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# The effect of emotional freedom techniques on anxiety depression and sleep in older people living with HIV: a randomized controlled trial

Wen Qi<sup>1</sup>, You Xinyi<sup>1</sup>, Wu Yuhan<sup>1</sup>, Yang Wenwen<sup>1</sup> and Song Yan<sup>2\*</sup>

## Abstract

**Objective** To investigate the effect of Emotional Freedom Techniques on anxiety, depression and sleep in older people living with HIV (PLWH).

**Methods** 70 older PLWH experiencing anxiety, depression, and sleep disorders were randomly divided into control and experimental groups using a random number table system (RNT), with 35 participants in each group. The experimental group received Emotional Freedom Techniques once a day for 15–20 min as part of their routine care and health counselling, and the intervention lasted for 2 weeks. The control group received standard nursing care and health guidance. The two groups were assessed using the Pittsburgh Sleep Quality Index (PSQI) and the Hospital Anxiety and Depression Scale (HADS) to measure changes in anxiety, depression, and sleep quality before and after the intervention.

**Results** There are totally 67 participants in the trial. In the EFT group ( $n = 33$ ), PSQI scores decreased from  $12.36 \pm 2.409$  to  $9.15 \pm 2.476$  (mean  $\pm$  SD  $P < 0.001$ ), HA scores decreased from  $12.39 \pm 2.344$  to  $9.12 \pm 2.176$  (mean  $\pm$  SD  $P < 0.001$ ), HD scores decreased from  $11.58 \pm 1.969$  to  $8.94 \pm 2.015$  (mean  $\pm$  SD  $P < 0.001$ ), compared with no change in the usual care group ( $n = 34$ ). The EFT group showed significantly lower post-intervention scores than the control group on all scales ( $P < 0.001$ ), indicating the effectiveness of the intervention.

**Conclusion** Emotional Freedom Techniques can effectively alleviate anxiety and depression in older PLWH and improve their sleep quality.

**Keywords** Emotional freedom techniques, HIV, PLWH, Older adults, AIDS, Sleep disorders, Anxiety, Depression

\*Correspondence:

Song Yan

njyy037@njucm.edu.cn

<sup>1</sup>School of Nursing, Nanjing University of Chinese Medicine, Nanjing 210023, Jiangsu, China

<sup>2</sup>Department of Nursing, The Second Hospital of Nanjing, Affiliated to Nanjing University of Chinese Medicine, Nanjing 210003, Jiangsu, China



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In recent years, the prevalence of HIV disease among older adults has increased [1]. The number of older HIV-infected patients in China is also on the rise [2, 3], from 3.1 million in 2008 to 5.7 million in 2016, and the proportion rose from 7.9% in 1990 to 15.6% in 2016 [4]. HIV in older ages is a concern because of the physical, mental and psychosocial health issues associated with HIV and aging, both separately and concomitantly [5]. Older people living with HIV (PLWH) have greater physical and mental stress and economic burden due to opportunistic infections and complications, which aggravate the occurrence of anxiety and depression [6], and these negative emotions significantly impair patients' sleep quality, disrupting their daily lives [7, 8]. Some studies have shown that the prevalence of anxiety and depression in older adults with HIV disease in China is 32.2% [9], and the prevalence of sleep disorders is close to 30% [4]. Poor neuropsychological test performance prior to the development of HIV disease is a proximal predictor of mortality [10]. If patients are disturbed by negative emotions and poor sleep for a long period of time, the levels of various hormones in the body, led by cortisol, will change accordingly [11], leading to secretion imbalance and blockage of the meridian system, which will lead to systemic reactions. Therefore, positive guidance and early intervention should be given to patients from the psychological level to improve the quality of sleep and quality of life and to promote the recovery of patients' physical functions.

Emotional Freedom Techniques (EFT) is guided by the meridian theory of Chinese medicine and combined with the principles of psychology. In the therapeutic process, EFT addresses and mitigates anxiety, depression and other negative emotions by tapping on specific acupoints and promoting self-acceptance through repetitive affirmations [12]. Following the application of EFT, physiological health indicators, such as resting heart rate (RHR), blood pressure (BP), and cortisol levels, significantly decreased, while levels of happiness and immune system function increased [13]. Studies [14–16] conducted both in China and internationally have demonstrated that EFT can effectively alleviate the negative emotions associated with chronic diseases and improve physical and mental health symptoms; however, there is a paucity of research and application concerning EFT within the context of PLWH. Therefore, this study aimed to implement EFT to alleviate anxiety and depression while enhancing sleep quality among older PLWH.

## Objects and methods

### Sample size and randomization

The sample size of this study was analyzed by PASS15 software. The HA scores were the observed outcome indicators. According to the results of the pre-test, mean HA scores before and after the intervention were 11.14

and 8.65, respectively. With 80% power and alpha level of 0.05, and considering the 10% dropout rate, a total of 70 participants were required. A random sequence of numbers from 1 to 70 was generated by a non-member of the research team using the Research Randomizer website (randomizer.org), and these random numbers were individually placed in sequentially coded, sealed, opaque envelopes for safekeeping. Following the identification of study participants, the random number custodian opened the envelopes in order and informed the researcher of the group allocation.

