

# The effects of aroma on relaxation during the group calligraphy activity of elderly people

## – Case studies in China and Japan –

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## ABSTRACT

Previous research has found that aromatherapy has positive effects on ability and mood. However, only a limited number of studies have focused on the effects of aroma on elderly people when they are engaged in group activities, although it has proven to be beneficial to the elderly. Consequently, we studied the effects of aroma on the relaxation of elderly participants of a group activity by conducting an experiment in which we used orange oil to provide an “aroma environment” and plain water to provide a “without-aroma environment.” Our results suggest that citrus aromas have an effect on the physiological and psychological relaxation of elderly people when they are participating in group activities. Further studies are required focusing on the observation of different kinds of aromas and the sustainability of the same aroma.

## 1. INTRODUCTION

Aromatherapy has been widely used for various purposes such as relaxation in daily life, concentration in work and study environments, and medical treatment in hospitals. Many studies have shown the benefits of aromatherapy, such as its ability to promote sleep (e.g. Wolfe, 1996), reduce mistakes made by people taking examinations (e.g. Kumagai and Nagayama, 2015), and provide interventions for people with dementia (Holt, et al., 2003). Aromatherapy may be an easy way to promote relaxation, creativity, or happiness during these activities. There are many programs for elderly people on topics such as music, arts, and exercise. However, little research has been carried out to show how aroma affects elderly people during activities. We conducted an experiment to examine the effects of aromatherapy on elderly people during group activities, using both physiological and psychological measurements.

## 2. METHOD

### 2.1 Participants

The experiments conducted in China included 30 participants aged from 70 to 89, with an average age of 81 ( $SD=5.2$ ). All participants lived in a care center in Beijing, China. Fourteen of them were male, while sixteen were female. They were randomly divided into six groups of five persons each, in which three groups were control groups and the others were

experimental groups. All participants were able to understand the instructions and were right-handed. Meanwhile, we added a control experiment in Japan with 25 participants with an average age of 74.3; this experiment employed the same procedures as the experiment conducted in China.

## 2.2 Task

The experiment was conducted in a room in the care center in which five participants were asked to sit around a round table.

General instructions were given to both groups at the beginning of the experiment. Considering the difficulties the elderly participants faced in finishing the tasks by themselves, each participant was given an assistant during the experiment to help them wear the device and answer the questionnaire. Before the group activity, the participants were asked nine questions from POMS (The Profile of Mood States, McNair et al. (1971)) regarding their tension or anxiety levels (TA questions) and ten questions regarding vigor or activity (VA questions). As for the psychological measurement, a five-point scale was used in the POMS as a measurement tool to assess the participants' mood states (5: Extremely; 4: Quite a bit; 3: Neither; 2: Not much; 1: Not at all). The participants then evaluated their current conditions using this scale. Afterward, the subjects were instructed to wear a watch-like heart rate monitor (Nissei HR-70) with the experimenter's assistance. The heart rate sensors were attached to the index fingers of participants' left hands and the watches were worn on the wrists of their left hands. After wearing the heart rate monitor, the participants rested for approximately three minutes so that their heart rates stabilized. Then, the subjects were given a paper cup that contained a tissue paper that had absorbed five drops of aroma and were asked to sniff it for 30 seconds. The paper cups given to the participants in the control group were filled with a "placebo aroma" (plain water) while in the experimental groups, the paper cups were filled with 100% pure orange essential oil (miaroma, UK). After the participants sniffed the cups, a calligraphy set was given to each subject and they were asked to write calligraphy for ten minutes. During calligraphy, the paper cups were put on the table. All of the participants started and finished calligraphy at the same time. The contents all participants were asked to write were the same and were provided on an A4-size paper in advance. After the experiment, the participants were also required to orally answer the same nineteen questions from POMS.

Although they performed the task simultaneously in the same room, they were instructed to perform individually without speaking with each other.

## 2.3 Physiological and Psychological Measurements

We used heart rate as physiological data; we recorded the participants' heart rates with the heart rate monitors. As for the psychological measurement, we calculated the TA and VA scores in POMS. We removed two participants from the data analysis because they wrote nothing during the group activity. We also removed four more participants because their heart rate deviated more than two standard deviations from the mean. A t-test was used in order to determine the significance of differences in heart rate, with the TA and VA score between aroma and without aroma conditions at a probability level of  $p < 0.05$ , by using IBM SPSS Statistics 21.

### 3. RESULTS AND DISCUSSION

#### 3.1 Heart Rate

Figure 1 and Figure 2 indicate the changes in heart rate per minutes of the participants during the experiments conducted in China and Japan. We subtracted participants' heart rates when they started sniffing the aroma from their current heart rates, which allowed us to more easily examine the changes in participants' heart rates after sniffing the aroma.

