

Mental Health Mobile App for Adolescents: Focusing on Application of Music Autobiography

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<https://doi.org/10.5392/IJoC.2023.19.2.071>

Manuscript Received 07 February 2023; Received 07 June 2023; Accepted 15 June 2023

This is an excellent paper selected from the papers presented at 2022 Korea Contents Association Academic Conference.

Abstract: *Adolescents who are living in the recent IT technology and social distancing environment are experiencing expansion and limitation at the same time in order to adapt to internal and external conditions and role changes. As they adapt to such conditions and changes, they suffer from significant stress and mental health difficulties. This study aimed to provide empathetic exchange and support by applying a half-duplex communication method to have emotional awareness and understanding by developing a 'Music Autobiography Program' to record and share music, a representative interest of youth, according to the chronology of growth. Considering that this will be a realistic and useful art healing content instead of treatment barriers and limitations, this study develops a music autobiography program for a mobile application for mindfulness of adolescents and discusses its meaning.*

Keywords: Adolescents' Mindfulness; Music-Autobiography; Smart Arts Therapeutic Content

1. Introduction

Recently, interest in the art therapy field has increased and research has been activated as an alternative psychotherapy due to the advancement of IT technology and the aftermath of the COVID-19 disaster [1]. Arts therapy through the experience of the senses and the expression of media has been recognized that it will be difficult to provide a unique experience with electronic devices and online reality [2]. But experience exists in the world, we exist as part of the world, and the world exists within our thoughts and actions. It is believed that the majority of people who have experienced positive emotional experiences and satisfaction through music will agree without disagreement about utilizing music appreciation therapy as the first step in art therapy as an extension to a wider world beyond face-to-face therapy.

Until the process of adaptation for social connection in the disconnected space of the Corona era, active thinking and attempt were unessential. However, the experience of a new world of human power through the use of media and a new approach made the experience and perception of music appreciation is no longer a therapeutic technique that can only be implemented face-to-face, and the expansion of awareness was naturally achieved [3].

In particular, non-face-to-face mediation for music appreciation for adolescents who are accustomed to utilizing media through smart content and online communication to relieve boredom and stress is expecting that IT technology will be applied in the field of psychology and art media therapy to serve as a bridgehead for expansion of each theory and philosophy [4]. Here, expectations for the therapeutic effectiveness of media that go beyond traditional arts therapy methods supplement positive to the possibility of expanding new intervention methods to the adolescents' adaptability and their ability to utilize and apply digital media conversion [5].

However, it is also true that adolescents experience considerable stress while growing up to adapt to changes in their inner state and changes in their roles as social beings [6]. In particular, in uncertain and controlled situations such as the current Corona era, mental energy is an important resource for adaptive development, but deprivation of experience in a social environment threatens the development of the nervous

system [7]. This can lead to immature understanding of inner feelings or self-expression, and is a risk factor for expressing emotions and behaviors in an unhealthy way [8]. Adolescent mental health management issues require practical approaches and efforts based on a more realistic understanding.

As the COVID-19 pandemic lasted for more than three years from the beginning of 2020 to the present of 2023, students in early adolescence are experiencing more psychological stress than students before COVID-19 [9]. It is reported that the number of teenagers treated for depression increased by about 20% from 48,099 in 2019 to 57,587 in 2021, and the number of teenagers treated for anxiety disorder increased by about 33% from 23,853 in 2019 to 31,701 in 2021 [10]. In addition, the number of teenagers who died by intentional self-harm or suicide during the COVID-19 period was 315 in 2020 and 338 in 2021, a 13% increase compared to 2019 and 2021, before the outbreak of COVID-19 [10].

