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Study of Mood adjustment effects and Interpersonal interactions through Music therapy

–From the perspective of Psychological and Physiological indicators–

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Chapter 1 Introduction

Background of this study

Music is said to be one of the stress management methods. Music therapy uses music as a therapeutic technique. Music therapy aims to improve the subject's mental and physical problems or maladjustments by utilizing music. The Japanese Society for Music Therapy defines music therapy as a therapeutic technique that intentionally and systematically utilizes the physiological, psychological, and social functions of music to restore physical and mental disabilities, maintain and improve functions, and enhance quality of life (Japanese Society for Music Therapy, 2003). is broadly classified into two types: passive therapy and active therapy. Furthermore, there is receptive experience in passive therapy (Kurino, 2018). On the other hand, active therapy includes singing, performance, creation, and induction, and active therapy uses include solo performance, ensemble performance, and improvisation (Yamane, 2007).

Many studies have shown that music listening improves mood and has a physical relaxation effect. However, it is not yet clear enough to examine the effects of music selection and music use according to the individual characteristics of the listeners. From this perspective, it is necessary to first investigate how and in what situations music is used in daily life. In addition, most of the previous studies have focused on psychological and physiological reactions “before and after” listening to music. In order to examine the experience of music listening, it is also important to clarify the chronological changes during, after, and to some extent after the music listening in order to examine certain persistent effects. In order to use music listening as a therapy, it may be necessary to pay attention to the psychological characteristics of listeners and the process of psychological change.

On the other hand, in active music therapy, it is essential to simultaneously measure psychological and physiological indices over time. This is because the mind and body are interconnected, related, and influence each other. By simultaneously measuring psychological and physiological indices over time, we may be able to visualize objective physical changes. In addition, understanding the mechanisms of effectiveness of music therapy is important for framing treatment sessions and for understanding the psychological and behavioral changes of the subject. In various situations in music therapy practice, evidence may serve as a guideline for understanding the subject's problems and how to respond to them.

Purpose of this Study

The purpose of this study was to clarify the effects of mood regulation through music listening and interpersonal interaction through impromptu musical interaction on

psychological and physiological indices.

Chapter 2 Study 1: Mood state before listening to and playing music in daily life and the effects of listening and playing music on music involvement (frequency, time) and mood regulation (musical impression, target emotion, and achievement)　Survey1-1

The purpose of Study 1 was to clarify the effects of mood state before listening to and performing music and listening to and performing music on the level of musical involvement and mood regulation among college students. The results revealed that mood state and music listening/performance significantly affected subjective frequency and duration of music, impressions of music, intended affect of listening/performance, and the degree to which the intended affect was achieved by listening/playing the music. The present study suggests that understanding these dynamics may be effective in using music therapy for emotion regulation. Limitations and future perspectives of this study include the possibility that relying solely on self-report to assess mood states and musical behaviors may result in participants' inability or failure to accurately recall or report their experiences and feelings. In other words, it may lead to response bias or inaccuracy. Therefore, it was hoped that studies with objective behavioral and physiological data would also be conducted.

Chapter 3 Study 2: Relationships between Level of Musical Involvement, Mood Regulation, and Psychological Characteristics of Music Listeners and Performers Survey1-2

The purpose of Study 2 was to examine the relationship between the degree of involvement in music and mood regulation, and the psychological characteristics of music listeners and performers. The degree of involvement in music refers to the frequency and length of time spent listening to and performing music, and the mood regulation effect refers to the impression of the music one listens to and performs, the feelings one wants to obtain through listening to and performing music, and the degree of achievement of these feelings. In order to clarify the relationship between the mood state before listening to or playing music and the mood-regulating effects of listening to or playing music, correlations were calculated using Spearman's ρ. The six conditions were (1) usual listening to music, (2) usual playing music, (3) listening to music when frustrated, (4) playing to music when frustrated, (5) listening to music when depressed, and (6) playing to music when depressed. The results suggest that, first of all, in all conditions except for the usual music listening conditions, those with higher subjective involvement in listening to and playing music have a higher sense of accomplishment through listening to and playing music. In all conditions except “listening

when frustrated" and "listening when depressed," those who listened to or played music for longer periods of time showed a higher sense of accomplishment in achieving the desired mood through music.