### Participants

This research was conducted at the Nanjing Public Health Medical Center in China. Inclusion criteria included: ① Age  $\geq 50$  years old; ② Meet the diagnostic criteria of HIV disease; ③ Have a certain cognitive and communication ability and be able to cooperate with the completion of the scale; ④ Pittsburgh Sleep Quality Index Scale score  $> 7$ ; ⑤ Hospital Anxiety Scale score  $> 7$ ; ⑥ Hospital Depression Scale  $> 7$  points. Exclusion criteria included: ① Consciousness disorder or mental illness; ② Receiving other insomnia treatments; ③ Terminal stage of disease.

### Design

This study was a RCT of 2-week duration, divided into two groups (EFT group, control group), aimed at exploring the effects of emotionally releasing therapies on order individuals with HIV disease. This study was designed in accordance with the CONSORT checklist. The Pittsburgh Sleep Quality Index (PSQI) and the Hospital Anxiety and Depression Scale (HADS) was administered at baseline and after 2 weeks.

### Intervention

#### Emotional freedom techniques group

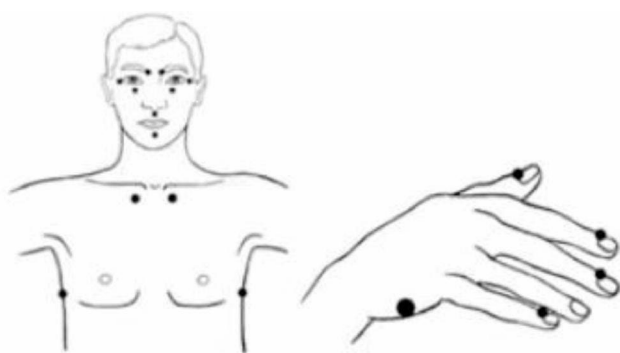
To effectively implement the EFT intervention, team EFT training was required prior to implementation. The team consisted of a nationally Level 2 psychotherapist proficient in EFT and two nursing research students. The psychotherapist trained the two nursing researchers for 5 days including watching videos, theoretical knowledge of EFT, explanations of acupoints, operational points, and techniques on how to guide patients to talk about negative emotions. The training time was 2 h per day.

In addition to routine care, affective care and health guidance for patients, the researchers strictly followed the steps of EFT to conduct interventions with the patients. Each EFT session lasted 15–20 min and continued daily for 2 weeks.

The specific steps [17] were as follows:

1. Assessing Emotional Intensity—Individuals first clarify the problem through exposure therapy and focus on the negative emotions that are assessed on a scale from 0 to 10.
2. Establishing Self-Declaration—The Self-Declaration phrase serves as an affirmation that focuses on and confronts negative emotions. Format: Although I have xxx problems, I accept myself completely.
3. Tapping in Order—The order of tapping is Zanzhu, Sun, Chengsui, Renzhong, Chengju, Yufu, Zhangmen, Zhongzhu. Recite the Self-Declaration phrase 1 time while tapping each point. Five rounds of tapping are conducted, with each round lasting 2 min. The location of the acupuncture points is shown in Fig. 1.
4. Emotional Reassessment and Adjustment of Self-Declaration—As the intensity of the individual's negative emotions gradually diminishes, it should be reassessed, and the affirmations adjusted accordingly. Tapping and chanting were stopped when the intensity of the assessed emotions was  $\leq 2$  points.
5. Emotional Desensitization—Individuals were instructed to sequentially perform nine neurolinguistic programming actions while tapping on the Zhongzhu acupoint: eyes closed, eyes open, nasal tip maintains fixation while directing gaze to the right and then to the left, rotating the eyes in a clockwise and then counterclockwise direction once each, and humming favorite and delightful song twice. This process needs to be repeated 3 times with an interval of 5 s each time.

The day before the study concluded, participants were explained the operation steps and key points of the EFT, and a recorded demonstration was provided. Furthermore, patients were monitored for a month through weekly phone calls to assess adherence, anxiety or depressive symptoms, and sleep patterns.



**Fig. 1** Acupuncture Points location

### Control group

Participants received routine nursing care, condition monitoring, medication administration, emotional support, and health guidance along with education on HIV disease. They were also advised on appropriate diet and exercise. Verbal counseling, distribution of a printed counseling booklet, and instruction on completing a sleep diary were provided on days 1, 5, and 10 over a two-week period.

### Assessment tools

Three types of assessment tools were utilized in the study, including a descriptive characteristics form, the PSQI, and the HADS. The questionnaires were administered by a trained researcher who was not involved in the intervention within 24 h of patient enrollment; 2 weeks after the intervention, the same researcher administered the questionnaires to avoid information bias.

The descriptive characteristics form was created by the researcher and included disease-related information such as sociodemographic data, route of infection, duration of antiviral resistance, and CD4+ cell levels, among other factors.

The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse et al. in 1989 [18], is a widely used scale for assessing sleep quality and shows a high correlation with polysomnographic test results. The PSQI consists of 19 self-rated questions, which are composed of seven factors: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction [19]. Each factor is assigned a score based on the responses to questions, ranging from 0 to 3. The total score for all factors ranges from 0 to 21. A total score greater than 7 indicates poor sleep quality. The internal consistency and retest reliability of the PSQI were satisfactory, with a Cronbach's alpha coefficient of 0.713 [20]. Construct validity was established through significant relationships between the PSQI and depression and anxiety [20]. Multiple lines of evidence [21–23] demonstrate the good validity and reliability of the PSQI in a population of older men.

