Research on the Application of Artificial Intelligence Product Design in Human Emotions: A Case Study of Chinese Women

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Abstract—Human emotional and health issues have been the subject of world concern. In psychology, the correlation between them is indivisible, which is also a major challenge in studying the improvement of human emotions.
To address this challenge, this study aims to explore the impact of design on human emotional health, with China as the scope of the survey, and design an application to design prototypes and AI intelligent products. Quantitative and qualitative research methods are used, using questionnaire survey methods of quantitative research and literature quality research, to summarize and observe the data, to find user pain points; competing product analysis methods, to analyze existing market applications; UX design method based on Garrett's five-faceted method, using emotional analysis design prototypes, to idealize product content. The research direction of this paper is to immersive involvement through external intervention in human emotional behaviour through emotional design, improve the human psyche, thereby lining the stability of self-emotion, and enhance the subjective sense of human well-being.

Index Terms—Emotional well-being (EWB), Emotional design, Emotion computing , Artificial Intelligence, Product design

I. INTRODUCTION

As people age, People's concerns over their emotional health and well-being are growing. Weare, (2000) mentions that Emotional literacy refers to the capacity to recognize, comprehend, and apply knowledge about one's own and other people's emotional states. It can be seen that people can use cognitive processes and behavioural strategies to focus their emotional well-being.
However, the female group has challenges in maintaining emotional stability compared to the male group, mostly owing to variables such as job pressure, study pressure, and life pressure. Barrett and Toothman, (2016) indicated the value impact of ageist and sexist society on women's emotional well-being throughout their adult lives. Moreover, Women's subjective experiences, influenced by their self-perception, contribute to decreased enjoyment and increased health issues as a result of their concern around their selves. stated differently, negative attitudes may have an enduring impact on their mental well-being. In psychology, emotion regulation (ER) includes selection of the situation, modification of the situation, deployment of attention, change of cognitions and modulation of responses (Gross, 1998). Therefore, Individuals' cognitive-behavioral emotion control abilities are a means by which adults may preserve emotional stability.
User-Centered Design (UCD) can fulfill consumers' requirements and address their issues via external involvement. However, the primary emphasis of this research is on the individual's emotional well-being(Lowdermilk, 2013). According to Norman (2004), emotional design produces positive experiences and focuses on the user's emotions. Anderson (2011) also indicates that an application's visual design, which is intended to create good experiences and evoke emotions, has a direct impact on users' trust and sense of identity. Emotional design involves crafting the interface in a manner that captivates users via visually stimulating effects, hence leaving a lasting first impression. To address the abstract nature of human emotions, a prototype of a mobile application named U-MOOD was developed.

II. RELATED WORKS

The concepts of the ABC model of emotions, flow experience and the application of emotion computing can explain that there is a certain relationship between emotion quantification and big data of artificial intelligence, and explore the application of emotion recognition in product design. Affective computing is capable of detecting and examining human emotions. By assessing its conceptual depth of analysis, it explores the two components of affective identification and affective analysis. These components can serve as technological support for research purposes.

A. The ABC theory of emotion（ABC model）

Activating event, consequences and beliefs are three important components of the emotional ABC theory (see to figure 1). According to Albert Ellis's emotional ABC theory, when individuals experience negative emotions and fail to intervene promptly, it leads to psychological alterations that adversely affect their physical and mental well-being. The ABC model is an integral component of Rational Emotive Behaviour Therapy (REBT), employed to comprehend the mechanism of emotional distress. REBT technology, based on the ABC hypothesis, has been extensively utilised in non-treatment settings and implemented across several fields (Wu et al., 2021). Katsikis et al. (2016) clarify that Emotional ABC models may assess human emotions and cognitions and incorporate them into the design field. This approach not only

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emphasises the emotional needs of the user but also ensures alignment between human cognition and behaviour. According to Denecke et al (2020), in the development of chatbot applications, the objective of emotional adjustment is accomplished by recognising emotional information and implementing applications such as robots, apps, and CBT mindfulness therapies. Therefore, the emotional ABC theory can assist consumers in recreating a belief environment or product that stimulates and fosters positive emotional needs and outcomes.

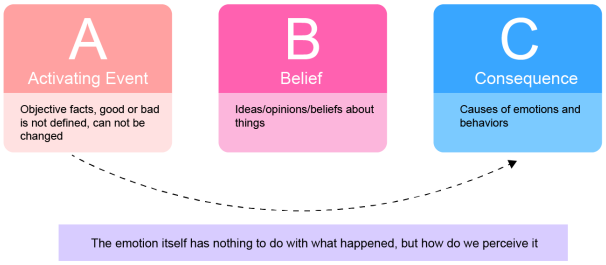


Figure 1: The ABC theory of Emotion

B. Flow experience

The flow experience is a progression that moves from being dependent on certain conditions, to being based on personal experience, and finally leading to a desired outcome (Nakamura and Csik Szentmihanyi, 2002). This illustrated the transformation of the flow phenomenon chart, expanding it from three experience regions to eight experience channels, these channels represent the varying levels of intensity experienced, depicted in a concentric ring. DeMatos, Sá, and Duarte (2021) mention that there is a correlation between subjective consciousness and emotions such as joy, pleasure, and loss of control when individuals engage in tasks or events. Emotions serve a significant role in emotional design by influencing an individual's decision-making, attention, and memory, thereby impacting the user's overall experience. Csikszentmihalyi's proposal encompasses nine conceptualised dimensions, (deMatos, Sa, and Duarte, 2021). Flow experiences provide a new focused user experience in emotional design, creating products and environments that balance challenge and skill, increased focus, clear goals, immediate feedback and an underlying sense of control under the key elements of flow experiences, thereby providing a sense of accomplishment and motivation to enhance their emotional well-being. Therefore, considering the double-sided nature of emotional design, the design will affect the user emotionally, and the user's emotions will have a certain view of the design. The application of flow experience makes the design not only meet the functional needs, but also contribute to the user's sense of well-being. Despite this, three conditions are required for flow to occur, namely that the challenges and skills should match the individual's abilities, that the user provide immediate, accurate feedback on the progress of the experience, and that the goals of the experience are clearly set (deMatos, Sa, and Duarte, 2021). Therefore, the understanding of the concept of flow experience and the application of flow experience in emotion design is very important for the design research of emotion management.

