Psychological States and Personality Traits Associated with In-Person Practice of Laughter Yoga: A Replication Study with Follow-up Assessment

Hiromitsu MIYATA, Yoshiko TAKADA

Abstract

Empirical studies in embodied psychology and psychosomatic medicine have shown that laughter has beneficial effects on both mind and body. In this context, laughter yoga, a mind-body practice that combines laughter exercises with yogic breathing techniques, has attracted growing research interest. The present study aimed to replicate Miyata, Takada, and Sase (2023) by examining psychological effects of laughter yoga practiced in an in-person setting with 39 participants. Psychological states were assessed using self-report questionnaires administered before and after the session, as well as during a follow-up assessment conducted one hour after the practical session had concluded, along with their associations with Big Five personality traits. Consistent with Miyata et al. (2023), positive affect significantly increased, while negative affect and state anxiety significantly decreased from pre- to post-session assessment. Psychological states measured at the post-session period were overall maintained at the follow-up assessment, although not statistically supported due to dropouts. Furthermore, among continued practitioners, longer practice period was significantly associated with higher openness scores of the Big Five personality. These findings support previous evidence that in-person practice of laughter yoga is associated with beneficial changes in psychological status, with short-term effects potentially maintained after a certain period has elapsed following practice.

Keywords: Laughter Yoga, Continued Practice, Psychological State, Big Five Personality, Follow-up Assessment

Introduction

Psychosomatic Effects of Laughter

A growing body of empirical research has demonstrated the beneficial effects of laughter on both physical and psychological functions of humans. In the 1980s, researchers in the U.S. first reported the influence of laughter on the immune and endocrine systems. In one early study by Dillon et al. (1985), participants were asked to watch either a humorous video or an educational video for 30 minutes, and salivary immunoglobulin A (IgA) levels were measured before and after viewing. Results showed that IgA levels increased after watching the humorous video, but not after the educational one.

Evidence has been obtained in Japan regarding activation of natural killer (NK) cells, which account for approximately 10 % of lymphocytes and are involved in targeting cancer cells. Itami et al. (1994) exposed participants to three hours of comedy performances (e.g., stand-up comedy, comic storytelling, and plays) and measured immune functions both before and after the intervention. Whereas total white blood cell and lymphocyte counts showed no statistically significant changes, NK cell activity increased significantly in 14 out of 18 participants after the laughter experience. Furthermore, the CD4/8 ratio, an indicator of immune activity, tended to normalize after laughter, i.e., those with low baseline values showed increases, while those with high baseline values showed decreases. Similarly, Nishida et al. (2001) reported that NK cell activity significantly increased in participants after a two-hour session of *rakugo* (Japanese comic storytelling), particularly among those who reported stronger subjective laughter experiences as assessed by the Face Scale, Visual Analog Scale (VAS), and self-report questionnaires.

Laughter has also been shown to influence glucose metabolism, suggesting potential benefits for metabolic health. Hayashi et al. (2003) found that laughter significantly suppressed postprandial blood glucose elevation in patients with diabetes. Ohira (2017) reported that laughter enhanced glucose metabolism and reduced blood sugar levels. Laughter has further been shown to affect cardiovascular function. Sakuragi et al. (2002) demonstrated that in healthy female participants, watching a 50-minute comedy video increased heart rate and blood pressure and promoted arterial and venous circulation. These findings indicate that laughter may effectively impact physiological functions, supporting both metabolic and cardiovascular functions.

Psychological and therapeutic benefits of laughter have also been widely reported. Laughter interventions have been shown to reduce depressive symptoms in patients with clini-

cal depression, which is characterized by persistent sadness, anhedonia, and suicidal ideation, and is associated with neurotransmitter depletion (e.g., serotonin, norepinephrine) (Cho & Oh, 2011; Shahidi et al., 2011). Cha and Hongs (2015) found that laughter therapy significantly increased serotonin levels across groups of female patients with varying levels of depression, with the greatest change observed in those with severe depression. Serotonin is suggested to play a critical role in regulating impulsivity and anxiety and in sustaining vitality (Lee, 2010). A meta-analysis by Zhao et al. (2019) further suggested that interventions by laughter and humor significantly reduced depression and anxiety while improving sleep quality. Regarding stress regulation. Farifteh et al. (2014) reported reductions in stress hormones associated with laughter. Berk et al. (1989) demonstrated that participants who watched a humorous video showed significantly decreased cortisol, epinephrine, and DOPAC levels as compared with control participants. Similarly, Bennett et al. (2003) found that women who viewed a humorous video reported significantly lower stress and showed reduced stress-related biomarkers compared with control participants who watched a sightseeing video. Laughter has also been shown to enhance self-efficacy (Bandura, 1986). Beckman et al. (2007) implemented a 15-day laughter program for employees in a mental health facility and found significant increases in optimism, self-regulation, positive affect, and social identification. These effects were maintained at the at follow-up assessment. These results suggest that intentional, humor-independent laughter can improve morale, resilience, and self-efficacy in the workplace.

Laughter Yoga and Its Psychophysiological Effects

Laughter yoga, developed in 1995 by an Indian doctor Dr. Madan Kataria, is a health-promotion practice that combines playful laughter exercises with breathing techniques of yoga. Laughter yoga is based on the principle that "we laugh not because we are happy, but we are happy because we laugh." Empirical research during the latest decades has increasingly demonstrated its physiological and psychological benefits. For example, in a relatively early report, Shahidi et al. (2011) found that among elderly Iranian women with depression, laughter yoga was as effective as exercise therapy in reducing depressive symptoms and enhancing life satisfaction.