The Hospital Anxiety and Depression Scale (HADS) is self-assessment scales compiled by British psychiatrists A. S. Zigmond and R. P. Snaith in 1989 [24]. The scale comprises 14 items, which are organized into two dimensions: anxiety and depression. A score greater than 7 indicates the presence of symptoms indicative of anxiety and depression, with the highest possible score being 21. A test of 4,210 HIV-infected individuals in China yielded satisfactory internal reliability for the HADS, with all Cronbach's alpha values exceeding 0.70 and Spearman's  $\rho$  falling between 0.30 and 0.70 [25].

Statistical methods

The study employed IBM SPSS Statistics 26 (Armonk, NY: IBM Corp) for data analysis. A comparison of general information was conducted at the baseline stage using the chi-square test. A two-sample t-test was employed to ascertain statistically significant differences between the evaluation indices before and after the intervention in the two groups. If the data did not meet the criteria for a normal distribution, an alternative statistical analysis was conducted using the rank-sum test, also known as the Mann-Whitney U test for paired-design data. The data were described in terms of frequency and percentage for the count data, while the measurement data were described using the mean and standard deviation. All statistical results were analyzed at a significance level indicated by a p-value of less than 0.05.

Ethical considerations

This study was approved by the Ethics Committee of the Nanjing Affiliated Hospital of Nanjing University of Traditional Chinese Medicine (No. 2024-LS-ky019). It has also been registered with the Chinese Clinical Trial Registry (registration number: ChiCTR2400085652). Before signing the informed consent form, participants were

given information about the purpose of the experiment, the procedure and the possible effects of the experiment, and they had the right to decide to withdraw from participation at any time.

Results

Comparison of general information

Patients were recruited from April 2024 to August 2024. Figure 2 provides a summary of the experimental procedure. 158 patients were evaluated for eligibility, and 70 male patients were eventually enrolled. During the experimental process, one case in the EFT group elected to terminate EFT treatment, and one case was discharged from the study prematurely; one case in the control group was identified as having an adverse event. Ultimately, 67 patients completed the intervention. Of the total number of cases, 33 were assigned to the EFT group, and 34 to the control group.

The 67 participants were all male, with a concentrated age range of 50–60 years [EFT group=15(45.5); control group=16 (47.1)], most were married [EFT group=16 (48.5); control group=18 (52.9)], unemployed or retired [EFT group=16 (48.5); control group=14 (41.2)], and had a monthly income of 3,000–6,000 [EFT group=15