Several domestic studies have also reported that school education based on non-face-to-face and non-contact(untact) is negatively affecting the mental health of adolescents due to the continued COVID-19 [12]. Since COVID-19, opportunities to develop social skills through interaction with peers are limited, and the negative impact of a complex lifestyle is intensifying, such as experiencing more academic-related stress due to non-face-to-face classes [12]. Although the current atmosphere is that COVID-19 is coming to an end, there is a possibility that new mutated infectious diseases will emerge in the future, there is a strong prospect that it will be difficult to completely return to the Pre-Corona era. The government has also identified this situation, and has expanded national counseling and treatment facilities to help adolescents experiencing mental health difficulties, and made various efforts to restore youth mental health by using ZOOM, SNS, and Metaverse [11].

Prior to COVID-19, psychological support services were primarily provided to adolescents with emotional behavioral problems such as anxiety, depression, suicide, and self-harm. However, in the Post-Corona era, there are also research reports that it is necessary to expand to general students to solve emotional and social development and psychological difficulties [13]. COVID-19 is becoming a factor that hinders the healthy social development of early adolescents(11-16 years old) who are emotionally unstable due to the onset of puberty. Sociability development affects contextual understanding and coping with situations, and these two have a great impact on emotional development, emotional awareness, emotional regulation, and emotional expression. However, as social and school life is cut off due to COVID-19, problems arise in social development. In addition, COVID-19 makes it difficult to adapt psychologically and feel inner happiness while experiencing isolation, alienation, and depression [14].

2. Theoretical background

2.1 The Arts-Psychotherapy in the Non-Contact Society

Arts-Psychotherapy partially introduced digital media from the 1980s and used it for incoming patient with reduced mobility and adolescents [3]. Since then, art psychotherapy incorporating IT technology has been more active and has been carried out through diverse media. Preceding studies of art therapy utilizing music include computer game-based music therapy [1], video game-based music therapy for Alzheimer's patients [17], and a development study of a portable blood pressure measurement monitor based on a smartphone for music therapy [18]. However, these studies were for the elderly or studies for health function. Starting with Hyun (2006) utilize the digital content and video media on art therapy by Han (2015) and Park (2019), but music appreciation was unutilized in these studies [22-24].

In spite of that varying studies have been conducted, such as application-based music therapy [20]. Most of the studies suggested health management methods through personalized well-being applications that applied music therapy and art therapy, or checked one's own health condition. Recently, studies such as music therapy utilizing VR [26] have been conducted for patients with intellectual disabilities, Parkinson's, and dementia. Several studies have been conducted based on the fusion of art and IT technology, such as music therapy through remote video technology [27], but research and development for the mental health of undiagnosed general adolescents are insufficient. In other words, although adolescents actively use music and have high access to media, there is a lack of research on using it as a resource for education or psychological support in a non-face-to-face environment.

With the development of science and technology, play tools and playgrounds are rapidly changing. Smartphones and computers with the latest IT technology have already become familiar play media for teenagers. Like the concept of 'Homo Ludens', a human being who plays, not to mention children, early adolescents naturally

achieve physical, emotional, cognitive, and social development through play [15]. For adolescents who face many psychological difficulties such as academic stress and peer relationship conflict, play is their own world and a factor that gives vitality to life, so it should be seen as an element that needs to be emphasized more in character formation and emotional social development. Recently, teenagers are creating new places and ways of play through digital play culture. Through digital media such as computers, smartphones, and smart TVs, teenagers enjoy digital culture and are being activated as 'play culture' in virtual spaces. For digital native youth, music activities are not only a common interest, but also a positive resource and hobby that satisfies the desire for creative expression and allows them to communicate and connect with others [27].

Adolescents actively use music and have high access to media, but studies on using it as a resource for education or psychological support in a non-face-to-face environment are lacking. To sum up many studies, using art therapy play activities through music as a therapeutic medium through digital media can help self-regulation. In addition, it has the advantage of arousing empathic resonance by developing a brain neural network involved in interaction [28].

