

## Postprint of Research on Library Bibliotherapy for Anxiety Disorders Using Biofeedback Technology

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### Abstract

[Purpose/Significance] Bibliotherapy is a method for maintaining and restoring physical and mental health through the study, discussion, and comprehension of targeted literature. Nowadays, the increasing number of anxious individuals in China and the promotion of reading initiatives have made anxiety disorder treatment, automatic emotional intervention, and enhancement of interest important requirements for bibliotherapy in libraries. This study explores the use of biofeedback to train proper emotions in anxious individuals, thereby enhancing both the interest and efficacy of the therapy. [Method/Process] An anxiety disorder bibliotherapy program was conducted at Jiangsu University Library, establishing book prescription tag profiles and combining biofeedback technology to automatically intervene in and train the emotional responses of anxious individuals during reading. [Results/Conclusion] Statistical comparison of pre-test and post-test data from the SAS (Self-Rating Anxiety Scale) indicates that the experimental group showed significant therapeutic effects, with differences in efficacy observed among the three major categories of factor items. Analysis of promotion and application demonstrates the feasibility of implementing such therapy in libraries.

### Full Text

### Preamble

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### Research on Anxiety Library Reading Therapy Using Biofeedback Technology

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## Abstract

**[Purpose/Significance]** Reading therapy is a method for maintaining and restoring physical and mental health through the study, discussion, and comprehension of targeted literature. Today, the increasing number of anxious individuals in China, coupled with the promotion of reading initiatives, has made anxiety treatment, automatic emotional intervention, and enhanced engagement critical demands for library reading therapy. This study explores the use of biofeedback to train anxious individuals in proper emotional regulation, thereby improving the engagement and efficacy of the therapy.

**[Method/Process]** At Jiangsu University Library, we implemented reading therapy for anxiety disorders, established book prescription label profiles, and integrated biofeedback technology to automatically intervene and train emotional responses during reading.

**[Result/Conclusion]** Statistical comparison of pre- and post-test data from the SAS anxiety scale demonstrates significant therapeutic effects in the experimental group, with notable differences in efficacy across the three major categories of factor items. Promotion and application analysis indicates that implementing this type of therapy in libraries is feasible.

**Keywords:** anxiety disorders; library reading therapy; biofeedback; book prescription label profiles

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Reading therapy uses literature as a medium, employing reading as a means of health care, wellness, and adjunctive disease treatment. Individuals can maintain and restore physical and mental health through learning, discussing, and comprehending literary content, either independently or under guidance [1]. Reading therapy offers advantages of cost-effectiveness and good scalability. Libraries are accessible to everyone, allowing individuals to undergo reading treatment without revealing any privacy, thus avoiding mental pressure and concerns [2].

Currently, three important demand trends have emerged in reading therapy: (1) **Large-scale demand for anxiety treatment.** Psychology explains anxiety as a conditioned fear response to environmental stimuli—an unpleasant emotion arising from anticipating adverse situations while being unable to obtain protection. Anxiety is universal, experienced by everyone to varying degrees. Reading therapy requires participants to have certain reading habits, which limits the types of people who can participate, resulting in a low proportion of spontaneous participants. Some participants also drop out due to waning reading interest. In summary, library reading therapy should focus on anxiety

disorder practice, introducing scientific and technological activities to assist with automatic emotional intervention and process gamification, thereby increasing efficacy and appeal to facilitate promotion.

The theoretical foundations of reading therapy include genetics, psychology, biology, and psychobiology [3]. Corresponding scientific and technological activities should therefore address these theoretical roots. Existing auxiliary activities are diverse, with each practice having its own personalized experience. Examples include book promotion activities in the genetic domain, and experience sharing and self-resolution activities in the psychological domain. However, auxiliary activities in the psychobiological domain are relatively scarce. Homogeneous repetitive activities based on the same theory can wear down readers' interest and diminish therapeutic effects. Meanwhile, the absence of auxiliary activities covering certain theoretical dimensions results in a lack of systematic approach, making it difficult to achieve perfect results. Therefore, introducing psychophysiological biofeedback into anxiety reading therapy has theoretical significance.