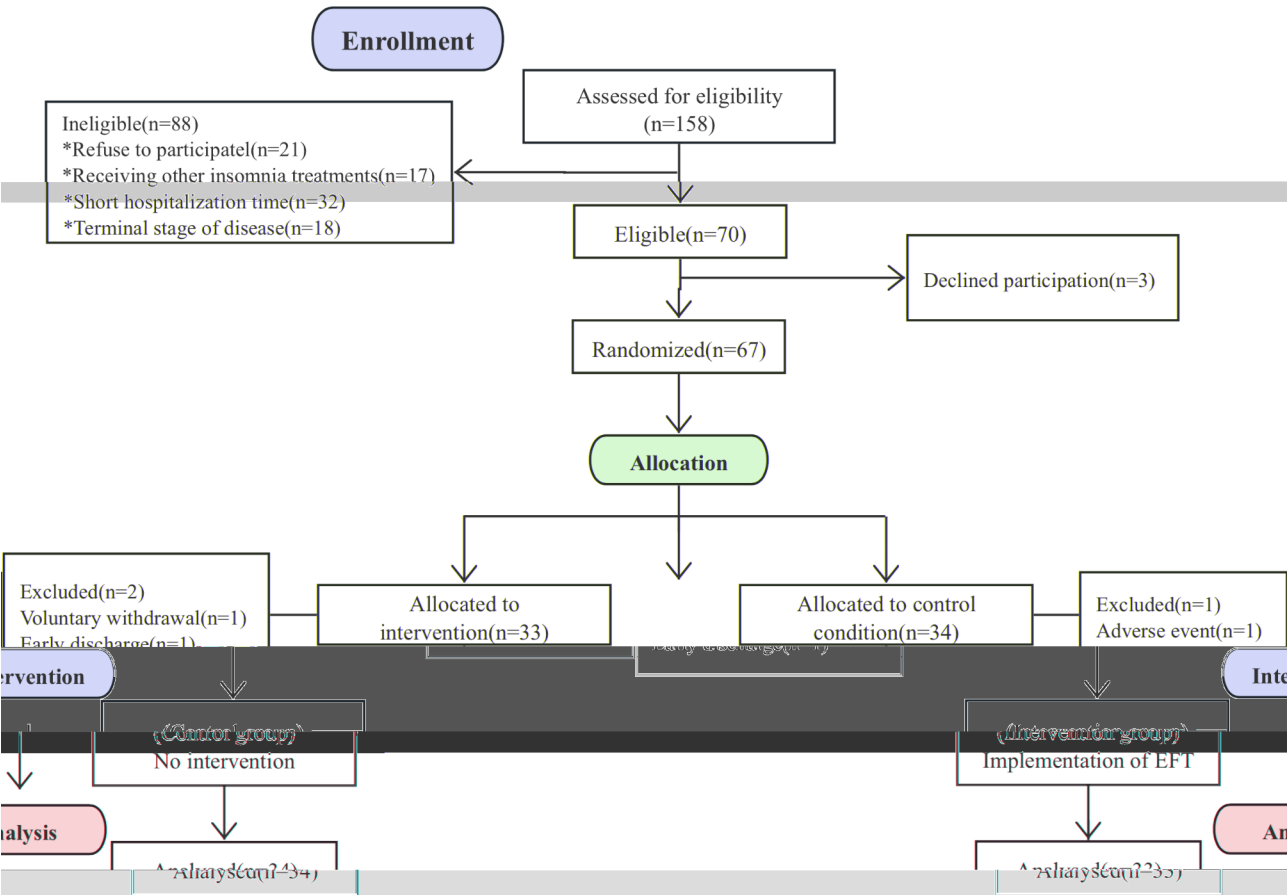


Fig. 2 Experimental Procedure

(45.5); control group=12 (35.3)]. More than half had contracted HIV through sexual transmission [EFT group=22 (66.7); control group=20 (58.8)], with a disease duration of more than 12 months [EFT group=23 (69.7); control group=24 (70.6)]. A comparison of the general information of the two groups revealed no statistically significant difference ( $P>0.05$ ), as illustrated in Table 1.

### Comparison of PSQI and HADS scores

#### Comparison within groups

When comparing the baseline HADS scores in the EFT group with the HADS scores at two weeks, a statistically significant difference was found ( $p<0.001$ ). After two weeks of EFT intervention, the HA score of the experimental group decreased from  $12.39\pm2.344$  to  $9.12\pm2.176$ , and the HD score decreased from  $11.58\pm1.969$  to  $8.94\pm2.015$ . The differences between the pre- and post-intervention HADS scores in the control group were not statistically significant ( $P>0.05$ ).

Additionally, EFT positively affected the quality of the patient's sleep. Post-intervention PSQI scores ( $9.15\pm2.476$ ) in the EFT group were lower than baseline scores ( $12.36\pm2.409$ ), and the difference was statistically significant ( $P<0.001$ ); there was no statistically significant difference ( $P>0.05$ ) between the pre- and post-intervention PSQI scores of the control group.

#### Comparison between groups

At baseline, the differences between the two groups were not statistically significant. After two weeks, the PSQI and HADS scores were significantly lower in the EFT group compared to the control group.

These results are shown in Table 2. A scatterplot was generated using Prism 9 software to illustrate the intra- and inter-group differences in PSQI and HADS scores, as shown in Fig. 3.

**Table 1** Demographic Profile of the Sample

Characteristic		EFT group Mean (SD) /n (%) (n=33)	Control group Mean (SD) /n (%) (n=34)	P-value
Mean Age (years)	50–60 years old	15 (45.5)	16 (47.1)	0.752
	60–70 years old	14 (42.4)	12 (35.3)	
	70 years and over	4 (12.1)	6 (17.6)	
Marital Status	Unmarried	2 (6.1)	0	0.287
	Married	16 (48.5)	18 (52.9)	
	Diverse	10 (30.3)	7 (20.6)	
	Widowhood	5 (15.2)	9 (26.5)	
Highest education level	Primary school	10 (30.3)	8 (23.5)	0.741
	Middle school	13 (39.4)	13 (38.2)	
	University	10 (30.3)	13 (38.2)	
Employment Status	Working	12 (36.4)	13 (38.2)	0.874
	Not working	21 (63.6)	21 (61.8)	
Monthly Salary	< 1000	3 (9.1)	5 (14.7)	0.815
	1000–3000	8 (24.2)	9 (26.5)	
	3000–6000	15 (45.5)	12 (35.3)	
	≥ 6000	7 (21.2)	8 (23.5)	
Current Address	City	16 (48.5)	19 (55.9)	0.544
	Countryside	17 (51.5)	15 (44.1)	
Route of Infection	Sexually transmitted	22 (66.7)	20 (58.8)	0.579
	IV drug	2 (6.1)	4 (11.8)	
	Medical blood transfusion	1 (3.0)	0	
	The rest	8 (24.2)	10 (29.4)	
Antiviral Time	3 to 6 months	2 (6.1)	2 (5.9)	0.997
	7–12 months	8 (24.2)	8 (23.5)	
	> 12 months	23 (69.7)	24 (70.6)	
CD <sub>4</sub> <sup>+</sup> Cell Level	< 200/μL	10 (21.2)	12 (35.3)	0.890
	200–500/μL	15 (60.6)	15 (44.1)	
	> 500/μL	8 (18.2)	7 (20.6)	

EFT: Emotional Freedom Techniques

Data from the intervention and control groups were compared using chi-squared analysis for categorical variables, with P-values less than 0.05 considered statistically significant