C. The utilisation of Affective computing

"Emotion computing", also known as Emotion AI, includes human emotions, emotions and feelings, emotion recognition and emotion analysis. It is also a branch of artificial intelligence that enables computers to interpret, simulate and react to human emotions (Wang et al., 2022). Emotion identification and emotion analysis are distinct aspects within the field of emotion computing. Emotion identification primarily involves identifying individuals' emotional state, with a focus on visual, linguistic, and physiological cues. On the other hand, emotion analysis is using technology to analyse social interactions, evaluate language, and determine good, negative, or neutral emotional outcomes (Balazs and Velasquez, 2016). This show that emotional computing has a wide range of applications in different fields, automatic recognition of emotions has changed the emotional information provided by human emotions, and the machine has expanded various fields to a greater extent. According to Madhusudan and A.K. (2016), emotion recognition refers to the act of obtaining, examining, and interpreting certain emotions displayed by users. Language, facial expressions, and emotion-related body postures can serve as means of conveying an individual's emotional state. Leong et al., (2023) mention that facial expression recognition for visual emotion recognition is achieved through three stages of machine registration, representation and recognition using pattern recognition, and facial expression data is easy to collect.

In this study, combining the emotion computing technology and machine algorithm, facial image analysis is carried out through the camera-based products to complete the analysis of facial expression recognition. Cai et al., (2018) state that face image analysis is performed by the camera, which necessitates specific conditions for shooting and where the data acquired varies with the intensity of light. This demonstrates that the design process takes into consideration the limitations and disadvantages of camera-based recognition of face emotions. Hence, this study primarily focuses on the utilisation of facial emotion recognition and expression in the realm of digital design.

III. Research Methodology

The research design used for this study is a qualitative approach that combines explanatory research with descriptive research aspects to elucidate the causal link between variables. Thus, an interpretive research methodology was employed to explore the manner in which design components convey human emotions and to contemplate strategies for mitigating adverse human emotions. And in the quantitative research design, the study of human emotions quantification is the difficulty of this study, designing the content of the survey, collecting a certain amount of samples, and analysing the quantitative content of emotions. Therefore, the purpose of this study is to understand the human emotions comprehensively in the process of designing and rationalising the improvement of emotional problems.

The literature search was initiated by doing a sample search using various combinations of keywords, resulting in the

identification of 77 items during the initial selection process. The content of the articles was cross-checked using the approach of literary Mata analysis. To mitigate the presence of redundant content from other databases, a thorough examination of the articles was conducted, resulting in the re-identification of 38 articles. Furthermore, the remaining articles yield 22 items through the assessment of their suitability based on the abstract and keywords. Upon carefully reviewing the article, limit the selection of relevant articles to a total of 14. Hence, a total of 14 items spanning from 2015 to 2023 have been chosen to be preserved for future study purposes. As depicted in table 1.
However, The sample for the questionnaire was obtained by releasing the questionnaire online for one month, resulting in a total of 82 valid responses. By analysing the initial data gathered on the web platform, it is possible to do an intuitive preliminary screening and conveniently determine if the quantity of questions fulfils the required criteria. Furthermore, the SPSS analytical technique was employed to establish the variables of the sample and perform a secondary analysis of the data in order to effectively and precisely achieve the research objectives.

IV. Data Analysis

Data was gathered from a total of 14 items carefully evaluated research papers and 82 questionnaires.

A. Findings from Qualitative Analysis

The study review of this article focuses on the significance of design content in relation to individuals' emotions, specifically examining the elements that influence emotions and the methods for regulating them. Furthermore, a cumulative of 18 scholarly articles were utilised for research purposes spanning from 2015 to 2023 (see to figure 2).

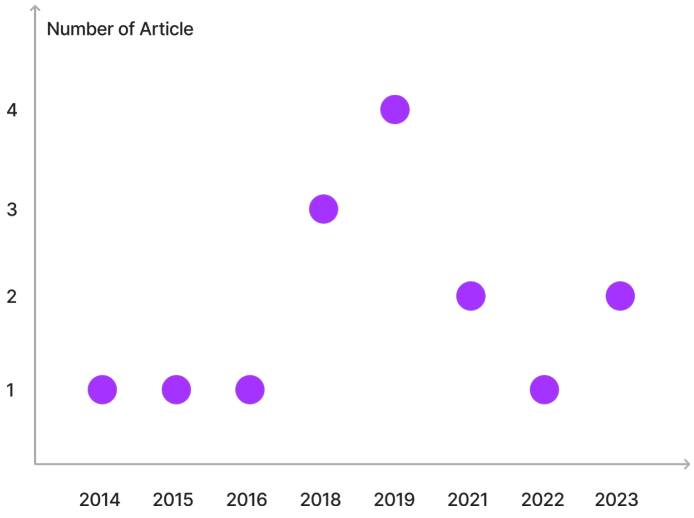


Figure 2: Number of articles published by year

1.Design elements affect people's emotional psychology

The development of science and technology has had an impact on people's emotional well-being as a result of the stress caused by multiple variables. Hence, by conducting a thorough examination of the article, several design components have the ability to evoke emotional reactions from users. The functional design of products and interfaces has the ability to alter consumers' emotions, thereby impacting their overall user experience. Moreover, as depicted in figure 3, it is evident that certain design components have a discernible impact on individuals' emotional psychology. Therefore, this study specifically examines the aspects of colour, shape, line, and function. This study specifically examines the aspects of colour, shape, line, and function.