Regarding anxiety treatment in reading therapy, some exploratory practices already exist. Shi Juanjuan conducted reading therapy for anxiety disorders at Xi'an Mental Health Center, where 50 patients received 4 weeks of intervention, with scale measurements showing certain therapeutic effects [4]. Fang Meiqing from Henan University of Chinese Medicine used philosophical and inspirational books, as well as geography photography books, to improve patients' anxiety symptoms [5]. Gong Meiling implemented reading therapy for anxiety and depression at Taishan Medical College [6]. In terms of anxiety treatment combined with biofeedback, widespread practical activities also exist. Yang Liming treated 78 anxious patients with psychological nursing, and the combination with biofeedback significantly improved somatization, compulsion, and other symptoms [7]. Tao Rui and Jiao Yan treated 90 anxiety patients, comparing medication alone with medication combined with biofeedback, with the latter showing more significant effects [8]. Fu Dan from Jiangxi University of Chinese Medicine used music therapy for anxiety, and the combination with biofeedback showed clear efficacy [9]. Therefore, from the perspective of current practical research, the innovative introduction of biofeedback into reading therapy activities is scientifically and exploratorily meaningful.

Using CiteSpace, the researchers conducted a knowledge mapping analysis of literature retrieved from the CNKI database on topics including reading therapy, anxiety, and biofeedback (see [Figure 1: see original paper]). The figure shows that reading therapy links to anxiety disorders through nodes such as library science and psychology, while biofeedback links to anxiety disorders through nodes such as psychological nursing, but there is no direct connection between the two. Therefore, from the perspective of literature research status, the combination of biofeedback and reading therapy represents a potential research direction, and their joint exploration for anxiety disorders is also highly meaningful.

## 2 Theoretical Analysis and Biofeedback Application

### 2.1 Close Association Between Psychology, Physiology, and Reading Efficacy

American psychophysiologicalist W. James explored psychological emotion mechanisms, proposing that the root of psychological emotions lies in peripheral physiological responses [10]. For example, when people feel ashamed, their faces turn red; when nervous, their extremities become cold and their faces pale; when fearful, blood pressure and heart rate increase. Reducing these physiological phenomena can alleviate negative psychology and even suppress causes in reverse. From the perspective of reading theory, appropriate physiological states, such as increased brain attention and relaxed breathing, can also enhance reading efficacy and accelerate book comprehension.

### 2.2 Signal Source Analysis of Biofeedback for Anxious Readers

Biofeedback utilizes operant conditioning to achieve emotional control through behavioral learning, reinforcing individuals' normal psychological responses and assisting in the treatment of psychological diseases [11-13]. It has numerous applications for anxiety disorders [14-16]. Medicine holds that when anxious individuals face stress, their brains are hypervigilant, causing immediate or delayed low-level damage. Psychophysiology has shifted from qualitative analysis to computational analysis of EEG [17]. Brain waves are divided into  $\delta$ ,  $\theta$ ,  $\alpha$ , and  $\beta$  waves according to frequency [18]. Feedback training during reading aims to promote brain relaxation and focus, targeting increased  $\alpha$  wave dominance [19,20]. Central nervous impulses travel from the spinal cord through motor nerves to muscles, generating electrical activity during muscle contraction. Psychophysiology considers EMG related to mental alertness; decreased EMG levels during reading help eliminate anxiety [21]. Skin conductance increases with excitement and tension, and decreases with calmness and relaxation [22], and is widely applied in human-computer interaction and medical fields [23,24]. Skin conductance feedback training to reduce individual anxiety during reading is more difficult to solidify than EMG but produces more stable effects. In summary, EEG, EMG, and skin conductance can be selected as signal sources for biofeedback during reading.

### 2.3 Specific Implementation of Biofeedback in Library Reading Therapy

Researchers integrated book prescriptions into the biofeedback system. Anxious individuals read through a screen interface while their EEG, EMG, and skin conductance were monitored simultaneously. Using data from interviews during calm periods as baseline values, initial thresholds were set 15% from the baseline. If therapeutic effects were significant, thresholds were gradually adjusted for optimization.

During reading, if thresholds were not met, the book prescription display was

automatically paused, accompanied by music prompting the anxious individual to rest and calm down before continuing. This process was repeated throughout reading to correct the patient's original anxiety patterns. The overall process was progressive, with increasing difficulty, similar to behavioral learning, gradually becoming solidified. Simultaneously, anxious individuals could directly observe changes in their own data during reading, with self-confidence increasing progressively.