2.2 The Music-Autobiography Application for Adolescents

Music is not only a common interest of young people, but also a positive resource and hobby that satisfies the desire for creative expression and allows them to communicate and connect with others. Consequently, if the music autobiography (YBM 2015 music subject 'my autobiography'[25], technique is implemented as an adolescents' mindfulness application, adolescents allow to participate in the process of reflecting on their experiences in a voluntary and unburdened way.

Music-Autobiography is a combination of 'music' and 'autobiography', with music is substituted by language and language is substituted by music. In accordance with the chronology of growth, one experiences one's own memories and life events through art media that retains thoughts and emotional histories, allow to recognize and experience present self-awareness, understanding of the past, and existence and reciprocity.

As a matter of fact, 'music autobiographical activities' are in line with the goals of the Ministry of High School Music Education in Korea, and the goals of '2015 Music and Common Curriculum' are as follows. 'The goal of music education is to nurture talents with communication skills to respect and consider others through the development of musical emotions and expressiveness to enhance self-expression skills, form self-identity, and recognize the pluralistic value of culture. 『2015 Music Department Revised Curriculum』, Ministry of Education Notice No. 2019-21' Thereupon, 'Music Autobiography', a combination of 'Music' and 'Autobiography' is achievable to generate a foundation for enhancing self-expression through music. In the process, effective multidimensional communication is conceivable, including understanding and respect for others, emotional empathy and exchange that are difficult to communicate verbally. Thus, if the music therapy technique is grafted into the music therapy field by referring to making a music autobiography in the high school textbook 'music subject' class, it is devised to fit the characteristics of the 'application program' and it bears to fully perform the educational and therapeutic roles of the music autobiography.

3. Content of the design development

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation as well as the experimental conclusions that can be drawn.

3.1 Figures, Tables and Schemes

3.1.1 Subsubsection

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This study is conducted as part of the 2020 selected general joint research support project convergence 3-year project 'Development and application of mobile mindfulness meditation app to promote mental health of adolescents'. In the first year, adolescent psychological education and meditation contents(clinical and developmental psychology), in the second year, interface and character development related to youth meditation app development and UX/UI design(art engineering) and the third year, the development of a breathing-centered dance/movement therapy app in the art therapy area and the design method for the implementation of

adolescents' mindfulness application using music autobiography techniques in the music therapy area were studied.

Emotionally stable pencil drawings and light, comfortable watercolor sensibility were applied as the main expression styles of the characters so that teenagers can participate in various mindfulness contents in the app with a comfortable mind through sympathy with the characters(Figure 1).

Furthermore, in order to supplement the watercolor line drawing, which has limitations in responding to UX based on space and vector drawing, by applying the background color of the Koala Mindfulness App design while maintaining the original design of the line art character, it was constructed as a simple and cute line-applied sub-style [Figure 2].