Design element	Description of the influence of design elements and emotions
Color	Warm colours evoke sensations of warmth, comfort, enthusiasm, and other emotions, whereas chilly colours symbolise tranquilly, sadness, and apathy
Lighting	Intense illumination evokes a sense of positivity, whereas dim illumination induces a state of relaxation and can perhaps contribute to a melancholic ambiance
Space and Layout	The spatial arrangement of the design can influence individuals' perception of cognitive freedom or constraint
Shapes and Lines	Curvilinear forms and contours are frequently regarded as calming and organic, whereas sharp, angular lines can elicit a perception of structure and exactitude, but may also convey a sense of aggression
Texture	Texture has the ability to communicate feelings of both comfort and discomfort. It can enhance the visual experience by adding a tactile element and has the power to affect emotional reactions
Symmetry and Balance	Symmetrical designs are commonly seen as harmonious and aesthetically pleasant, whereas asymmetrical designs can be more dynamic and enjoyable, but may occasionally evoke emotions of disquiet or imbalance
Typography	The choice of font style in the design might also elicit an emotional response
Patterns and Repetition	Patterns can engender a feeling of stability and predictability, so providing solace. Excessive repetition, on the other hand, might become tedious and uninteresting
Personal and Cultural Associations	Human experience and cultural background can significantly impact emotional reactions to many design aspects
Context and Functionality	The mood of a design can be influenced by both its setting and its function

Figure 3: The impact of design aspects on emotional psychology

2.Methods to regulate emotions

Emotional regulation is a key characteristic of mental well-being. Hence, it is crucial to have a diverse range of ways to effectively regulate unpleasant emotions, such as music, engaging in physical activity, practicing deep breathing, seeking social support, smiling and so on. In Facial Expression Training, since there are variations in emotional reactions and perceptual acuity, individuals may be less perceptive to discerning face expressions. Individuals are unable to perceive their own facial expressions, and the primary method to enhance face expression is through practicing expression. When self-training facial expressions, some external media intervention is needed. Han et al., (2023) pointed out that the poorly supervised DECD framework utilises static facial expression photos for training in order to detect the timing of emotional changes, due to certain issues in computer vision analysis.nTherefore, for an effective facial expression training system, it is necessary to provide user selectable target facial expression interface. Training to change facial expressions from negative to positive or neutral can be interfered with using a number of methods (see to figure 4). Among them, mirror exercise, expression imitation and facial feedback hypothesis are effectively used in this study.

Method	Paraphrase
Awareness Training	Being conscious of one's own emotions and facial expressions is typically the first step. Practices like mindfulness or meditation that help people to notice their emotions and expressions without passing judgement can help achieve this.
Mirror Exercises	People can focus on changing their facial motions and become more aware of them by practicing in front of a mirror. For instance, when remembering a tense situation, one could make an effort to keep a neutral demeanour.
Biofeedback	Biofeedback devices can assist individuals in identifying negative emotions and gaining control over their reactions. Your concept's intelligent recognition mirror is a kind of biofeedback equipment that offers real-time analysis and adjustment suggestions.
Relaxation Techniques	Deep breathing, progressive muscular relaxation, and visualisation are among techniques that can be used to manage emotional arousal, which frequently comes before negative reactions.
Expression Imitation	Seeing pictures or videos of various face expressions and trying to mimic them can aid in improving facial muscle control.
Emotion Regulation Strategies	The underlying emotions that give rise to unpleasant expressions can be altered by the application of cognitive-behavioral techniques. This may be rephrasing unfavourable ideas or concentrating on the good things that have happened.
Acting Techniques	Performers frequently train their facial expressions to convey a range of emotions. Individuals can learn to control their own expressions by adapting some of these approaches.
Professional Therapy	Working with a therapist can occasionally assist individuals in identifying the underlying causes of their negative expressions and creating coping mechanisms.
Social and Emotional Learning (SEL)	Through this process, people can learn how to identify and control their emotions, create and meet constructive goals, and empathise with others.
Facial Feedback Hypothesis	This idea says that facial gestures might be able to change how people feel. One example is that smiling on purpose can make someone feel better.

Figure 4: Methods of facial expression training

B. Findings from Quantitative Analysis

The questions in the questionnaire are of various compound types, such as multiple choice questions, multiple choice questions and open-ended questions, so as to avoid the multiplicity of content. The participants selected for the survey are mainly Chinese adults aged 18 to 65. According to the survey, people in this age group can operate the basic functions of smart phones, so the survey participants can easily access and fill in the questionnaire. A total of 86 valid samples (n = 86) were obtained for the initial evaluation of the questionnaire. A cross-analysis was conducted by selecting several dependent and independent variables. The data regarding the participants' gender, age, and education were condensed in order to establish the fundamental characteristics of the participants.

1. Reliability analysis

Reliability analysis is a research method to study whether the quality of data is reliable. A total of 86 subjects were included in the study, with a total of 67 voluntary participants covering 20 programs. Through Cronbach. α alpha analysis of the data, as shown in the table 1, the reliability coefficient of the scale was obtained as 0.996, indicating that the scale had high reliability and internal consistency. This outcome further confirms the dependability and consistency of the scale in assessing target variables, and offers trustworthy foundational data for ongoing study.

Sample size (N)	Number of items	Cronbach's Alpha
86	20	0.996

Table 1 : Reliability analysis

2.Validity analysis

Validity is a metric employed to assess the rationality of the design of a given item, specifically in the context of quantitative data and limited to scale data. To accomplish the desired analysis, a total of 12 questions were chosen from a pool of 14 questions. One of the questions pertained to quantifying emotional words, while the remaining 10 questions were expanded. After in-depth analysis of the data generated, the questionnaire validity analysis mainly involves two parts: factor analysis and Kaiser-Meyer-Olkin (KMO) test. In the factor analysis part, 10 factors were selected from the questionnaire, and the variance explanation rates of these factors ranged from 1.00% to 67.56%. The cumulative variance explanation rate before rotation is 96.92%, and the cumulative variance explanation rate after rotation is 96.92%. The eigenroot values before and after rotation are all greater than 1, indicating that each factor can explain part of the variability in the questionnaire. The variance interpretation rate after rotation is lower than that before rotation, but still presents a higher interpretation rate overall. The result of KMO test was 0.945, close to 1, indicating that the questionnaire was very suitable for factor analysis. The value of Barth's sphericity test was 4704.665, and the significance P-value was less than 0.05, which further proved that the questionnaire was suitable for factor analysis. Therefore, the questionnaire has high validity and good structural validity, which is suitable for follow-up research and analysis in emotional health, psychology and other aspects.