## **2.4 Biofeedback Enhances Engagement in Library Reading Therapy**

The advantages include: (1) It can attract more anxious populations to participate under the guise of physiological training, reducing the stigma of seeking treatment; (2) It has good appeal for individuals with strong gaming desires or science and engineering backgrounds, enabling those with weak reading habits to actively participate in therapy; (3) Biofeedback training is an engaging process, and readers with more somatic complaints under stress will participate more actively; (4) Readers with rich imagination are also willing to participate, as in synchronous reading biofeedback, readers are often guided to imagine pleasant, comfortable backgrounds to adjust physiological responses and achieve ideal states.

## **3 Specific Practice**

### **3.1 Subject Selection**

Experimental subjects were recruited through a recruitment model. Initially, researchers promoted reading therapy to Jiangsu University students, recruiting those who self-identified as having anxiety psychological issues and were willing to participate. After registration, volunteers completed the pre-test of the Self-Rating Anxiety Scale (SAS), which includes 20 factor items: disproportionate painful emotional experiences relative to circumstances, psychomotor restlessness, and autonomic nervous dysfunction, including anxiety, fear, panic, feelings of going crazy, misfortune premonition, hand and foot tremors, somatic pain, fatigue, inability to sit still, palpitations, dizziness, fainting sensations, breathing difficulties, hand and foot tingling, stomach pain or indigestion, frequent urination, facial flushing, sleep disorders, and nightmares. Among these, 15 items use negative statements and 5 use positive statements. A total of 92 valid measurement forms were collected, with 69 individuals scoring above the norm cutoff value of 50. Researchers then selected 56 of these as anxiety disorder subjects based on individual life and learning conditions, dividing them into reading therapy experimental and control groups of 28 each using a random number table method.

### **3.2 Book Prescription Refinement**

Therapeutic book prescription analysis focused on three points: (1) Specificity for anxiety disorders; (2) Specificity for electronic reading, as biofeedback train-

ing displays book prescriptions on system screens, requiring compatibility with electronic reading characteristics; (3) Personalized labels, requiring book prescriptions to have label profiles similar to medicinal properties to facilitate matching.

Therefore, researchers first conducted literature research [25-27], then combined field research from psychological centers, reader clubs, and electronic reading clubs to compile alternative book prescriptions for anxiety. Alternative book prescriptions were analyzed through two approaches:

- (1) **Analysis of electronic reading characteristics.** Electronic reading features weak realism but strong virtuality, weak traditional cultural sense but strong modernity, and strong abstract thinking diffusion, differing from paper book reading [28]. Alternative book prescriptions were screened through data analysis and SPSS statistical comparison, targeting those with significantly high electronic reading efficiency. [Figure 2: see original paper] shows the electronic reading rate survey of popular science books among alternative prescriptions at our university, with the top three selected as popular science book prescriptions. Electronic reading emphasizes information exchange of book content, making readers less susceptible to the refinement of writing details. Works such as translated foreign works like *How to Relieve Anxiety and Worry* and straightforward popular works like *Learning: Change Your Life* were found to facilitate electronic reading. Among poetry and prose prescriptions, works with concise writing like *Three Hundred Tang Poems* are also suitable for electronic reading, with synchronized music playback by the system producing better effects.
- (2) **Discussion and comprehensive scoring by psychological counselors and student counselors** marked anxiety book prescription personality labels, values, and profiles to facilitate book prescription matching by library therapists during subjective treatment and utilization of principles such as “sorrow overcomes anger, fear overcomes joy, anger overcomes thought, joy overcomes worry, thought overcomes fear.” If a book prescription label item showed no obvious tendency and was relatively balanced and neutral, it was not labeled. The intensity of the book prescription for anxiety disorders was distinguished, labeled as intensity; readers’ preference for narrative style was distinguished, labeled as logical tendency or image tendency; adaptation to early or late-stage anxiety was distinguished, labeled as early-stage or late-stage; readers’ preference for content connotation was distinguished, labeled as theoretical or practical tendency; and readers’ overall emotional tendency needs were distinguished, labeled as joy, sorrow, anger, fear, or thought types. Numerical values indicated tendency degree, with 0 as minimum and 4 as maximum.

For example, Kennerley’s *Overcoming Anxiety* has a book prescription label profile as shown in [Figure 3: see original paper].