3.1 Figures, Tables and Schemes

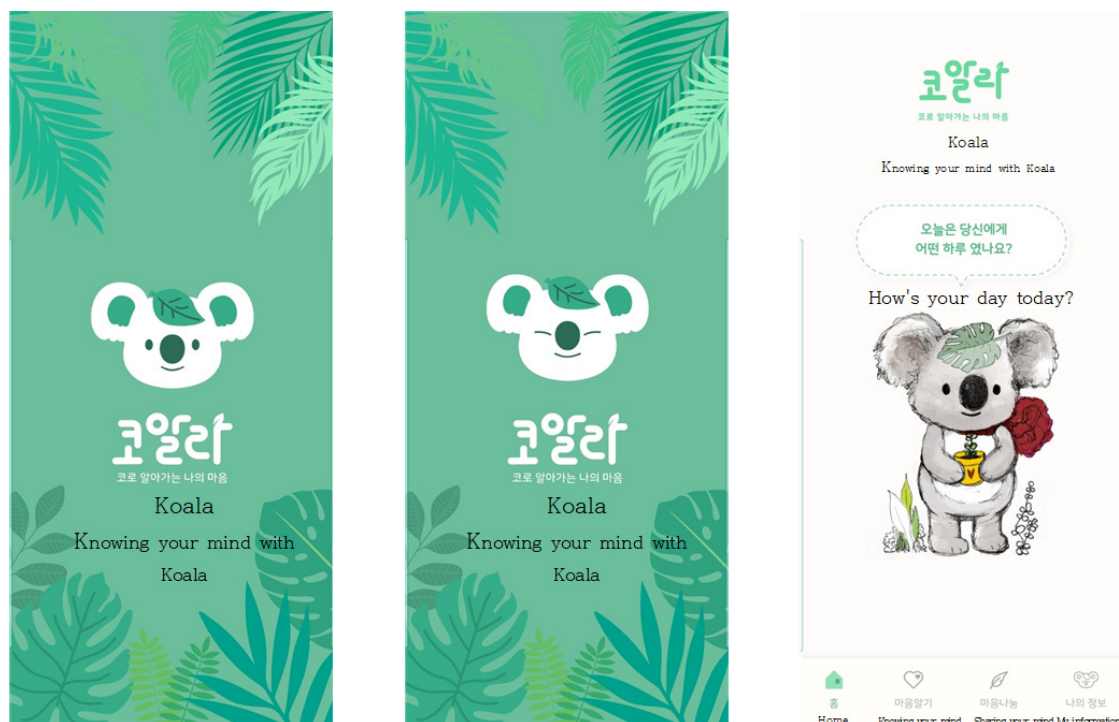


Figure 1. Design of Main character Koala.

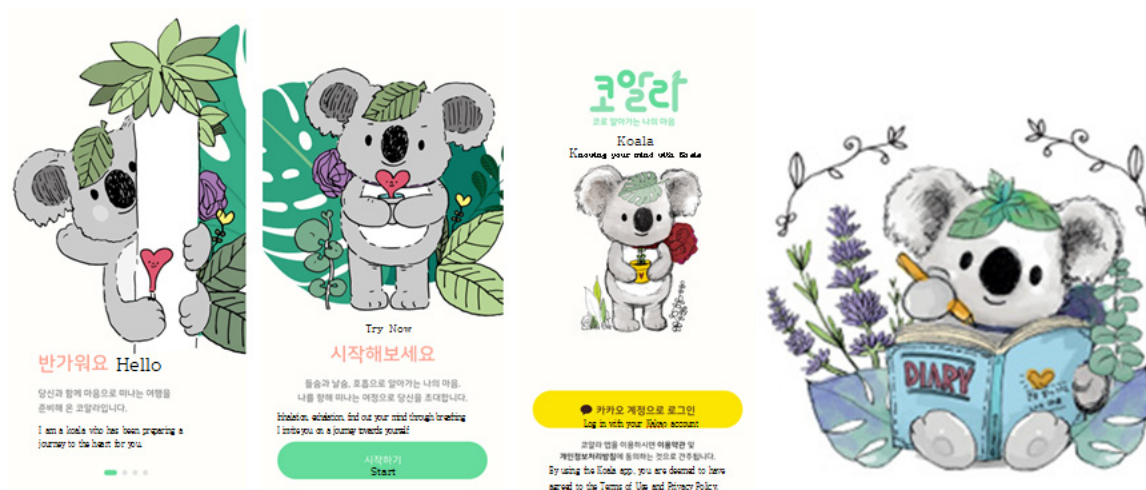


Figure 2. Development of detail character design.

Sub-functions of music contents, music-related Koala Mindfulness App on detailed pages are composed as follows. In the 'Sound' menu, the 'Echo to stabilize the mind' page at the bottom, ASMR, the sound of nature, is provided, and a play button activation function has been added to facilitate concentration and mindfulness while using meditation, mind diary, and psychological education [Figure 3].