Next, the results of the mood regulation effects supported the musical theme theory that music induces moods that are consistent with the music's moods. For example, in all conditions, those who had a strong impression of the intensity of the music indicated that they wanted to be energized by the music. In all conditions, those who responded that their impression of the music's brightness was cheerful indicated that they wanted to be cheered up by the music. In all conditions, except for the depressed and listening conditions, the results suggest that those who wanted to be cheered up by music were in the mood to be cheered up by music, i.e., they were cheered up by music. Furthermore, in all conditions except the depressed listening condition, those who had a weak impression of the intensity of the music indicated that they wanted to be calmed by the music. In all conditions except for the "usual listening" and "irritable listening" conditions, the results suggest that those who had a high level of desire to be calmed by music were in the mood they wanted to be in, i.e., calmed by the music.

However, the correlations between the mood-regulating effects differed depending on the mood state prior to music listening and performance. Specifically, it was found that those who were irritable before the music performance reached their desired mood to a greater extent by playing the dynamic impression piece. This result supported the homogeneity principle rather than the musical theme theory. If this is interpreted from a music therapy perspective, it can be said that the significance of the homogeneity principle intervention of first having the participants listen to a song that matches their mood state is supported, and the significance of the composition theory intervention of bringing about a mood state that matches the song is also supported at the same time. This is considered to be the same as the phenomenon known as the "transition to heterogeneity," which is a technique characteristic of music therapy. These findings suggest the importance of assessing the mood state before listening to or playing music, and selecting the method of listening or playing music, and what kind of impression music should be listened to or played.

Furthermore, the results indicated that the mood state prior to music listening/performance and music listening/performance may influence the correlation between the degree of involvement in music, mood regulation, and psychological characteristics. These findings suggest the importance of assessing the mood state and psychological characteristics before listening to or performing music, and selecting the method of listening or performing music, and what kind of impression music should be listened to or performed.

Based on the above, it is expected that Study 2 will contribute to the development of more effective music therapy by providing more effective interventions, such as the method, time, and selection of music, in accordance with the mood state of listening and playing music and taking psychological characteristics into consideration.

Mood regulation in this study refers to the impression of the music one listens to or plays, the feelings one hopes to obtain by listening to or playing music, or the degree to which one achieves these feelings. The impression of music is intensity and brightness. If we translate this into psycho-clinical practice, the strength of the musical impression corresponds to the strength of the tone of voice, whether it is strong or gentle, and the brightness of the musical impression corresponds to whether the content of the conversation is positive, such as "Go for it," or whether it is supportive, such as "I see," to the person with the problem. The theory of musical theme theory corresponds to the leading in clinical psychology, and the homogeneous principle of music corresponds to the words and deeds that are close to the person with a problem. It may be related to the phenomenon corresponding to the approach of quietly approaching a depressed person and saying, "I see," rather than encouraging him or her to "hang in there" strongly at first.

Chapter 4　Study 3: Effects of Mood-Regulating Effects of Music Listening on Psychological and Physiological Indices Experiment1-1

The purpose of Study 3 was to clarify the effects of music listening on mood regulation on psychological and physiological indices. In other words, we wanted to clarify whether there were differences in psychological and physiological changes when listening to music that one usually listens to when one wants to be energized (active music) and music that one usually listens to when one wants to relax (relax music). The psychological indices were the changes in the impression of intensity and brightness of the music listened to. For the mood evaluation of active and inactive pleasantness, we examined whether there was a difference between active and relaxing music listening. Pulse wave and electroencephalogram were used as physiological indices. In this study, we analyzed fluctuations in biological signals that are related to mental and physical health, and among these biological signals, we focused on finger tip pulse wave. Since the finger pulse wave is considered to have psychophysiological significance, containing various information on the central nervous system and the autonomic nervous system, it was used as an objective index by analyzing the fluctuation of the finger pulse wave. Furthermore, based on previous research showing that changes in physiological indices due to music listening differ depending on the sex ratio, we examined whether there were differences in physiological indices depending on the sex ratio under different listening

conditions for active and relaxing music.

The results showed that the physical characteristics of the music, i.e., the impression of the music, were stronger and brighter for the active songs than for the relax songs. Subjective listening to the active music made the participants feel more active, while listening to the relax music made them feel more relaxed. These results suggest that the impression of the music used in this experiment was appropriate as an arousing and a calming piece of music, since the intensity and brightness of the two pieces of music differed from each other. Furthermore, the mood-regulating effects of the two pieces of music differed in active pleasantness and inactive pleasantness, suggesting that they were appropriate as active and relaxing pieces of music. It was considered that listening to music in accordance with subjective active/relaxed mood may lead to a mood-regulating effect on the body and mind. Furthermore, it was found that pulse waves and electroencephalograms differed according to gender. From a music therapy perspective, simultaneous time-series analysis of psychological and physiological indices may lead to objective evaluation. Assessment by gender as a factor, and selection of the strength and brightness of the listening music impression may be important for intervention.