Book prescriptions were organized into four categories: **Category 1: Anxiety popular science and self-narratives.** Such as Kennerley's *Overcoming Anxiety* (labels: intensity 4, logical 3, early-stage 4, practical 1, thought 2); Carras's *How to Relieve Anxiety and Worry* (labels: intensity 3, image 0, late-stage 1, practical 1, thought 1); Liu Yilan's *Anxiety Disorders* (labels: intensity 3, logical 2, early-stage 4, theoretical 3, fear 1); Ke Yunlu's *Anxiety Patients* (labels: intensity 3, image 3, late-stage 2, practical 2, fear 0).

**Category 2: Anxiety problem triggers.** Employment: *Jack Welch's Autobiography* (labels: intensity 1, image 4, late-stage 2, practical 1, joy 0); Napoleon Hill's *Think and Grow Rich* (labels: intensity 2, logical 3, early-stage 1, theoretical 0, thought 2). Love: Zhu Jiaxiong's *Peking University Love Letters* (labels: intensity 1, image 3, late-stage 1, practical 3, thought 1); Bao Jingjing's *Love is Not Blind* (labels: intensity 2, image 4, late-stage 2, practical 3, joy 1). Learning: *Learning: Change Your Life* (labels: intensity 3, logical 2, early-stage 1, theoretical 1, thought 1); Social interaction: Yue Jinghui's *Carnegie's Art of Living* (labels: intensity 2, logical 1, early-stage 3, practical 0, thought 1).

**Category 3: Individual cognition and inspiration.** Diana's *Be Your Best Self* (labels: intensity 2, image 1, early-stage 1, practical 1, fear 0); Jin Yong's *The Deer and the Cauldron* (labels: intensity 1, image 3, late-stage 3, practical 2, joy 3); Lu Yao's *Ordinary World* (labels: intensity 1, image 4, late-stage 4, practical 3, thought 2); Charles Dickens's *David Copperfield* (labels: intensity 1, image 4, early-stage 1, practical 3, fear 0).

**Category 4: Poetry and scriptures.** Such as *Three Hundred Tang Poems* (labels: intensity 2, image 1, late-stage 2, practical 1); *Zhuangzi* (labels: intensity 1, image 2, early-stage 2, practical 1); *Tao Yuanming Collection* (labels: intensity 1, image 2, late-stage 2, practical 1).

### 3.3 Equipment and Facilities

The biofeedback system used a multi-channel physiological feedback instrument with a sampling frequency of 256Hz. Collected signals were processed by Biotrace to obtain time-axis visualizable data. The experiment was conducted at the Jiangsu University Library Reading Therapy Laboratory, including a biofeedback reading room, rest interview room, and monitoring room. The experimental site had good lighting and a quiet environment.

### 3.4 Intervention Protocol

The control group received no intervention, while the experimental group underwent a three-month intervention. The protocol included the following items:

- (1) Researchers created an elegantly decorated individual reading room with sofas, round tables, flowers, and calligraphy/paintings to alleviate anxiety through environmental factors.

- (2) **Interview analysis and prescription compatibility recommendation.** Interviews required completion of analysis of major factors including reading tendencies, anxiety causes, life experiences, and knowledge background. Compatible prescriptions were selected and combined from the four aforementioned book prescription categories: Category 1 served as the basic medicinal component, providing anxious individuals with scientific cognitive foundations regarding causes, symptoms, treatment methods, or recoverers' experiences; Category 2 served as necessary medicinal components, addressing root triggers and resolving mental knots; Categories 3 and 4 served as selective components, balancing medicinal properties from perspectives of self-cognition, inspiration, and emotional regulation [29]. For example, a female junior majoring in engineering worried excessively about her professional course grades and future work capabilities compared to male peers, experiencing severe agitation and daily memory decline. Patient characteristic analysis indicated: moderate tolerance for book prescription medicinal properties, preference for image expression, mild late-stage condition, effective practical content, and emotional bias toward sorrow and fear. Based on the book prescription label profile, the selected prescription was: *How to Relieve Anxiety and Worry*, *Jack Welch's Autobiography*, *Ordinary World*, and *Tao Yuanming Collection*, forming medicinal properties from basic cognition, trigger elimination, and emotional mitigation layers.
- (3) Book prescription content was imported into the biofeedback system and displayed on the interface during training. Subjects read book prescriptions scrolling in the center of the screen with light music accompaniment. The left and right sides displayed EMG and EEG  $\alpha$ -wave status, while the bottom displayed skin conductance status and time axis. Thresholds were set in the background based on baseline values. When  $\alpha$ -waves fell below threshold or EMG/skin conductance exceeded thresholds, reading was automatically paused to assist anxious individuals in controlling emotions, resuming after returning to normal. As shown in [Figure 4: see original paper].