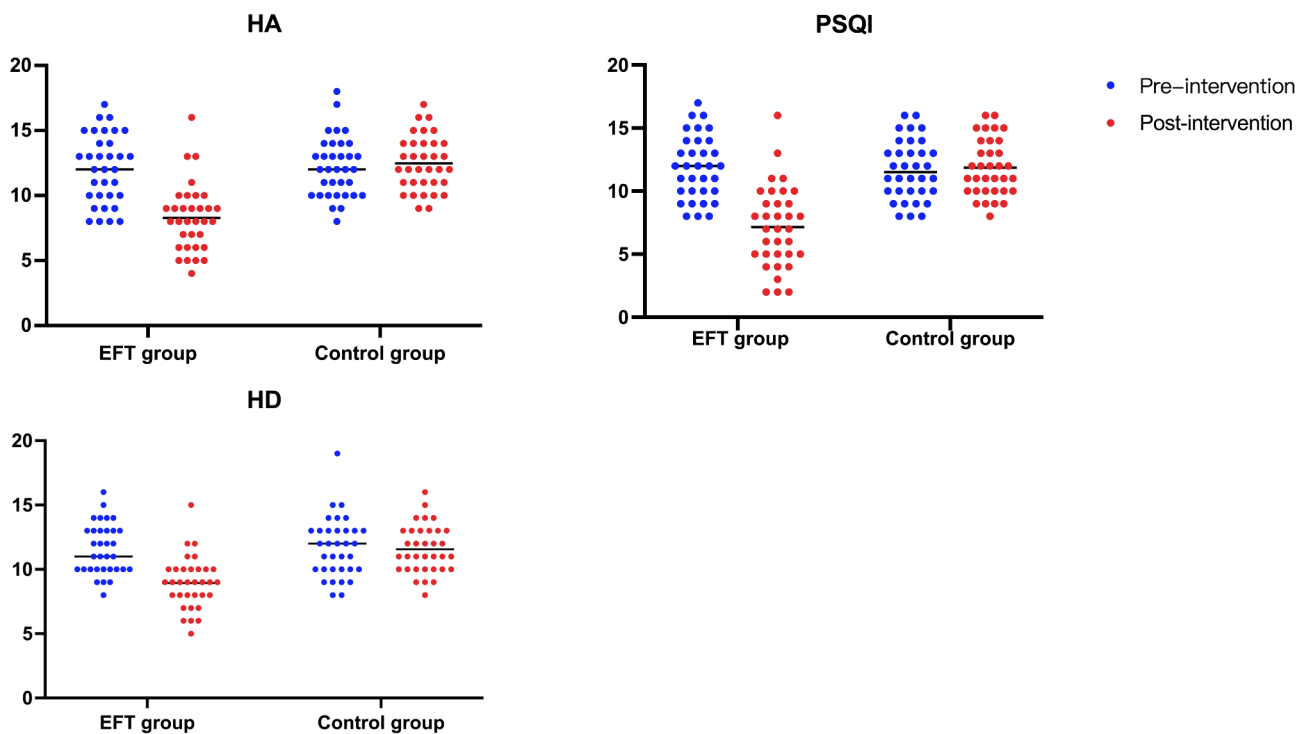
**Table 2** Comparison of PSQI and HADS scores

Scale	Group	Baseline Mean $\pm$ CD	Post-intervention Mean $\pm$ CD	t-value	P-value
HA	EFT Group (n = 33)	12.39 $\pm$ 2.344	9.12 $\pm$ 2.176*	13.037	< 0.001
	Control Group (n = 34)	12.50 $\pm$ 1.813	12.82 $\pm$ 1.914	-1.933	0.062
HD	EFT Group (n = 33)	11.58 $\pm$ 1.969	8.94 $\pm$ 2.015*	11.094	< 0.001
	Control Group (n = 34)	11.71 $\pm$ 2.329	11.56 $\pm$ 1.862	0.758	0.454
PSQI	EFT Group (n = 33)	12.36 $\pm$ 2.409	9.15 $\pm$ 2.476*	13.309	< 0.001
	Control Group (n = 34)	12.38 $\pm$ 2.030	12.41 $\pm$ 2.047	-0.190	0.851

EFT: Emotional Freedom Techniques; PSQI: Pittsburgh Sleep Quality Index; HA: Hospital Anxiety Scale; HD: Hospital Depression Scale

\*: Post-intervention scores were statistically significant when compared between groups ( $p < 0.001$ )

Pre-post comparisons within groups were made by t-test and  $P < 0.05$  was statistically significant

**Fig. 3** PSQI & HADS Scatterplot

### Comparison of PSQI sleep factor scores within groups

In further analysis of the effect of EFT on patients' sleep quality, the data from the two groups did not follow a normal distribution ( $P < 0.05$ ), so the data were analyzed using the Mann-Whitney U test. Patients using sleep medication were excluded from the study population, and thus this factor was removed from the comparison of PSQI sleep factors. We found statistically significant differences in sleep factor scores before and after the experiment in the EFT group compared to the control group ( $p < 0.05$ ), with the most significant differences in sleep latency (z-value=-5.070) and sleep efficiency (z-value=-4.260), as is shown in Table 3.

### Discussion

The RCT aimed to evaluate the effectiveness of Emotional Freedom Techniques for older PLWH. According to the study results, following a two-week EFT intervention, the HADS and PSQI scores in the test group were significantly lower than at baseline, and also lower compared to the control group ( $P < 0.001$ ). These results indicate that Emotional Freedom Techniques can effectively alleviate anxiety and depression and improve the sleep quality in older PLWH.