3.Comparative analysis

Comparative analysis can be used to set one or more independent variables and dependent variables, so as to obtain the difference of dependent variable data at different levels of independent variables, and presented in data tables or line charts, bar charts, etc. Therefore, the correlation between the questionnaire questions was analyzed for the set independent variables and dependent variables. In addition, for the convenience of viewing, the serial numbers of the questions were marked T1, T2, T3... to T14. When the independent variables are T1 (X= gender) and T2 (X= age), and the dependent variables are T5, T6, T7, T8, T10, T11, and X=T1, T2, Y=T10 in-depth analysis is performed.

Hypothesis 1: X=T1， T2, Y=T5.

Based on the cross-analysis of anxiety frequency among different age groups and genders, as shown in Figure 5, it can be observed that women between the ages of 18 and 35 experience a higher level of anxiety. On average, these women experience anxiety episodes every three to seven days. The findings indicate that women experience a notable level of anxiety, and the frequency of the anxiety cycle is higher.

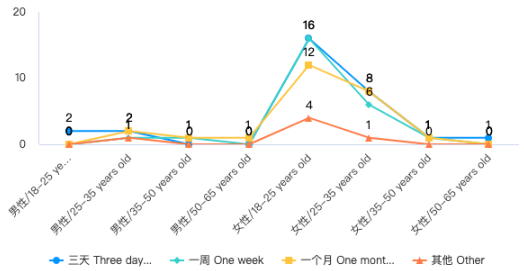


Figure 5: Anxiety's recurring pattern

Hypothesis 2: X=T1, T2, Y=T7.

According to Figure 6, the participants were distributed as female groups, while the longitudinal analysis.The way to relieve anxiety, playing mobile phones, listening to music is the preferred way, followed by reading, sports, travel. From this point of view, people have a high dependence on electronic

products, and the way to choose mitigation is not the traditional form, which also shows that people choose products under digital intelligence to intervene, because time or economy is not allowed, so they choose ways that can be used frequently in daily life to alleviate.

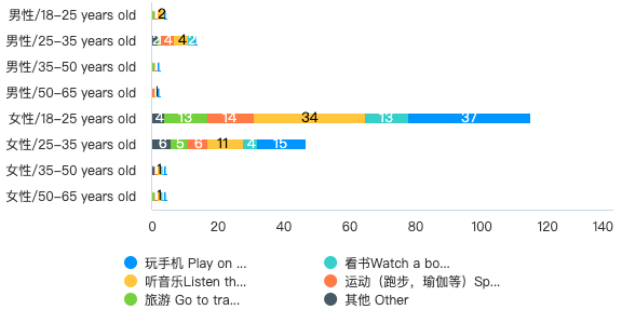


Figure6: A way to ease your emotions

Hypothesis 3: X=T1, T2, Y=T8.
Based on the longitudinal analysis chart (see figure 7), more than a third of the participants were never physically or psychologically examined. According to the data, the sample of male participants is small, but basically tend to pay attention to physical health or mental health, while the female participants in the age of 18-35 are mostly not concerned. This shows that women are affected by different environmental factors that affect their health, resulting in a lot of health or emotional problems, so it is difficult to find emotional health problems.

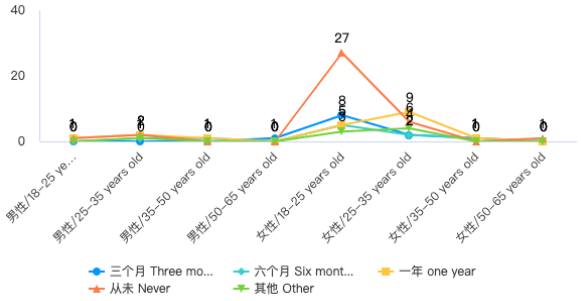


Figure7: The frequency at which participants assessed their own physical and mental well-being

Hypothesis 4: X=T1, T2, Y=T10
According to figure 8, out of the 86 participants, 76 have not utilised emotion management applications. This suggests that either consumers are not interested in a particular product or they lack awareness of similar products. Nevertheless, studies indicate that individuals experience enhancements when utilising emotion management applications, goods, or employing other methods to interfere in their emotions. The data collected in the questionnaire serves as guidance for the ensuing design process, aiming to create products or novel designs that captivate people' attention.

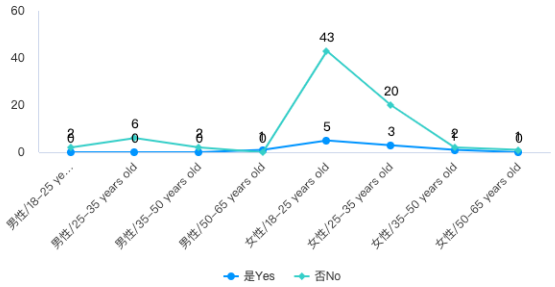


Figure8: Participants' use of an emotion management APP

Hypothesis 5: X=T1, T2, Y=T11.
As can be seen from Figure 9, participants' understanding of the correlation between emotions and health is relatively obvious, but the degree of understanding only tends to a general level. This also shows that people only pay attention to a topic of emotional problems, and have no initiative to deeply understand them.

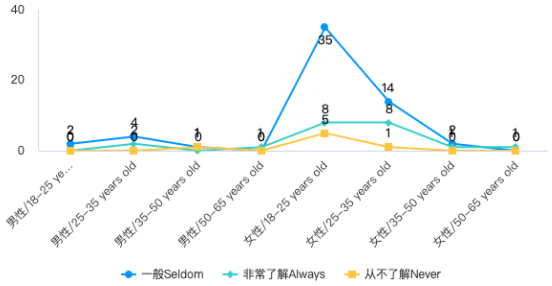


Figure 9: The participants' level of understanding of emotional health

Hypothesis 6: X=T7, Y=T11, T12
Figure 10 and figure 11 demonstrates the cross-analysis between voluntary participation in the emotional test and the educational level of participants when examining emotional health. According to the data, the cohort beyond the college level possesses a comprehension of emotional well-being and actively engages in the examination. These findings indicate a correlation between individuals' level of education and their concern for emotional well-being.