The music autobiography menu is composed of a page titled 'Music Memories', and when approaching the page, the first two tracks are selected and designed to participate in the program. First, 'Remind memories of those days' is a track divided into chronological stages according to the developmental stage, and is configured to recall that point in time by searching for music, and save links. Second, 'Remind memories at that time' is a page composed based on autobiographical episodic memories. It is a representative event derived from a pilot study conducted with 48 students of first-year college students and adolescents. It apart from chronology, was configured to search for music resources to remember life events and important moments in life and to store the links. The detailed list is shown in Table 1 [Figure 4].

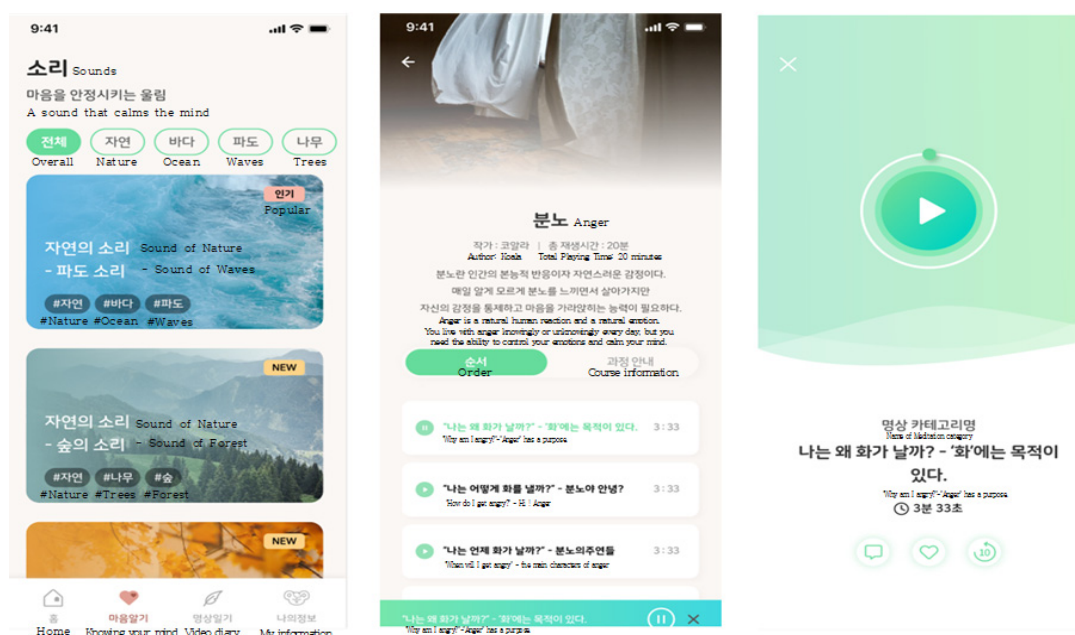


Figure 3. Sub-function of Music Content.