In both Figure 1 and Figure 2, participants all started doing the calligraphy task from the 7th to the 17th minute. We observed that in these two experiments, their heart rates increased significantly after they started the calligraphy task. The heart rates in the control group (without aroma environment) were both significantly greater than those in the experimental group (aroma environment) during the task ( $p < .05$ ).

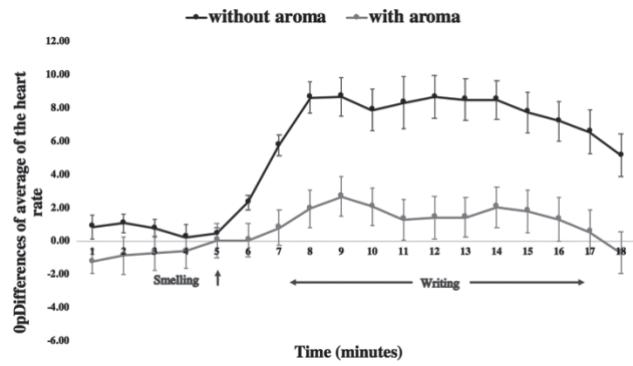


Figure 1: Average difference in heart rate per minute (experiment in China). Error bars indicate standard errors.

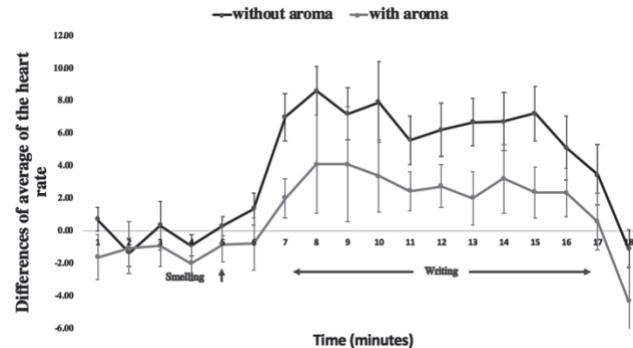


Figure 2: Average difference in heart rate per minute (experiment in Japan). Error bars indicate standard errors.

#### 3.2 POMS

The scores of POMS before and after activities are shown in Figure 3. A significant effect was observed between with-without aroma and before-after in "VA" ( $F(1,27)=5.32$ ,  $p=0.029$ ), while there is no significant difference in "TA" ( $F(1,17)=0.77$ ,  $p=0.39$ ). It was shown that the variable of before-after showed significant changes on the level of "with aroma" ( $p<0.05$ ), which meant that the scores of VA decreased significantly after the group activity with an aroma environment.

The scores of TA increased after the group without aroma and changed little under the “with aroma” condition. The scores of VA increased slightly after group activities in the control groups although there was no significant statistical effect.

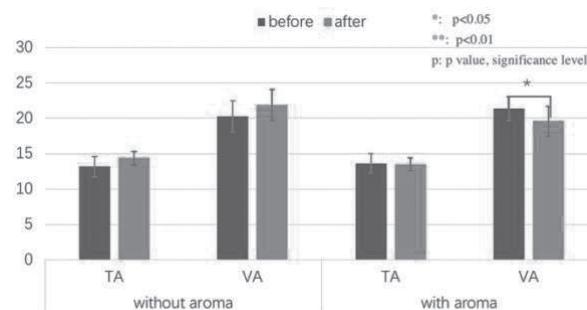


Figure 3: The scores of POMS. Error bars indicate standard errors.

#### 4. CONCLUSIONS

This study aimed to examine whether aroma has a relaxation effect on elderly people when they are participating in group activities. Our results suggest that citrus aromas have a relaxation effect during group activities for elderly people in care centers. In addition, although almost all participants stated that they felt more spirited and fresh after the group activities when they answered the POMS, the result showed that the level of “vigor or activity” decreased significantly after the group activity with an aroma environment while there was no significant change without the aroma. Future research is required to observe whether different kinds of aromas will also have an effect on relaxation among the elderly.

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#### REFERENCES

- Kumagai C, Nagayama K, 2015, *Effects of essential oils on numerical ability and mood of elementary school students*, Japan Journal of Aromatherapy, 16(1), 7-14. [In Japanese]
- McNair D M, Lorr M, Droppe L F, 1971, *Edits manual for the profile of mood states (POMS)*. Educational and industrial testing service.
- Holt FE, Birks TPH, Thorgrimsen LM, Spector AE, Wiles A, Orrell M, 2003, *Aroma therapy for dementia*, Cochrane Database of Systematic Reviews 2003, Issue 3. DOI: 10.1002/14651858.CD003150.
- WOLFE N, HERZBERG J, 1996, *LETTER TO THE EDITOR. Can Aromatherapy Oils Promote Sleep in Severely Demented Patients?*, International Journal of Geriatric Psychiatry, 11(10), 926-927.

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