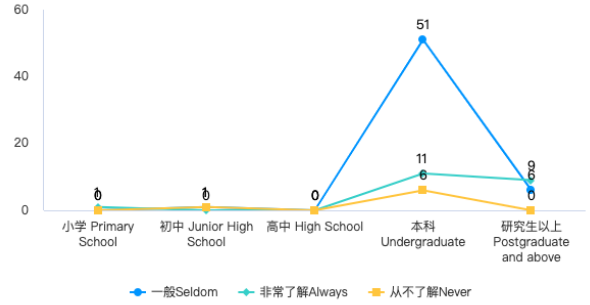


Figure10: To understand the relationship between emotional health and the educational level of the participants

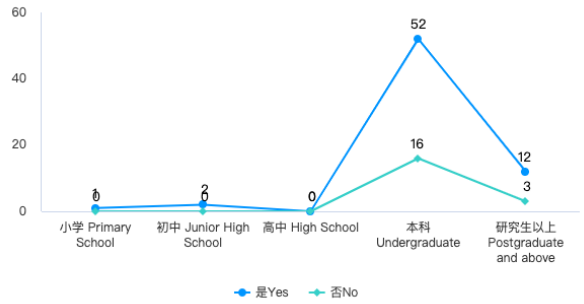


Figure 11: Relationship between participation in mood tests and participants' educational attainment

V. Design and Evaluation

Utilising APP (UMOOD) design and product design as the primary mediums. The main goal of this chapter is to apply design thinking, specifically focusing on the four stages of Design thinking (Empathize/Define, Ideate/Prototype, Design/Build, and Review/Refine).

A. Target user

It has been determined that individuals between the ages of 18 and 35 have a keen interest in the aforementioned issues, and their emotions are influenced by numerous factors. Hence, the intended demographic for this study comprises individuals aged 18 to 35(see to figure 12).

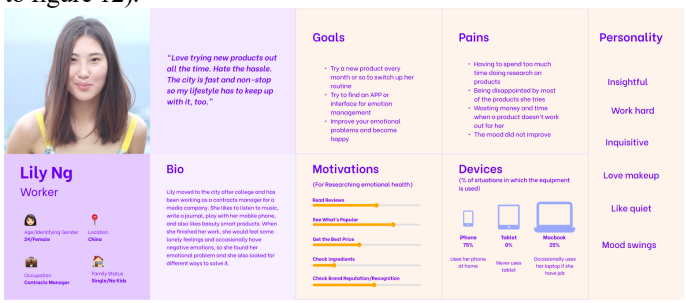


Figure 12: Persona

B. Problem Definition

Around the 5W1H (i.e, what, why, where, who, when, how) principle is defined, from external factors to internal factors, in-depth analysis of the problems faced by users, to find users' pain points and needs. The main problem defined in this study (see to figure 13) is that users lack the vision to detect emotions and lack some sense of self-affirmation in their hearts. As for the main problem, the solution is that it is difficult to change due to external factors. The user's inner psychological self-awareness builds the awareness of discovering emotions, and influences people's emotions through design to achieve a stable positive emotional state.

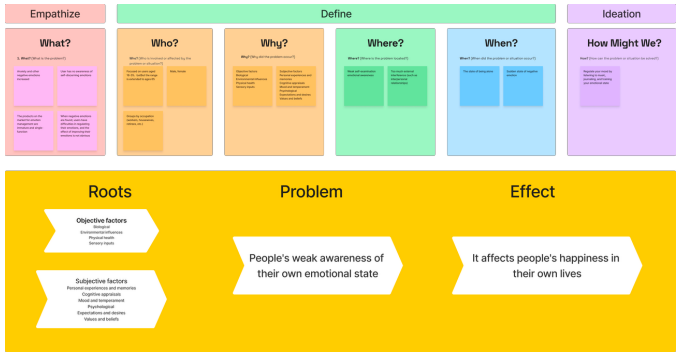


Figure13: Define problem

C. Emotion vision design

Emotion is an abstract concept that is visually represented via the use of colour and line in the design elements. The emotion data is then incorporated based on the quantification of emotions obtained from the questionnaire. Figure 14 illustrates the usage of warm colours to represent happy emotions, whereas cool colours are employed to depict negative emotions. The closed shape of the emotion visualisation pattern is displayed. The central motif is encircled by a circular dial, indicating the specific moments when emotions are manifested, and allowing for a clear observation of emotional fluctuations. This design prepares for the subsequent product design. Under the current technological feasibility, the quantified emotion data table is visualized and input into the product. Through the big data of AI, it is analyzed based on factors such as users' personal usage and environmental changes, thereby obtaining a more rigorous data presentation.