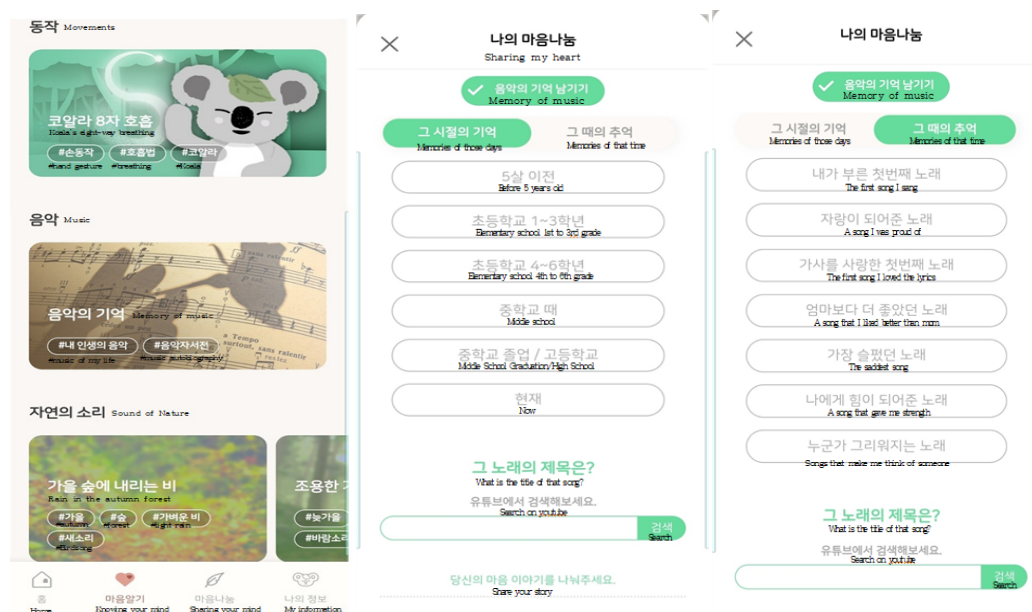


Figure 4. Music autobiography main page and detailed features.

Table 1. Composition of the Music autobiography page menu

Remind memories of those days	Remind memories at that time
<ul style="list-style-type: none"> • Before 5 years old • Lower grades of elementary school • Upper grades of elementary school • Middle School • High school • Now 	<ul style="list-style-type: none"> • The first song I sang • The song I was proud of • The first song I loved the lyrics • The song that I liked better than my mom • The saddest song • A song that gave me strength • A song that make me missing someone

**Figure 5-1.** Musical autobiography sharing page.

All the detailed pages of the music autobiography are linked to each sound source in order that memories about the music can be written on the writing page. After fully enjoying the selected music through half-duplex communication, it is possible to share empathy and exchange with peers through comments and stickers through pages set to public. A shared page was constructed by building a public/private function that can be viewed with other users. At the bottom of the 'Heart Sharing' post view function, a sticker such as 'Like' can be add to the writer, and the reward system that the membership level changes according to the number of pages written in such a manner that participants feel a sense of interest and achievement. Naturally sharing memories and emotions with users of a similar age, expressing one's own stories and experiences, and taking time to look back, to organize not only current emotions but also procedural memories and feelings of being alive and to have a positive self-view [Figure 5-1][Figure 5-2].

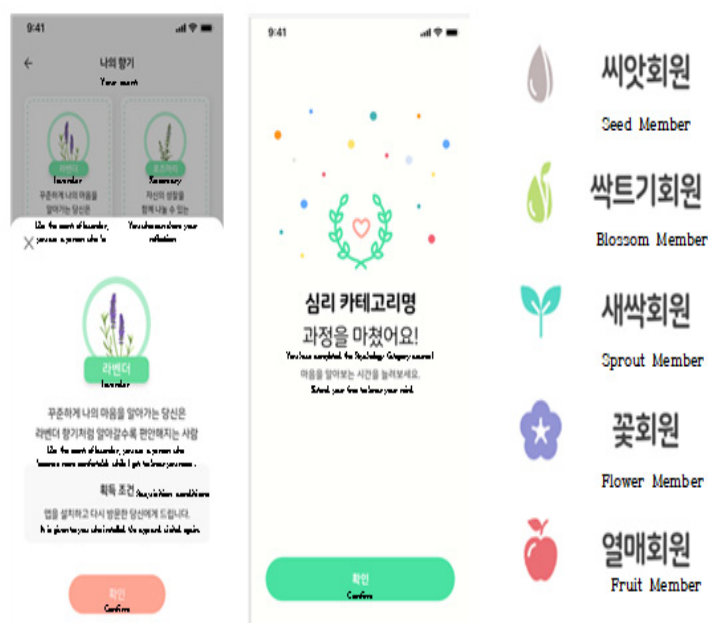


Figure 6-2. Musical autobiography sharing page.

Analyzing the implementation stages of a musician's autobiography used in the field of music psychotherapy, it can be divided into seven stages: introduction/explanation/issue suggestion/reminiscence/music autobiography/listening to music/concluding. This application program constructed according to each of these steps. It allows adolescents to organize the music of their memories by page through menus such as naming emotions, attaching photos, writing in a diary, and sharing, they can voluntarily perform the therapeutic functions of noticing their mind, experiencing the present, and utilizing social resources by communication and empathy. The episode of a specific moment held in each person's memory is meaningful in its own way, and becomes a part of the organized youth's own world and self.