The results of our study are consistent with existing literature that confirms the effectiveness of EFT in reducing symptoms of anxiety and depression. Robbins et al. [26] observed similar improvements in anxiety and depressive symptoms through the use of EFT in postpartum women, suggesting its broad applicability. Additionally, Church et



**Table 3** Sub-analyses of the PSQI scale

Factor	Baseline Mean $\pm$ CD	Post-intervention Mean $\pm$ CD	z-value	P-value
<b>EFT group (n = 33)</b>				
Subjective sleep quality	2.24 $\pm$ 0.751	1.73 $\pm$ 0.517	-3.900	< 0.001
Sleep latency	2.79 $\pm$ 0.415	1.85 $\pm$ 0.508	-5.070	< 0.001
Sleep duration	2.39 $\pm$ 0.556	2.00 $\pm$ 0.750	-3.153	< 0.001
Sleep efficiency	2.39 $\pm$ 0.609	1.58 $\pm$ 0.663	-4.260	< 0.001
Sleep disturbances	1.79 $\pm$ 0.781	1.42 $\pm$ 0.792	-3.207	< 0.05
Daytime dysfunction	0.91 $\pm$ 0.678	0.70 $\pm$ 0.728	-2.968	< 0.05
<b>Control group (n = 34)</b>				
Subjective sleep quality	2.24 $\pm$ 0.781	2.26 $\pm$ 0.618	-0.302	0.763
Sleep latency	2.68 $\pm$ 0.535	2.62 $\pm$ 0.604	-1.000	0.317
Sleep duration	2.41 $\pm$ 0.657	2.38 $\pm$ 0.604	-0.333	0.739
Sleep efficiency	2.32 $\pm$ 0.535	2.32 $\pm$ 0.535	0.000	1.000
Sleep disturbances	1.94 $\pm$ 0.776	1.97 $\pm$ 0.674	-0.378	0.705
Daytime dysfunction	0.85 $\pm$ 0.558	0.97 $\pm$ 0.577	-2.000	0.046

EFT: Emotional Freedom Techniques

Differences within groups were compared using the Mann-Whitney U test and were statistically significant at  $P < 0.05$ 

al. [27] confirmed the effectiveness of EFT across a range of psychological conditions. One reason EFT aids in releasing negative emotions is its improvement of multiple physiological health markers [13], particularly leading to significant reductions in cortisol levels [28, 29], which are strongly associated with anxiety and depression [30]. Conversely, acupuncture mediates its antianxiety and other therapeutic effects through the limbic-paralimbic-neocortical system, which plays a central role in the regulation and integration of emotion, as well as endocrine and immunological functions [31]. Moreover, although EFT is a single technique, its focus on emotions and the creation of a self-declaration expose patients to stimuli they feel anxious about or are trying to avoid. Through positive words and phrases, the individual's positive thinking is significantly enhanced, thereby reducing negative emotions [32].

Our findings also reveal a significant improvement in sleep quality among older adults with HIV disease, echoing results from Kalroozi et al. [33] and Tang et al. [34] who highlighted EFT's effectiveness in improving sleep quality among patients with severe chronic conditions. Sleep disorders are linked to the regulation of the autonomic nervous system, with anxiety and depression serving as significant mediators [35, 36]. Our data analysis revealed a positive correlation between patients' PSQI and HADS scores, indicating that higher levels of anxiety and depression are associated with more severe sleep disorders. EFT alleviates patients' negative emotions, leading to increased synthesis of 5-hydroxytryptamine and norepinephrine, which normalizes the sleep-wake mechanism and indirectly enhances sleep quality [37]. Furthermore, analysis of changes in each sleep factor revealed varying degrees of improvement in the experimental group's scores post-EFT treatment, with sleep efficiency

and sleep latency showing particularly significant enhancements. The results are similar to those of Nagwa et al. [38]. When individuals feel anxious or depressed, their prefrontal cortex are in a state of high arousal [39], leading to difficulties in falling asleep or maintaining a stable sleep state. When the patient's bad mood is cured, the quality of sleep improves.

Our study highlights the practicality and utility of EFT as a complementary therapy to mitigate psychological burdens and enhance sleep in older PLWH. Future research should focus on exploring the neural mechanisms underlying the effects of EFT and its integration into broader therapeutic frameworks. This would provide deeper insights into optimizing treatment strategies tailored to the specific needs of individuals with chronic health conditions in older age.

### Limitations

There are several limitations of this study. Due to time constraints, the intervention lasted only two weeks, preventing an assessment of how duration affects EFT effectiveness. Additionally, the study focused solely on older PLWH, further research should explore the characteristics of various age groups and disease types. The follow-up period was limited to one month, necessitating more in-depth investigation of the long-term effects of EFT.

Despite the fact that participants were explained the key points of EFT and sent videos of the operation at the time of group exit, less than 40% of the patients adhered to the use of EFT during the follow-up. Subsequent studies should consider the promotion of EFT and the cultivation of more EFT therapists.

## Conclusion

Older adults with HIV disease face substantial physiological and psychological pressures due to disease and social factors, which can ultimately impact their quality of life. This study substantiated that EFT has a positive effect on relieving anxiety and depression and improving sleep quality in older PLWH, and is worth promoting and using.