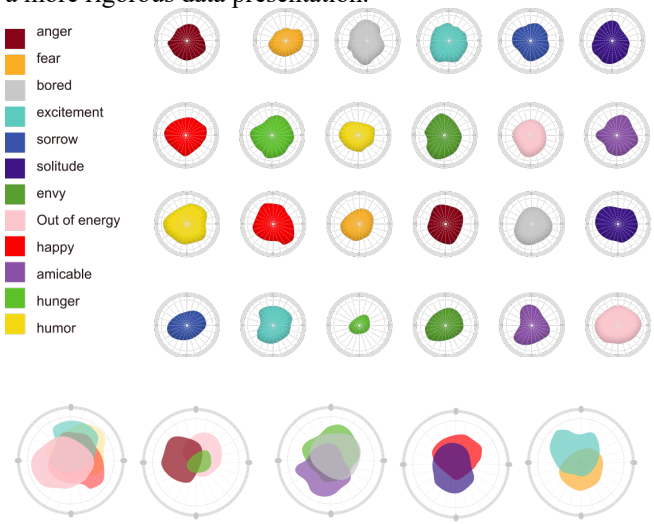


Figure 14: Emotion vision design

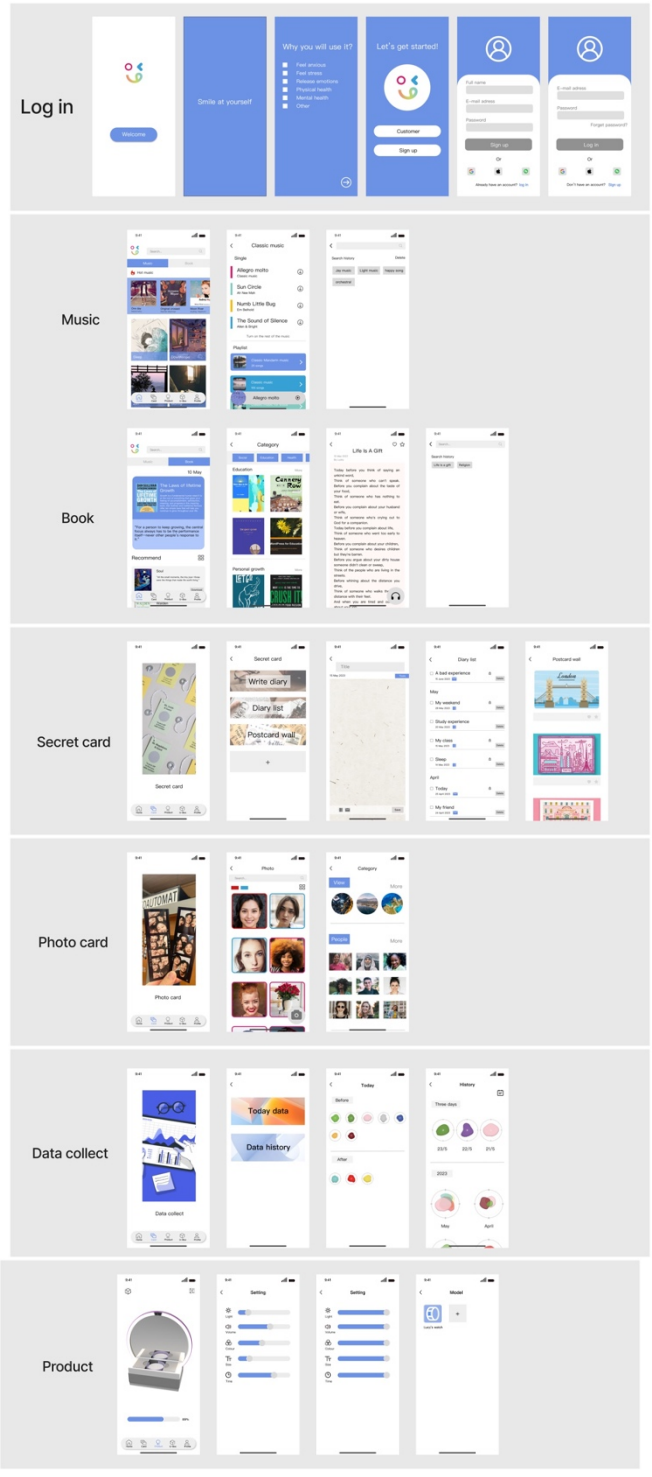
D.APP design

The main function of the application (APP) is to collect product data, analyze it through big data and technology, and collect users' emotional changes for visual display. This function is required to be used in conjunction with the product. The detailed introduction of the APP is as follows:

1. Following the literature research and data analysis, the App utilises the mood therapy approach by suggesting music and proposing articles or books. The selection of these materials

takes into account their suitability for promoting happy feelings. The primary criterion for music selection is predominantly light music, such as the cello. Furthermore, music of comparable genres is further categorised, and the colour of each music entry also varies based on the distinct emotional states evoked by each piece. The article selection criteria are characterised by their positivity and readability, exemplified by works such as "The Little Prince."

2. The auxiliary products, including the bracelet module, can be shown and their fundamental functions can be altered through mobile phone operation. This includes modifying the light source of the product and setting the duration of usage. Furthermore, the functionality of the product can be assessed to ascertain its usability and effectiveness in serving as a reminder for users.
3. The function of the card is to gather the user's personal content, which can enhance their bad emotions and provide insights about mood fluctuations. This can be achieved by customising the card content or utilising pre-set cards. The literature research and analysis have summarised one of the three strategies of emotional regulation, which is creative activity through writing. Fixed cards typically consist of three primary elements, one of which is the privacy card. This card enables users to document their daily mood by writing down fragmented text on a regular basis. Additionally, the photo card primarily gathers up-to-date facial photographs of users throughout product usage. Furthermore, the task involves categorising and exhibiting the photographs, essentially creating a photo repository. The data collecting and analysis card primarily displays the emotional changes that have been analysed using emotional computing technology in products and apps. Furthermore, the emotional visualisation feature showcases the user's emotions within a given time frame, which can be as precise as an hour interval. The data history includes a 24-hour record, a three-day record, and a monthly record.
4. The function of the U-box is to facilitate effective communication between users and various groups of individuals. Research has indicated that when individuals experience negative emotions in response to external stimuli, the majority of people tend to withdraw and limit their interactions with others. This is due to individuals exhibiting adverse behaviours towards social engagement and self-expression, which hinders emotional well-being. Furthermore, the online contact facilitated by the Internet undermines the robustness of face-to-face communication, hence providing significant assistance to individuals who experience communication deficiencies. The objective of this study is to ensure that consumers consistently maintain a steady emotional state and bolster their confidence. Hence, inside the design framework of U-box, individuals have the option to engage in communication with various groups, encompassing close connections such as family and friends, as well as unfamiliar individuals. When establishing this communication function, the user information is supposed to be secret, and the particular details are not shared between users. However, a broad description is provided. Furthermore, certain demographic segments exhibit heightened emotional distress, necessitating an augmented reliance on private healthcare practitioners. The combined impact of the application (APP) and the product allows for the initial extraction of huge data for preliminary analysis. Subsequently, communication with a private doctor enables the doctor to gain insight into the user's daily emotional state, facilitating the development of an effective treatment plan. This function is discretionary and potential research.
5. Personal Settings refer to the customisation options available for modifying both personal information and the application itself.