Implement a system to re-experience as a vivid sensory resource through play music and evoking feelings or retrieval of thoughts about the subject allows adolescents to experience the past, present and connection. Since then, it will be the most personal holding work as a role of adaptation and challenge, which is an internal resource.

The 2015 music education curriculum is 'to develop self-expression skills and form self-identity through the cultivation of musical emotions and the development of expressive power. The goal is to develop the ability to communicate with respect and consideration for others through the recognition of the pluralistic value of culture. We believe that it will be effective as an intervention to help adolescents grow as a whole and manage their minds by sharing and exchanging one's own resources in a positive way by exchange of music in this era.

4. Discussion

In addition to traditional face-to-face psychotherapy, psychological treatment methods through the Internet or smartphone apps are being developed in the West including the United States, and there are thousands of them. However, in Korea, the development of this field is not yet active, and the development of a digital psychological support platform for teenagers is weak. Through 3 years of meditation app research, the researchers created a self-healing mind management meditation app(Koala Mindfulness App) that can deal with the psychological difficulties of early adolescents exposed to everyday psychosocial complex environments and stress. And the differential meaning possessed by this study is as follows.

First, although programs using Edu-Tech are being developed in the field of education, there are not many programs that preemptively prevent mental health problems. Adolescents who have experienced the experience of selecting sound sources, recognizing emotions, and being sympathetic to others according to the chronology of growth can recognize the present and seek natural conversion of emotions and thoughts. This enables adolescents to understand their past and present, connect themselves and others, and gain a mutual treatment experience at a new level through 'living experiences' encompassing the relationship between the act of artistic

expression and mental exchange [29]. Existing programs related to mindfulness meditation have been applied to adolescents, adults, and psychiatric patients suffering from severe psychological pain such as depression, anxiety, and panic disorder. However, mindfulness is being used in the educational field as a part of character education. If this is more universally provided to young adolescents through mindfulness experience programs, they will be able to acquire living skills, including life attitudes that can last throughout their lives through late adolescence and early adulthood [16]. This will be the foundation for the future generation of adolescents to grow up a little healthier psychologically and emotionally [21]. In particular, this approach can be seen as a differentiated study in that it is provided not in group education or offline, but in the form of online education familiar to teenagers, and furthermore in a virtual space such as the metaverse [28].

Second, this study tried to provide the concept of mindfulness in a form of practical experience that is more accessible to adolescents based on the research experience so far. 'Music autobiography', which is the safest client-centered approach and has unique and continuous therapeutic efficacy, is a possession of one's own and will be preserved in the future, provides adolescent users with an emotional sympathy experience and is an alternative treatment for creation and healing will be able to function [22]. Therefore, the music autobiography mindfulness application smart content is expected to be useful mind management content for growing through communication by continuously recognizing and recording one's emotions in a comfortable environment instead of the entry barriers and limitations of psychotherapy. Based on this, this study aims to contribute academically and is expected to contribute to society through the prevention of psychological disorders in adolescents, the future generation [30]. Furthermore, it will be effective in preventing psychosocial problems if applied to out-of-school adolescents, adolescents under probation, and adolescents in need of protection who are imprisoned in juvenile detention centers, where it is difficult to approach psychotherapy due to lack of manpower or budget.

Therefore, the 'music autobiography' of adolescents can not only be a culture of another way to consume and enjoy music as a personalized resource, but also experience awareness and presence through active music appreciation. It is expected to provide an experience of understanding and respecting themselves, others, and the meaning of time and experience.

Acknowledgments: This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2020S 1A 5A 2A 03045953).

Conflicts of Interest: The authors declare no conflict of interest.

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