## Abbreviations

HIV	Human immunodeficiency virus
AIDS	Acquired immune deficiency syndrome
PLWH	People living with HIV
AIDS	Acquired immune deficiency syndrome
RNT	Random number table system
EFT	Emotional Freedom Techniques
RHR	Resting heart rate
BP	Blood pressure
PSQI	Pittsburgh Sleep Quality Index
HADS	Hospital Anxiety and Depression Scale
RCT	Randomized controlled trial
SD	Standard Deviation
CD <sub>4</sub>	Cluster de differentiation 4
TCM	Traditional Chinese Medicine

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## Author contributions

Ms. Wen developed the research concept and idea, conducted the literature screening review, research design, research intervention, data collection and data analysis, and drafted the initial manuscript. Ms. You conducted the research intervention, data collection and critical review of the article. Ms. Yang and Ms. Wu suggested revisions to the article. Ms. Song performed study design refinement, critical review of the article, and approved the final manuscript as submitted.

## Data availability

Data is provided within the manuscript or supplementary information files.

## Declarations

## Competing interests

The authors declare no competing interests.

## Authorship confirmation

Ms. Wen developed the research concept and idea, conducted the literature screening review, research design, research intervention, data collection and data analysis, and drafted the initial manuscript. Ms. You conducted the research intervention, data collection and critical review of the article. Ms. Yang and Ms. Wu suggested revisions to the article. Ms. Song performed study design refinement, critical review of the article, and approved the final manuscript as submitted.

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## References

1. Qiao YC, et al. Epidemiological analyses of regional and age differences of HIV/AIDS prevalence in China, 2004–2016. *Int J Infect Dis.* 2019;81:215–20. <https://doi.org/10.1016/j.ijid.2019.02.016>.
2. Smit M, et al. Future challenges for clinical care of an ageing population infected with HIV: a modelling study. *Lancet Infect Dis.* 2015;15(7):810–8. [https://doi.org/10.1016/s1473-3099\(15\)00056-0](https://doi.org/10.1016/s1473-3099(15)00056-0).
3. Ren Ningjun L, Yuansheng Z, Wenxin. etc. The burden of HIV/AIDS disease in China's elderly population from 1990 to 2019 and its trend [J]. *Chinese Journal of Disease Control*, 2022,26(06):639–644. <https://doi.org/10.16462/j.cnki.zhjbkz.2022.06.004>
4. Xie M, et al. Association between HIV duration and symptom distress among middle-aged and elderly people with HIV-infected in China: a cross-sectional study. *BMC Geriatr.* 2022;22(1):728. <https://doi.org/10.1186/s12877-022-03411-x>.
5. Chambers LA, et al. Evidence informing the intersection of HIV, aging and health: a scoping review. *AIDS Behav.* 2014;18(4):661–75. <https://doi.org/10.1007/s10461-013-0627-5>.
6. Gianella S, et al. A cross-sectional study to evaluate the effects of Age and Duration of HIV infection on anxiety and depression in Cisgender men. *AIDS Behav.* 2022;26(1):196–203. <https://doi.org/10.1007/s10461-021-03373-y>.
7. Ghosh AK. Four decades of continuing innovations in the development of antiretroviral therapy for HIV/AIDS: Progress to date and future challenges. *Glob Health Med.* 2023;5(4):194–8. <https://doi.org/10.35772/ghm.2023.01013>.
8. Mousavi ME, et al. Association between psychological discomforts and sleep quality among people living with HIV/AIDS. *AIDS Res Ther.* 2023;20(1):78. <https://doi.org/10.1186/s12981-023-00579-z>.
9. Guan Y, et al. HIV/AIDS strategies should focus on outcomes and the psychological status of older patients diagnosed with HIV. *Biosci Trends.* 2022;16(1):91–8. <https://doi.org/10.5582/bst.2021.01437>.
10. Wilkie FL, et al. Mild cognitive impairment and risk of mortality in HIV-1 infection. *J Neuropsychiatry Clin Neurosci.* 1998;10(2):125–32. <https://doi.org/10.1176/jnp.10.2.125>.
11. Fiksdal A, et al. Associations between symptoms of depression and anxiety and cortisol responses to and recovery from acute stress. *Psychoneuroendocrinology.* 2019;102:44–52. <https://doi.org/10.1016/j.psyneuen.2018.11.035>.
12. C C. The clinical EFT manual. California Energy Psychology; 2010.
13. Bach D, et al. Clinical EFT (emotional freedom techniques) improves multiple physiological markers of Health. *J Evid Based Integr Med.* 2019;24:2515690x18823691. <https://doi.org/10.1177/2515690x18823691>.
14. Church D, Sparks T, Clond M. EFT (Emotional Freedom techniques) and resiliency in veterans at risk for PTSD: a Randomized Controlled Trial. *Explore (NY).* 2016;12(5):355–65. <https://doi.org/10.1016/j.explore.2016.06.012>.
15. Zhang Yin Z, Yali X, Lei. etc. The effect of emotional release therapy on the self-efficacy of elderly patients with type 2 diabetes [J]. *Chinese Journal of Nursing*, 2017, 52 (10): 1207–1210.
16. Kalla M, et al. Making sense of chronic disease using Emotional Freedom techniques (EFT): an existential view of illness. *Explore (NY).* 2020;16(4):214–24. <https://doi.org/10.1016/j.explore.2020.03.006>.
17. Church D. *The EFT Mini-Manual*. 2012; [http://www.eftuniverse.com/images/pdf\\_files/EFTMiniManual.pdf](http://www.eftuniverse.com/images/pdf_files/EFTMiniManual.pdf)
18. Buysse DJ, et al. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res.* 1989;28(2):193–213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4).
19. Zitser J, et al. Pittsburgh Sleep Quality Index (PSQI) responses are modulated by total sleep time and wake after sleep onset in healthy older adults. *PLoS ONE.* 2022;17(6):e0270095. <https://doi.org/10.1371/journal.pone.0270095>.
20. Yan DQ, et al. Application of the Chinese Version of the Pittsburgh Sleep Quality Index in people living with HIV: preliminary reliability and validity. *Front Psychiatry.* 2021;12:676022. <https://doi.org/10.3389/fpsy.2021.676022>.
21. Chehri A, et al. Validation of the Persian version of the Pittsburgh Sleep Quality Index in elderly population. *Sleep Sci.* 2020;13(2):119–24. <https://doi.org/10.5935/1984-0063.20190134>.
22. Zhang C, et al. Reliability, validity, and factor structure of Pittsburgh Sleep Quality Index in Community-based centenarians. *Front Psychiatry.* 2020;11:573530. <https://doi.org/10.3389/fpsy.2020.573530>.
23. Spira AP, et al. Reliability and validity of the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale in older men. *J Gerontol Biol Sci Med Sci.* 2012;67(4):433–9. <https://doi.org/10.1093/gerona/glr172>.
24. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983;67(6):361–70. <https://doi.org/10.1111/j.1600-0447.1983.tb09716.x>.