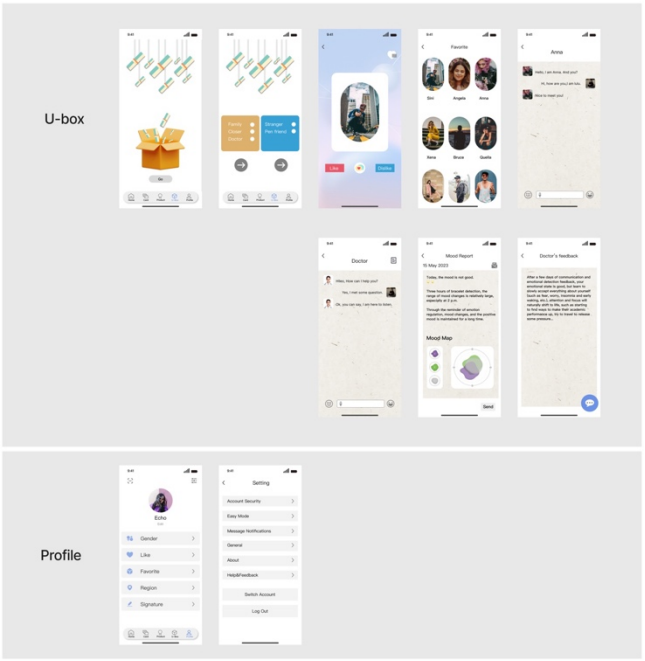


Figure 15:APP Design

E. Product design

According to market research and analysis, the integration of APP and product design is a strategy that enhances user experience and is frequently taken into account by designers. The product design in this study consists of a mirror and a smart bracelet that possess the ability to accurately detect and analyse emotional fluctuations. The product's functional design primarily consists of five functions. The analysis provided is comprehensive and thorough:

1.Through literature research and analysis, it is possible to apply emotional computing technology to products in order to detect and recognise users' emotions. By conducting a thorough analysis, one can receive data about feedback and recognition. If the user experiences prolonged or severe negative emotions, the product can serve as a reminder for the user to engage in self-training.

2. The product is used by the associated programme (UMOOD), which has the capability to play music and listen to the content of articles, among other things. The product design incorporates acoustic functionality. The objective of this design is to provide users with a means of escaping from the intricate information on their mobile phones during moments of negative emotions, and to allow them to indulge in the gratification and assurance offered by the immersive product.

3. Because the product is set as a smart makeup mirror, it can not only improve people's mood, but also act as an ordinary mirror to use, users can make up and so on. In addition, the design with a light belt can not only brighten the surrounding dark environment, but also be clearly identified in the smart mirror in recognizing people's emotions.

4. The bracelet is equipped with an intelligent recognition mirror as a component of the product. The lower compartment of the box is specifically intended to contain a concealed area that serves as both the charging and storage unit for the smart bracelet.

5. Intelligent mirror recognition primarily focuses on the impact of people's emotions. When intervention from external sources is necessary, users can receive feedback on changes in their facial emotions. The duration of emotional training takes precedence in identifying the user's emotions, and it is determined through internal technical analysis. Additionally, the length of emotional training can be customised.

6. The smart bracelet is mainly used to detect emotions. Because the use environment of the smart mirror is limited, it is not suitable for carrying. Therefore, the bracelet can always detect the user's emotional state, and the function of the bracelet is a single function, mainly for time viewing, movement distance and emotional function detection and feedback.

F. Product size

The size of the product is determined by considering the dimensions of similar genuine products and analysing the user's usage patterns and environment, in order to create a suitable and practical size for the product. Therefore, the products of this study are divided into a mirror that intelligently identifies emotions and a bracelet that intelligently detects emotions. The initial prototype has been established. The dimensions of the smart mirror's box component are as follows: 150mm in length, 100.03mm in width, and 60mm in height. The wristband storage space has dimensions of 70mm (length) x 56mm (width) x 32mm (height), and the mirror is a component inserted in the box with a radius of 94mm, the detailed dimensions are shown in Figure 16. The smart bracelet has a circular shape with a circumference of 300 degrees, a radius of 25.5mm, a width of 25mm, and a thickness of 1.5mm, the precise dimensions are depicted in Figure 17.

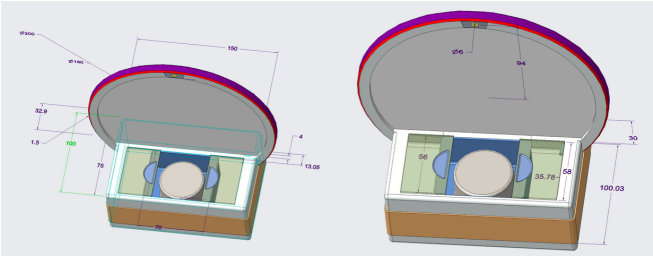


Figure 16: Smart mirror size

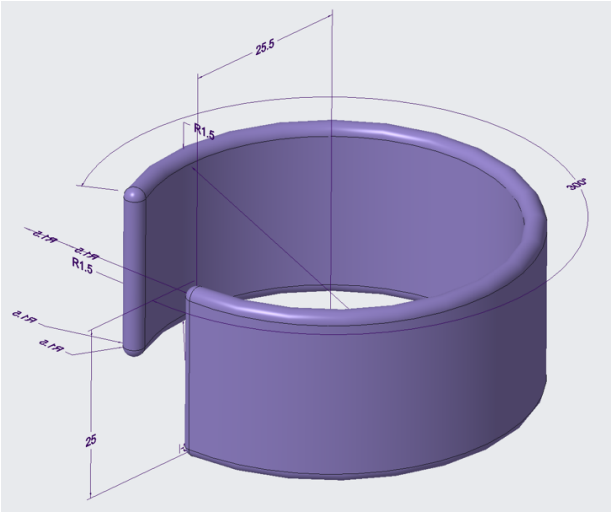


Figure 17: Smart bracelet size

The Hi-fi of the product is the display of the material of the product model, which can be close to the real product. In the design process of the product, the overall design of the product color selection is simple milky white. The sound material in the smart mirror product is fabric texture, and the switch of the storage bracelet is acrylic material (see to figure 18). The band is made of carbon fiber and the screen is made of glass (see to figure 19).