Before reading, anxious subjects were interviewed to induce emotional calmness for 10 minutes. Researchers measured and used Fast Fourier Transform for power spectrum analysis of EMG, skin conductance, and EEG  $\alpha$ -wave values as baseline values. Physiological signals can be interfered with by other factors, requiring retention of valid data from emotion-induced periods [30]. Ten-minute start and end markers were annotated to calculate baseline values, as shown in . The table contains 603 seconds of original data, with 5.68% of artifacts rejected.

### 3.5 Efficacy Evaluation

During the three-month intervention for the experimental group, no subjects dropped out. Participants generally reported strong engagement with the therapy, with 40% expressing hope to continue biofeedback-style reading after the

experiment concluded. At the experiment's conclusion, researchers used the Self-Rating Anxiety Scale (SAS) to evaluate both the control and experimental groups.

## 4 Statistics and Analysis

Pre- and post-test SAS data were entered and processed using SPSS. Normally distributed data used means, while non-normally distributed data used medians. Independent sample t-tests compared factor score differences between groups before and after intervention. Results showed that before intervention, the experimental and control groups were homogeneous with no statistical differences; after intervention, significant differences existed between groups, as shown in . Paired sample t-tests compared within-group factor score differences before and after intervention. Results showed no statistical differences in the control group before and after, while the experimental group showed significant differences, as shown in .

Post-intervention SAS factor scores and standard scores in the experimental group were significantly lower than pre-intervention, with most comparisons showing P-values less than 0.05, indicating statistically significant differences within the experimental group and demonstrating that the therapy can effectively improve anxiety.

Post-intervention horizontal paired comparison of measurement data between control and experimental groups showed that experimental group SAS factor scores and standard scores were lower than the control group, with P-values less than 0.05, indicating statistically significant differences and proving the therapy's overall effectiveness is good.

**Efficacy analysis of each factor item.** The SAS anxiety scale contains twenty factor items that can be divided into three major categories: disproportionate painful emotional experiences relative to circumstances, psychomotor restlessness, and autonomic nervous dysfunction. Therapeutic effects vary across factor items or categories. Therefore, experimental group data in were standardized. Factor items were first calculated as differences before and after the experiment, then divided by the sum of all factor item differences to obtain characteristic values, as shown in .

From the therapeutic data of each factor, biofeedback-assisted anxiety reading therapy shows therapeutic effects from strong to weak for painful emotions, psychomotor restlessness, and autonomic nervous dysfunction, with better effects on direct negative emotions and general effects on induced adverse physiological states. The therapy shows optimal effects for psychologically anxious individuals with anxiety, panic, misfortune premonition, somatic pain, inability to sit still, nightmares, and hyperhidrosis. Library practice should prioritize treating such anxious individuals. The therapy shows poorer effects for anxious individuals with fear, hand and foot tremors, fatigue, fainting sensations, and facial

flushing. If such patients are identified during interviews, they can be directly encouraged to seek treatment at health institutions.

## 5 Promotion and Application Analysis

Practice demonstrates that with biofeedback assistance, reading therapy can increase engagement, provide preliminary intelligent emotional intervention, effectively reduce anxiety responses, and accelerate the identification, projection, purification, and comprehension processes of reading therapy.

Promotion of anxiety reading therapy using biofeedback technology in libraries can be conducted according to demand theory. Maslow's theory states that needs encompass basic needs, safety realization needs, social needs, esteem needs, and self-actualization needs [31-32].