As a limitation and future perspective, this study did not examine or compare musical behaviors other than listening, such as improvisation, performance, singing, and composition. Therefore, it is necessary to keep in mind the extent to which the results found in this study are unique to music listening. The duration of the effects also needs to be examined. This study measured the effects immediately after the intervention and after 10 minutes, but did not examine long-term effects. Long-term effects, for example, after 1 week, 2 weeks, 3 weeks, or 4 weeks, are possible based on previous studies. Longitudinal studies are needed to clarify the persistence of the effects of music listening on subjective moods of active relaxation.

Chapter 5　Study 4: Psychological and Physiological Changes Induced by Music Listening and Their Relationship to Psychological Characteristics Experiment1-2

The purpose of Study 4 was to examine the relationship between psychological and physiological changes caused by music listening and psychological characteristics. To this end, we examined the correlation between psychological and physiological changes due to music listening and psychological characteristics such as extraversion and empathy. The results showed that the more extroverted the subjects were, the smaller the amount of change in active pleasant mood when listening to relax music. On the other hand, the more emotionally unstable, people who suppress their anger by storing it up inside themselves, and depressed people were, the greater the amount of change in active pleasant mood when listening to relax

songs. Next, the higher the trait anger, the less the change in inactive pleasant mood when listening to relax songs. On the other hand, the higher the emotional warmth, the greater the change in inactive pleasant mood when listening to relax songs. The higher the emotional affectivity, the weaker the impression of the intensity of the music when listening to relaxing music. These results indicate that there is a correlation between the amount of mood change in active and inactive pleasantness and some psychological characteristics in the active and relax music conditions. The correlations between the amount of mood change in active and inactive pleasure and some psychological characteristics in the active and relaxation music conditions were found to be reciprocity and commonality. Furthermore, it was found that there were correlations between the impression of listening music and some psychological characteristics in the active and relax music conditions.

Similarly, it was found that there were correlations between changes in physiological indices and some psychological characteristics in the active/relaxed music condition. In the active/relaxed music condition, the correlations between changes in physiological indices and some psychological characteristics were found to be reciprocity and commonality. From a music therapy point of view, it may be important to assess psychological characteristics and to select of the strength of the impression of the listening music when intervening. Music listening in accordance with the subjective objective mood may lead to more effective mood regulation effects by taking psychological characteristics into consideration.

If we translate the songs we usually listen to when we want to be energized (active songs) and the songs we usually listen to when we want to relax (relax songs) into clinical psychology, we can say that the active songs correspond to words that arouse energy and liveliness in clinical interviews, while the relax songs correspond to words that accompany depressed moods. relaxing songs may be considered to be equivalent to words of advice to accompany depressed moods. Therefore, it may be suggested that it is important to assess the psychological characteristics of the subject and to select appropriate verbal expressions that suit the subject's characteristics and condition when intervening in a clinical trial.

Chapter 6　Study 5: Effects of Interpersonal Interaction in Improvised Music Therapy on Psychological and Physiological Indicators　Experiment2

The purpose of Study 5 was to determine the effects of interpersonal interaction of sound in improvisational music therapy on psychological and physiological measures. Two situations were set up in Study 5: the first was an improvisational music therapy intervention by a therapist, and the second involved an interaction between college students in a friendship relationship. The intervention was based on improvisational music therapy techniques. The

college students were conditioned to be friends in order to form good communication. Tone chimes were utilized. Study 5 focused on improvisational musical exchange as a model of improvisation. College students who had no experience in clinical psychology, music therapy, or tone chimes were selected and instructed to establish good communication as friends.

The results showed that the interpersonal interaction of impromptu musical exchange led to an overall positive mood state as measured by the POMS shortened version (Yokoyama, 2005), a positive interpersonal impression rating, and increased empathy. In the physiological index, there was a significant difference in the maximum Lyapunov index of the finger pulse wave after the interpersonal interaction, and activation of the psychological adaptive state and sympathetic nervous activity were observed. In addition, the improvised music therapy group improved in POMS liveness, and in interpersonal impression ratings such as intimacy, trust, empathy, equality, friendliness, agreeableness, and openness to others, as well as in listening and trying to fit in. As described above, clarifying the effects of mutual interaction in terms of psychological and psychophysiological responses may provide a basis for multifaceted support in terms of what kind of music to provide and how to provide it to various clients.