Figure 18: Smart mirror

Figure 19: Smart bracelet

Figure 20: Real scenes

G.Service blueprint

Before use, in use, and after use are the three phases that are included in a service blueprint (see to figure 21). This blueprint is a study of products and applications in conjunction with the three phases before and after use. Users have a clear understanding of the product and application service process since it is broken down into front-end user operations, back-end application analysis, and product analysis.

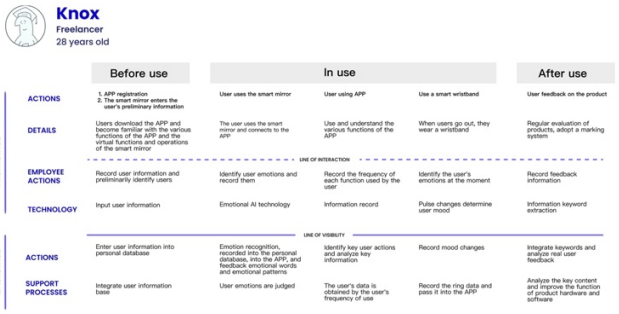


Figure 21: Service blueprint

H. Heuristic Evaluation

Heuristic evaluation is a method in which specialists assess the usability of user interfaces by applying established guidelines during individual walkthroughs and documenting any identified problems (Interaction Design Foundation,

2019). Based on ten usability heuristic methods to expand (see figure 22). Therefore, the evaluation of the design aspect of the study is conducted using the Nielsen-Molich method, which involves assessing the product based on a predetermined set of inspection criteria.

1. The APP integrates a smart mirror and bracelet to provide users with mutual reminders about the status of the device. For instance, mobile phone applications can effectively control the functionality of smart mirrors and wristbands.
2. Optimise the design of the APP based on a study of pertinent research on rival applications and consumers' usage patterns. As an illustration, the design incorporates a layout where three photographs are arranged horizontally to enhance user comprehension of the material. The product utilises a reduced language, employs graphical and textual representations for the APP icon, and avoids redundant repetition of fixed text information within the APP. The size and style of smart mirror goods are determined by measuring their dimensions and height, ensuring that people may utilise them more ergonomically and healthily.
3. The APP, smart mirror, and bracelet are primarily designed for interaction. Users can modify and personalise these devices according to their habits. For example, the content displayed on the APP cards can be customised.
4. Users can adapt their behaviour to preserve operational flexibility. Simultaneously, users can promptly get the needed information using the search function. During the initial usage of the smart mirror application, users can become acquainted with its functions through the automated design of the operation process. Additionally, users may encounter difficulty in navigating the settings function within the application.

Consequently, the three gadgets (APP, smart mirror, bracelet) have a mutual interaction, making the product design accessible.

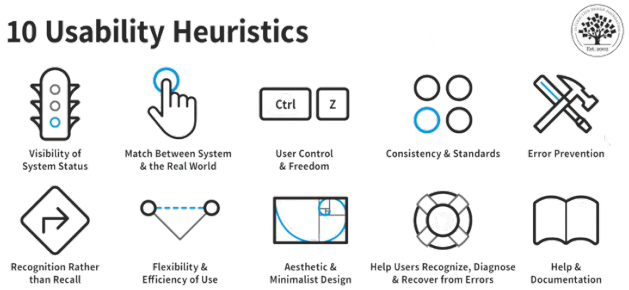


Figure 22: Ten usability heuristic methods
Source:(Interaction Design Foundation, 2019)

VI. Conclusion

This study examines the emotion visualization model, which is developed via data analysis. The objective of this study is to enhance individuals' emotional well-being by integrating an application (APP) with a product. In literature studies and surveys, people's awareness of emotional health issues is weak, while in market research, people's emotions are mostly analyzed and improved in the form of a single application. Thus, this study considers not only the principles of user experience but also the visually pleasant interface design of products and applications. By utilizing the developed products of this study, users can successfully enhance their emotions. The advantage of the design is that users can have an immersive environment to improve their emotions, and emotional feedback can be obtained through emotion recognition, so that users can self-select the three ways to regulate their emotions.

In psychology, emotions are intangible and challenging to quantify. The primary objective of this study is to measure emotions and propose optimal remedies using advanced technology. By searching keywords (emotion visualization, emotion visualization), the relevant literature summary is obtained. Through detailed reading and analysis, it is found that there is a lack of practical application demonstration in design in previous studies. By conducting a keyword search on emotion visualisation, the relevant literature summary is obtained. Thorough examination and analysis reveal a dearth of practical application demonstrations in design in prior research. Prior to the widespread adoption of products and apps, emotional assessment tables can be employed to gather users' current emotional states, establish a comprehensive database, and present abstract visual representations using design components such as colours and graphics.

The study not only innovatively captures facial expressions to communicate emotions, but also collects quantitative data on emotions. This research contributes to the field of combining psychology and design, particularly in the realm of digital design. This study investigates the research direction of facial expression training as a technique of adjusting emotions when receiving feedback. Once emotional AI technology reaches maturity and is implemented in practical settings, further study is required to accurately record individuals' emotional fluctuations and align them with their own feelings. Not only consider the theoretical support, but also need to consider the initial output of the design. This study requires long-term practical testing to obtain data and accurate detection rules. In the application design, the function to involve the psychiatrist in people's everyday lives, not just the traditional way of consultation, in the case of self-management, when the user needs help, through the product's preliminary data method to give the doctor's initial judgment, in addition, for the person's emotional visualization patterns, can also under 3D printing technology, transform the emotional model into physical.

There are also limitations in this study, when collecting questionnaire data, the survey carried out only on the population of China, although the data obtained is effective, can detect problems and support the topic of the study, but the amount of data is not large enough, which is not enough for the accuracy of the research. Furthermore, in this study, it is difficult and limited to apply design applications and products to real life, not only taking into account the technology in the product, but also the organization of big data. For these constraints, the design of this study is reasonable, based on previous research and analysis and experience of market products and applications. In future studies, it is given priority. Secondly, according to the survey, there is a lack of awareness about improving emotional health, and the market products do not attract users, so attracting the attention of users also needs to be considered.

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