- (1) **Basic needs level** involves introducing biofeedback on the foundation of traditional therapy. Biofeedback systems are common in university medical and psychology departments, and university libraries can adopt resource-sharing strategies. Public libraries can purchase biofeedback systems at costs similar to database servers.
- (2) **Safety realization needs level** involves optimizing human resources and book prescriptions. Libraries can strengthen central construction of professional therapists and general construction of staff therapeutic skills, collect effective books that resolve anxiety from daily reader feedback, and establish regional or industry-characteristic anxiety book prescription databases.
- (3) **Social needs level** allows participants to communicate with each other and obtain more psychological support, such as building QQ and WeChat social groups for anxiety reading therapy participants and recovered individuals, and creating specific therapy exchange activity rooms.
- (4) **Esteem needs level** involves protecting the reputation of anxious patients and preventing discrimination. Therapy activity names can focus on reader biofeedback training, providing personality protection and respect from both inner feelings and external atmosphere.
- (5) **Self-actualization needs level** allows participants to observe improvements in their physiological data overcoming anxiety during each reading session, and recovered individuals can give special lectures about their experiences to new participants, achieving self-worth.

The above research is only a preliminary exploration of library anxiety reading therapy assisted by biofeedback, obtaining experience within a certain scope regarding anxiety application, intelligent emotional intervention, and engagement enhancement. Future research will continue to deeply investigate the integration degree of biofeedback and library reading therapy, as well as therapeutic applications for other psychological disorders, hoping to benefit industry research.

## References

- [1] Wang Bo. Analysis of the concept of reading therapy[J]. Library and Information Knowledge, 2005(1): 98-
- [2] Gong Meiling, Cong Zhong. Research on reading therapy for college students' psychological problems[J]. China Library Journal, 2004(2): 95-96.
- [3] Wang Bo. Reading therapy[M]. Beijing: Ocean Press, 2014: 16-46.
- [4] Shi Juanjuan, Wang Jing, Duan Longfang. Efficacy of reading therapy as adjunctive treatment for anxiety disorders[J]. China Journal of Health Psychology, 2014, 22(3): 334-335.
- [5] Fang Meiqing. Reading therapy as adjunctive treatment for anxiety neurosis[J]. Chinese Journal of Practical Nervous Diseases, 2015, 18(17): 58-60.
- [6] Gong Meiling. Practical exploration of reading therapy in universities[J]. Library Journal, 2010, 10(10): 33-35.
- [7] Yang Li, Liu Xiuqin. Psychological nursing combined with biofeedback promotes recovery of anxiety patients[J]. Chinese Journal of Nursing, 2004, 39(10): 783-784.
- [8] Tao Rui, Jiao Yan, Li Zongguo, et al. Comparative study of medication alone versus combined biofeedback for anxiety disorders[J]. China Journal of Health Psychology, 2011, 19(1): 26-
- [9] Fu Dan, Zhang Mengchun, He Zhifang, et al. Effectiveness study of music combined with EEG biofeedback for mild anxiety[J]. Contemporary Music, 2016(13): 92-94.
- [10] Calvo R A. Affect detection: an interdisciplinary review of models, methods, and their applications[J]. IEEE Transactions on Affective Computing, 2010, 1(1): 18-37.
- [11] Karavidas M K, Lehrer P M, Vaschillo E, et al. Preliminary results of an open label study of heart rate variability biofeedback for the treatment of major depression[J]. Applied Psychophysiology and Biofeedback, 2007, 32(1): 19-30.
- [12] Zucker T L, Samuelson K W, Muench F, et al. The effects of respiratory sinus arrhythmia biofeedback on heart rate variability and posttraumatic stress disorder symptoms: a pilot study[J]. Applied Psychophysiology and Biofeedback, 2009, 34(2): 135-143.
- [13] Zheng Yanping. Clinical practice of biofeedback[M]. Beijing: Higher Education Press, 2003: 2-3.
- [14] Zheng Qin, Qu Miao, Pei Qinghua. Study on the efficacy of biofeedback adjunctive therapy for anxiety disorders and its correlation with TCM syndrome types[J]. Journal of Changchun University of Chinese Medicine, 2015, 31(1): 121-123.
- [15] Tang Xiaomang. Analysis of therapeutic effect of EEG biofeedback for anxiety patients[J]. China Medical Guide, 2015, 13(21): 198-199.
- [16] Fu Dan, Zhang Mengchun, He Zhifang, et al. Effectiveness study of music combined with EEG biofeedback for mild anxiety[J]. Contemporary Music, 2016(13): 92-94.
- [17] Kong Weimin. New theory of emotional psychology[M]. Changchun: Jilin People's Publishing House, 2002: 71-

