time\*group interaction effects were all significant, indicating that all scores of the experimental and control groups changed significantly with the extension of the intervention time and that the changes in the scores of the experimental group were more significant than the changes in the scores of the control group. The above demonstrates the effectiveness of the VR meditation intervention based on Confucian ethics designed in this study, and the results once again illustrate the great potential for the development of cognitive behavioural therapies based on new technologies

(Ying et al., 2022; Zhang et al., 2023; de Gier et al., 2023), and the necessity and validity of the cultural adaptation of psychological interventions in a cross-cultural context. Modification is necessary and effective (Wen et al., 2023).

More specifically, PSQI, CPSS, and SAS scores changed significantly in the intervention group from T1 to T3 but not in the control group, and in addition, between-group effects tests reflected that from T1 to T3 PSQI, CPSS, and SAS scores showed more robust changes in scores in the intervention group versus the control group, suggesting that members of the intervention group showed more significant improvements in their scores for sleep, stress, and anxiety than the control group was more pronounced. This result is similar to the psychological intervention effects of incorporating Buddhist ethics into CBT with culturally adapted modifications (Liu et al., 2024; Hamilton-West et al., 2018; Burgess et al., 2021), suggesting that culturally adapted modifications of CBT in mainland China have great potential for development and may have a more effective intervention effect on patient produce more effective intervention outcomes (Rathod et al., 2013). Additionally, participants in both the intervention and control groups showed non-significant improvements in PSQI and SAS scores from T1 to T2 but significant improvements from T2 to T3, which may be related to the ethical basis of the abstraction of the meditation intervention topic (Wen et al., 2023). Specifically, it took some time for participants to internalize and practice the Confucian ethics underlying the meditation intervention, and even with the aid of the virtual reality space created by VR, participants' knowledge acquisition needed to combine with knowledge application (Wang et al., 2009). Participants' mastery of Confucian ethics and meditation techniques increased as the intervention program progressed. Individuals' perceptions of the nature of life and the meaning of work increased during the intervention program, contributing to their self-esteem and sense of efficacy and thus positively impacting their mental health (LaMontagne et al., 2014).

In summary, this study has the following findings: first, this study found that cognitive-behavioral therapy based on Confucian meditation and cultivation ethics has sound effects on improving the mental health of bank employees, and the intervention method of this project has a vital development potential; second, VR, as an emerging technological means of mental health interventions, can enhance the immersion experience of participants by creating a virtual reality space, thus improving the treatment. Third, this study illustrates the need to adapt behavioural cognitive therapy (BCT) in a cross-cultural context, which has become one of the key manifestations of the third wave of BCT; fourth,



the Confucian meditation and cultivation ethic emphasised in this study stresses the characteristics of “presentness”, highlighting the need for psychological interventions to focus on improving patients’ essential competencies; fourth, this study highlights the need to improve patients’ essential competencies through the use of VR. Fourth, the Confucian meditation ethics emphasised in this study stresses the characteristic of “presentability,” which highlights the need for psychological interventions to pay attention to improving the basic abilities of patients, including resilience, beliefs, sense of value, and worldly behaviours, which is conducive to enhancing the effectiveness and continuity of the intervention effects.

Nonetheless, this study still has some limitations. First, during the use of the VR equipment, some participants may suffer from physiological discomfort such as dizziness, which may affect the intervention effect; second, the cities in the western region of China, a less economically developed region, were selected as the study sites in this study, whereas the bank employees in the eastern region of China may face with more severe work pressures and mental health problems, which reduces the persuasive power of the intervention program of this study; third, as the present research Third, because the Confucian ethics referenced in the intervention themes of this study are relatively abstract, this may lead to a high initial dropout rate of participants on the one hand, and a limited effect of the initial intervention on the other hand; Fourth, this study is the first attempt to localise behavioural cognitive therapy in mainland China, and there is still much room for improvement in the design of the intervention programs and themes.

## Conclusion

This study demonstrates the effectiveness of a VR-based cognitive-behavioral intervention therapy within the ethical framework of Confucian meditation and cultivation of the body to improve sleep quality, anxiety, and stress among bank employees in western China. Our findings suggest that a VR-based Confucian meditation approach significantly enhances bank employees’ psychological well-being in the western China. This study also further confirms the necessity and effectiveness of adapting and improving psychological intervention methods for cross-cultural contexts and illustrates the facilitating effect of emerging technologies such as VR on the third wave of behavioral and cognitive therapy. Therefore, we support the application of VR and other technologies to adopt the VR-based cognitive-behavioral

intervention therapy of Confucian meditation proposed in this study for occupational groups in different parts of mainland China in the post-pandemic era to cope with the potential mental health problems of the population in the present time. In addition, this study also has some theoretical and practical implications for the development and practice of cognitive-behavioral therapy, providing a Chinese case study in the third wave of cognitive-behavioral therapy development.

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**Data availability** Since this study has yet to be published, the data are private. However, the dataset analysed in this study after publication is available from the corresponding author upon reasonable request.

## Declarations

**Institutional review board statement** This study was approved by the Ethics Review Committee of the Lanzhou University Research Base on Aging, and the procedures used in this study followed the principles of the Declaration of Helsinki.

**Informed consent** Informed consent was obtained from all subjects involved in the study.

**Conflict of interest** The corresponding author represents all authors, and this study has no conflict of interest.

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