

Evaluation of Facial Expression by AI Validate Impression of Elders and Impression of Staffs

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Abstract

Background: Evidence of effects by cosmetic therapy was obtained from participants who answered the questionnaires in psychological studies, and we need another method to validate. **Purpose:** The purpose of this study was to clarify effects of cosmetic therapy, investigating changes in facial expression of elders of nursing homes and analyzed by AI. **Method:** Elders with mild dementia in two nursing homes received cosmetic therapy once by a certified specialist. Elders put on makeup for themselves together following the specialist. The duration of cosmetic therapy was about one hour. They answered the questionnaires about well-being before and after it. Researchers took pictures of them. AI analyzed photos. Elders and staff described impression. **Results:** Elders' face changed from calm, modest, suppressed, serious, tension and introverted to bright, open, soft, lively, familiar, and diplomatic. Categories of elders' impression were "Feeling good," "Waking up," and "Feeling beautiful." Categories of staff's impression were "Promoting elder's memory," "Importance of doing by themselves," "Elder's positive behavior," "Reflecting staff's assumption," and "Staff's new finding." **Conclusion:** Elders experience felt good or happy becoming bright and beautiful. Putting on makeup by themselves in cosmetic therapy makes elders active. Staff found the ability of the elderly. Cosmetic therapy was useful for well-being of elders in nursing homes.

Keywords

Cosmetic Therapy, Elders, Facial Expression, AI, Broaden-and-Build Theory

1. Introduction

The number of elderly people has been increasing every year, and the number of elderly people with dementia is also increasing. Moreover, elders often feel depression or anxiety. Proposing some kind of intervention is needed. Cosmetic therapy is one of the most useful interventions.

There are some studies about cosmetic therapy from physiological aspects (Watanabe, 2013; Sakatani, 2015; Ikeuchi et al., 2017; Machida & Shirato, 2020), particularly from the brain aspects. There are few studies about effects cosmetic therapy from psychological aspects. Zhang et al. (2020) showed the impact of routine skin care on the quality of life for new mothers. Participants were young and effects were not clear for elders. Kawai et al. (2016) showed effects of cosmetic therapy on subjective healthy feelings or depression for healthy elders living in the communities. However, it was not clear about psychological effects cosmetic therapy for elders in nursing homes. Moreover, most psychological studies obtain data from participants' response to questionnaires. We needed to obtain data from another point. So, we try to get data from photos of participants and analyze them by AI (Artificial Intelligence). And we get data by impression about putting on makeup directly from participants and staff at nursing homes.

The purpose of this study was to investigate effects of psychological effects from facial expression and impression through cosmetic therapy.

2. Method

2.1. Participants

The participants were 16 (1 male, 15 female) elders. The number of elderly people was 5 people at 70 years, 9 people at 80 years, 2 people at 90 years. They were users at nursing homes.

2.2. Cosmetic Therapy Program

The therapist was certified by Shiseido company with training. The cosmetic therapy included the following program. 1) Explanation about cosmetic therapy, 2) Relaxation including stretch, 3) Skin care with massage of face, 4) and Make up.

2.3. Procedure

We recruited participants through facilities for the elderly two nursing homes. The cosmetic therapy was one time session. Duration of the session was about 60 minutes. Researchers took pictures of participants. The size of a photo is mainly face and neck like a passport size. The researcher asked to describe impression for elders and staff.

2.4. Data Analysis

The engineer of the Kimura Information Company made the application using AI. The researcher ordered the application and she did not program contents in

detail. The application AI program analyzed photos pre and post cosmetic therapy and showed results as sentences. About impression, since sentences were not so many, we made code as the shortest meaningful sentence, and made categories as a qualitative study.

2.5. Ethics

We performed this study in accordance with the Declaration of Helsinki. This study was approved by the Research Ethics Committee of Nisikyusyu University (25AVX22).

3. Results

We showed the results of (Table 1). AI program showed sentences about photos, and we chose keywords. Lastly AI shows estimated mind state after putting on makeup.

Table 1. Analysis by AI on elder's photos pre and post putting on makeup.

ID	Key word (Pre)	Key word (Post)	Mind states after putting on makeup
1	calm, modest, introverted	bright, open, happy, delight	She experienced happiness and a sense of safety through interaction with others.
2	tension, modest, suppressed	soft, familiar, bright,	Appearance change affected inner change, and she had positive feeling with confidence.
3	neutral, tension, modest	relaxing, familiar peace of mind	Her mood improved and filled with mind. It shows big positive change.
4	stiff, tension, suppressed	soft, modest, sense of security	She adapted to environment and open mind and became happy. It shows positive change.
5	calm, modest, introverted	bright, familiar, active	She harmonized with surroundings and experienced pure joy on stability. It shows delightful change.
6	tension, calm, suppressed	lively, bright, energetic	She experienced positive emotional change, and it improves self-esteem and relationships with surrounds.
7	serious, tension, calm	cheerful, warm, diplomatic	He experienced inner positive emotional change. It shows changes to palliative of mind and delight.

Most impression after cosmetic therapy were positive contents. And mind state was also positive.