- [18] Yu Raodong. Research on attention detection technology based on brain waves and computer vision in E-Learning[D]. Kunming: Kunming University of Science and Technology, 2015.
- [19] Hou Yue, Wang Yuping, Zhan Shuqin, et al. Randomized controlled open study of left and right EEG biofeedback for generalized anxiety[J]. Chinese Mental Health Journal, 2013, 27(3): 236-240.
- [20] Gao Yuexia, Huang Jing, Liu Huali. Application efficacy of EEG biofeedback in anxiety disorder treatment[J]. China Journal of Health Psychology, 23, 2015(11): 1757-1760.
- [21] Zhang Dongmin, Guo Yunfei. EMG numerical analysis of biofeedback relaxation treatment for generalized anxiety[J]. Chinese Journal of Practical Nervous Diseases, 2016, 19(4): 105-106.
- [22] Wang Yuanchao, Gao Shuxian. Skin conductance and its applications[J]. Chinese Journal of Rehabilitation, 1992(1): 41-
- [23] Pfister H R, Wollstds P, Peter C. Affective responses to system messages in human-computer interaction: effects of modality and message type[J]. Interacting with Computers, 2011, 23(4): 372-383.
- [24] Lin Zi, Yu Yinliang. Comparative analysis of skin conductance data before and after biofeedback treatment for generalized anxiety[J]. Chinese Journal of Trauma and Disability Medicine, 2014(9): 49-50.
- [25] Wang Bo. Reading therapy bibliography[J]. Library Work in Colleges and Universities, 2004(5): 14-22.
- [26] Gong Meiling, Cong Zhong. Investigation of book categories helpful for solving college students' psychological problems[J]. Chinese School Health, 2002(5): 470-471.
- [27] Wang Jingwen, Huang Xiaoer, Tang Pin, et al. Review of research and practice of reading therapy bibliography in China[J]. Library Journal, 2015(4): 46-51.
- [28] Zhi Keke, Liu Hua. Comparative study of e-book and paper book borrowing with the same title—taking Shanghai University Library's H and I categories as examples[J]. Library Construction, 2017, 276(6): 50-51.
- [29] Yang Hua, Lu Zhangping, Li Xiaobo, et al. Exploration of university library reading therapy based on human physiological signals[J]. Journal of Academic Libraries, 2017(6): 111-116.
- [30] Koelstra S, Muhl C, Soleymani M, et al. Deap: a database for emotion analysis using physiological signals[J]. IEEE Transactions on Affective Computing, 2012, 3(1): 18-31.
- [31] Zhao Jianshuang, Tu Meng, Cheng Lina. Application of Maslow's needs theory in reader service psychology research—taking the National Library as an example[J]. Journal of Xianning College, 2012, 32(5): 101-102.
- [32] Zhang Ruorong. Application of "Maslow's hierarchy of needs" in library management[J]. Journal of Tibet Nationalities Institute, 2010, 31(2): 104-107.

## Author Contribution Statement

Yang Hua: Research design, experimental analysis, and paper writing;  
Lu Zhangping: Paper theoretical guidance;  
Yuan Run: Paper experimental guidance.

## Study on Anxiety Library Reading Therapy Using Biofeedback Technology

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**Abstract:** [Purpose/significance] Reading therapy is a way to preserve and restore physical and mental health through the study, discussion and comprehension of targeted literature. Nowadays, the increasing number of anxious people in China and the proposal of reading promotion make anxiety treatment, automatic emotion intervention and interest enhancement become important demands of library reading therapy. The paper aims to explore the use of biofeedback to train the correct mood of anxious people, and enhance fun and efficacy of the treatment. [Method/process] At the library of Jiangsu University, the researcher carried out the anxiety reading therapy, established the book medicine label portraits, and intervened and trained anxious people's emotional reactions automatically by biofeedback technology when they reading. [Result/conclusion] Comparing the data from SAS anxiety scale before and after, we can find that the curative effect of the testing group is obvious, and the three kinds of factor item have the difference of curative effect. Promotion application analysis shows that this kind of therapy in library is feasible.

**Keywords:** anxiety disorders; library reading therapy; biofeedback; book medicine label portraits

*Note: Figure translations are in progress. See original paper for figures.*

*Source: ChinaXiv — Machine translation. Verify with original.*