25. Yang Z, et al. Psychometric properties and factor structure of the Chinese Version of the hospital anxiety and depression scale in people living with HIV. *Front Psychiatry*. 2019;10:346. <https://doi.org/10.3389/fpsy.2019.00346>.
26. Robbins N, Harvey K, Moller MD. Emotional freedom techniques for Post-partum Depression, perceived stress, and anxiety. *Nurs Womens Health*. 2024;28(1):41–9. <https://doi.org/10.1016/j.nwh.2023.09.005>.
27. Church D, et al. Clinical EFT as an evidence-based practice for the treatment of psychological and physiological conditions: a systematic review. *Front Psychol*. 2022;13:951451. <https://doi.org/10.3389/fpsyg.2022.951451>.
28. Church D, Yount G, Brooks AJ. The effect of emotional freedom techniques on stress biochemistry: a randomized controlled trial. *J Nerv Ment Dis*. 2012;200(10):891–6. <https://doi.org/10.1097/NMD.0b013e31826b9fc1>.
29. Stapleton P, et al. Depression symptoms improve after successful weight loss with emotional freedom techniques. *ISRN Psychiatry*. 2013;2013:p573532. <https://doi.org/10.1155/2013/573532>.
30. Hakamata Y, et al. Implicit and explicit emotional memory recall in anxiety and depression: role of basolateral amygdala and cortisol-norepinephrine interaction. *Psychoneuroendocrinology*. 2022;136:105598. <https://doi.org/10.1016/j.psyneuen.2021.105598>.
31. Fang J, et al. The salient characteristics of the central effects of acupuncture needling: limbic-paralimbic-neocortical network modulation. *Hum Brain Mapp*. 2009;30(4):1196–206. <https://doi.org/10.1002/hbm.20583>.
32. Xu Wei W, Yuzheng L. The improvement effect of 8-week mindfulness training on negative emotions [J]. *Chin J Mental Health*. 2015;7497–502. <https://doi.org/10.3969/j.issn.1000-6729.2015.07.004>.
33. Kalrooz F, et al. Comparing the effect of emotional freedom technique on sleep quality and happiness of women undergoing breast cancer surgery in military and nonmilitary families: a quasi-experimental multicenter study. *Perspect Psychiatr Care*. 2022;58(4):2986–97. <https://doi.org/10.1111/ppc.13150>.
34. Tang X, et al. Feasibility and effect of emotional freedom therapy on sleep quality in patients with end-stage renal disease receiving maintenance hemodialysis: a pilot study. *Geriatr Nurs*. 2023;51:112–20. <https://doi.org/10.1016/j.gerinurse.2023.02.021>.
35. Sun M et al. *Sleep Quality and Subjective Cognitive Decline among Older Adults: The Mediating Role of Anxiety/Depression and Worries*. *J Aging Res*. 2024. 2024: p. 4946303. <https://doi.org/10.1155/2024/4946303>.
36. Han S, et al. Sleep satisfaction and cognitive complaints in Chinese middle-aged and older persons living with HIV: the mediating role of anxiety and fatigue. *AIDS Care*. 2021;33(7):929–37. <https://doi.org/10.1080/09540121.2020.1844861>.
37. Luppi PH, Fort P. Sleep-wake physiology. *Handb Clin Neurol*. 2019;160:359–70. <https://doi.org/10.1016/b978-0-444-64032-1.00023-0>.
38. Soulim N, et al. Effectiveness of emotional freedom techniques (EFT) vs sleep hygiene education group therapy (SHE) in management of sleep disorders among elderly. *Sci Rep*. 2022;12(1):6521. <https://doi.org/10.1038/s41598-022-10456-w>.
39. Hare BD, Duman RS. Prefrontal cortex circuits in depression and anxiety: contribution of discrete neuronal populations and target regions. *Mol Psychiatry*. 2020;25(11):2742–58. <https://doi.org/10.1038/s41380-020-0685-9>.

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