Table 2 shows impression of cosmetic therapy by participants. There are 3 categories like "Feeling good," "Waking up," and "Feeling beautiful."

Table 3 showed impression of cosmetic therapy from staff in the nursing home. There are 5 categories like "Promoting elder's memory," "Importance of doing by themselves," "Elder's positive behavior," "Reflecting staff's assumption," and "Staff's new finding."

Table 2. Impression for cosmetic therapy from elders.

Category	Code
1) Feeling good	1) Puttin on makeup was fun. 2) Puttin on makeup was interesting. 3) It lifts my mood. 4) I found various effects on putting on makeup. 5) I will continue to put on makeup. 6) I recognize that putting on makeup makes me feel good.
2) Waking up	7) I was happy for the first time in ten years 8) I felt awake since I had not put on makeup because of COVID-19.
3) Feeling beautiful	9) I rejuvenated. 10) I think that I am beautiful. 11) A color of the lip is to my liking.

Table 3. Impression for cosmetic therapy from staff.

Category	Code
1) Promoting elder's memory	1) An elder remembered the cosmetic therapy next day, though she forgot things a few minutes ago. Staff were surprised at it.
2) Importance of doing by themselves	2) Staffs thought that elders remembered putting on makeup because they put on makeup by themselves.
3) Elder's positive behavior	3) I found new aspects of elders. 4) We were impressed and surprised that elders could put on makeup by themselves, following an instructor.
4) Reflecting staff's assumption	5) Staffs presumed that elder can't put on makeup by themselves, but they could. We were impressed. 6) We make them try to do various things, not presumed. 7) Elders had great facial expressions. Staff felt that putting on makeup affects elder's inner self.
5) Staffs' and families' delight	8) Elders and families of them were glad. 9) We thank you for putting on makeup. 10) Family member of the elder was glad.

4. Discussion

4.1. Analysis of Photos by AI and Impression by Participants

Before cosmetic therapy, elders' facial expressions were calm, stiff, neutral, suppressed, or introverted. However, after cosmetic therapy, their facial expressions were bright, open, soft, energetic, or diplomatic. These changes support part of [Yoshida et al. \(2007\)](#) in which participants enjoyed the cosmetic class and felt glad or good mood. These positive change supports "The broaden-and-build theory" by [Fredrickson \(2001\)](#). He demonstrated that positive emotion broadens his

thinking or behavior and build behaviors connected with individual resources. Cosmetic therapy in this study supports his theory.

Also, these positive changes were supported by categories of impression from elders themselves. AI analysis was validated from their direct impression. “Feeling good,” “Waking up,” and “Feeling beautiful.” “Waking up” relates with a sense of touch,” and “Feeling beautiful” relates with a sense of sight. These effects is cross modal of human sense. Elders felt various cross modal feelings. This feeling may hold their quality of life and prevent dementia. It supports [Tagai \(2021\)](#). And, though [Kawai et al. \(2016\)](#) showed that cosmetic therapy affected well-being of dwelling people, we can say that it makes elders happy feelings.

4.2. Effects for Staff at Nursing Home

Categories about impression were “Promoting elder’s memory,” “Importance of doing by themselves,” “Elder’s positive behavior,” “Reflecting staff’s assumption,” and “Staffs’ and Family’ delight.”

As for “Promoting elder’s memory,” it is a great finding that an elder remembered putting on makeup, though she tends to forget in a few minutes. It may be because 1) putting on makeup was very fun and impressive, 2) she remembered the long time habit of putting on makeup. Although [Machida & Shirato \(2020\)](#) showed that three months cosmetic therapy prevent to decline cognitive function comparing no make, we will show that cosmetic therapy may promote cognitive function.

As for “Elder’s positive behavior,” elders who did not do by themselves tried to put on makeup. It may be because they adopted to class environment and revitalized their selfcare ability. [Tsumitani et al. \(2008\)](#) showed that nail care with aroma massage promoted Quality of Life including physical, psychological, and social of elders. They say that nail care empowered vigor and had positive thinking. From the present study, cosmetic therapy made elders adapt class environment and revitalize selfcare ability.

As for “Reflecting staffs’ assumption,” sometimes staff think that elders can’t do many things. However, in this study, staff found that elders have ability to put on makeup by themselves. Cosmetic therapy at waked staffs thinkings.

As for “Staffs’ and family’s delight,” care workers or family who take care elders sometimes feel burnout or stress. So, it is useful to care workers or family feel delight to prevent burnout. This result support [Yoshida et al. \(2007\)](#) in which volunteers of cosmetic therapy experienced delight. We can think that positive emotions of elders affect staffs and family. By “The broaden-and-build theory” by [Fredrickson \(2001\)](#), positive emotion may affect surrounds.

As limitations, the number of participants were small and we need to include much more participants. And there was unbalance in the number of gender and we need to balance. Many staffs felt that cosmetic therapy is useful, however, it requires a specialist of putting makeup and much money for goods. In future, we need to think these things.

5. Conclusion

Cosmetic therapy was useful for well-being of elders in nursing homes. Their positive changes were validated by AI analysis or direct impression. This therapy affects staffs and family supporting the broaden-and build theory.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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