In terms of research limitations and future perspectives, it is critical to conduct studies aimed at understanding how interventions can be tailored to specific age groups or populations to optimize treatment effectiveness. In addition, investigating how age, individual differences, and demographic factors affect music therapy outcomes is essential to providing effective and personalized care. Such research could lead to more nuanced, evidence-based approaches to the use of music as a therapeutic tool across a variety of settings and for a variety of individuals.

Further investigating the long-term effects and persistence of positive outcomes from music therapy interventions is an important aspect of research. Longitudinal studies can help determine whether the benefits observed immediately after treatment persist over time and have the potential to affect long-term health and well-being. Such studies can provide valuable insight into the lasting effects of music therapy on individuals' lives and health outcomes.

In addition, examining various factors such as choice of instrument, frequency of sessions, and different relational conditions such as the therapist's relationship with a particular client and the degree of intimacy allows for a deeper understanding of the nuances of music therapy interventions and their effects. Interdisciplinary collaboration is also essential for a holistic understanding of the mind-body connection and the potential benefits of music therapy. This collaborative approach combines insights from multiple disciplines, including music therapy, psychology, and medicine, which may lead to more rigorous research and more effective patient care.

Chapter 7　Study 6: Effects of Interpersonal Interaction of Improvised Musical Interaction on Psychological and Physiological Indicators　Experiment3

The purpose of Study 6 was to clarify the effects of interpersonal interaction of impromptu musical exchange on psychological and physiological indices. In the act of sound generation using tone chimes, we set up an interpersonal scene and a solo scene to examine whether there were differences in the psychological and psycho-physiological effects.

The results indicate that improvisational musical interactions produced positive psychophysiological changes, but that improvisational musical interactions in interpersonal situations promoted greater mental activation than did sound production in solitary situations. In addition, gender differences may need to be taken into account. For example, boys showed greater mental activation in interpersonal scenes than in solitary scenes. In addition, the psychophysiological indices in this study may serve as indicators of positive psychophysiological changes during impromptu musical interactions. Therefore, it is suggested that active musical instrument playing in interpersonal interactional situations has the potential to construct empathic communication.

Chapter 8 Comprehensive Discussion

The results of this study suggest that improvisational music interaction activates the sympathetic nervous system more than listening to music, and leads to more active and proactive effects than listening to music. In music therapy, it may be important to assess the mood state and psychological characteristics before listening to or playing music, and to select whether to have the patient listen to or play music, as well as the strength and brightness of the musical impression. In addition, musical impression, target emotion, and achievement may be effective in assessing the mood regulation effects of music. In addition, it may be appropriate to simultaneously measure psychological and physiological indices as indices of mood regulation and interpersonal interaction through sound and music.

If we translate this into a psychological clinical situation, we may say that the strength of the impression of music corresponds to the strength of the tone of voice, whether it is strong or gentle, and the brightness of the impression of music corresponds to whether the content of the conversation is positive, such as “Go for it,” or whether it is close to the person who has a problem, such as “I see. The theory of musical theme corresponds to the induction in psycho-clinical practice, and the homogeneous principle of music may correspond to the words and actions that are close to the person with a problem. Therefore, it seems to suggest that it is important to assess the psychological characteristics of the subject and to choose

appropriate words and actions that suit the person's characteristics and condition when intervening in psychotherapy. The above can be interpreted as indicating that there are similarities between music therapy and psychotherapy.

Significance and Prospects of this Study

The accumulation of physiological knowledge of music therapy is still insufficient (Kondo,2014）. Theoretical explanations for the mechanisms of the effects of music therapy have not been sufficiently examined. As mentioned above, this study clarified changes in the mood regulation effects of music listening and interpersonal interaction effects of impromptu musical interactions from psychological and physiological indices. Clarifying the effects of music therapy in terms of psychological and psychophysiological responses may provide a basis for multifaceted support through music, i.e., what kind of music to provide and how to provide it to various clients. The results of this study are significant in that they are expected to contribute to the wider public's benefit from music. The benefits of music are the ability to regulate mood and connect with others in any psychological, physical, or cognitive state. In addition, music may have the potential to develop social connections in a disease-preventive manner in order to maintain good health.