In Japan, Fukushima (2008) reported significant decrease in state anxiety, mood disturbance as assessed by Profile of Mood Status (POMS), and stress responses after participating in a practical session of laughter yoga. Subsequent studies conducted by involving Japanese samples also confirmed effects of laughter yoga in reducing fatigue, enhancing vigor, and improving

emotional stability (e.g., Fukushima, 2016; Hashimoto, 2015; Nishida & Fukushima, 2012). Hashimoto (2015) included university students in Japan and showed that practicing laughter yoga significantly reduced state anxiety and enhanced self-esteem compared with the control group. Moreover, both laughter yoga and spontaneous laughter (e.g., watching *rakugo*) were shown to be effective in improving psychological health. Additional studies have highlighted buffering effects of laughter yoga against fear responses (Fukushima, 2016) as well as the potential of laughter yoga to improve physiological indicators such as blood pressure, respiration, and oxygen saturation in elderly populations (Yamamura & Hirata, 2015).

More recently, Miyata, Takada, and Sase (2023) examined psychological effects of laughter yoga conducted in an in-person setting with 24 Japanese adults. Self-report questionnaires were administered before and after a practical session of approximately 75 minutes to assess changes in positive and negative mood and state anxiety, as well as to explore associations with Big Five personality traits. Results showed that positive mood significantly increased, whereas both negative mood and state anxiety significantly decreased after the practical session. Although negative mood was higher among non-practitioners ($N = 5$) than continued practitioners ($N = 19$) before the session, no significant group difference was observed after the session. In addition, continued practitioners, compared with non-practitioners, reported significantly higher agreeableness scores on the Big Five scale. Further analyses also revealed significant correlations between measures of laughter yoga practice and personality traits, such that a longer duration of daily practice was associated with higher neuroticism and lower openness. These findings suggest that laughter yoga can elicit significant short-term changes in psychological states and may also be linked to specific patterns of personality traits among continued practitioners (see also Miyata & Takada, 2024).

Purpose of the Present Study

Collectively, previous research has shown that laughter yoga can reduce stress and depressive symptoms while enhancing self-esteem and psychological health. Continued practice may further enhance positive mood, and might also be associated with more adaptive personality traits. However, Miyata et al. (2023) included relatively few non-practitioners who engaged in the practice for the first time, which limited comparisons between non-practitioners and continued practitioners. In addition, it remains unclear whether the psychological changes observed immediately after a session are sustained for a certain period of time within the day. To address these gaps, the present study aimed to replicate and extend Miyata et al. (2023) by

including a follow-up assessment one hour after the session. Specifically, we intended not only to reproduce the previously reported psychological correlates of laughter yoga in a Japanese sample but also to examine whether its benefits persist beyond the immediate post-practice period, thereby providing a more comprehensive understanding of its short-term psychological impacts.

Methods

Participants

A total of 39 Japanese adults (35 women, 3 men, 1 non-binary; mean age = 63.1 years, *SD* = 12.2) participated in the study. Of these participants, 29 (27 women, 1 man, 1 undisclosed; mean age = 62.8 years, *SD* = 13.35) reported that they had been practicing laughter yoga on a regular basis, with the period of practice ranging from 0.2 to 10.0 years (mean = 3.1 years), an average frequency of practice 9.3 days per month, and an average practice time 7.1 hours per month. The remaining 10 participants (8 women, 2 men; mean age = 64.2 years, *SD* = 7.08) reported that they did not engage in laughter yoga on a regular basis. All participants were attendees of the "*Suidobashi Laughter Club*," which was organized by the Japan Laughter Yoga Association, on the days of data collection. They were invited to take part in the present study on those days. Prior to the practical session, all participants received an explanation of the study from the researchers, and individuals who agreed to cooperate provided written informed consent. All participants were clearly informed that cooperation in the study was voluntary and that the results of the study may be open for academic purposes only. Participants were not financially rewarded for cooperation in the study. The study was conducted in accordance with the Declaration of Helsinki.

Question Items and Psychological Scales

The questionnaire survey included question items regarding their sex, age, and experience with laughter yoga, as well as to three established psychological scales in Japanese as described below. Participants were instructed to answer honestly according to the instructions provided for each questionnaire, as there were no good or bad, nor correct or wrong answers.

Mood. Positive and negative mood was assessed using the Japanese version (Sato & Yasuda, 2001) of the Positive and Negative Affect Schedule (PANAS), which was originally developed by Watson et al. (1988). The PANAS is a brief, widely used scale for measuring mood status consisting of 16 items: eight items measuring positive affect (PA) and eight items

measuring negative affect (NA). In the present study, participants rated their current mood on a six-point Likert scale ranging from 1 ("does not apply at all") to 6 ("applies very well").

State Anxiety. State anxiety was measured using the Japanese version (Shimizu & Imae, 1981) of the State-Trait Anxiety Inventory (STAI), which was originally developed by Spielberger et al. (1970). The STAI comprises two subscales: the State Anxiety scale (A-State), which measures temporary anxiety states, and the Trait Anxiety scale (A-Trait), which measures anxiety as a stable personality characteristic. In the present study, only the A-State was used to assess participants' states of anxiety associated with the practice. Participants rated their current level of anxiety on a four-point Likert scale ranging from 1 ("not at all") to 4 ("very much so").

Personality Traits. Personality traits were assessed using the Big Five scale developed by Wada (1996) in Japanese, in accordance with the Big Five model proposed by Costa and McCrae (1992). The Big Five model explains personality in terms of five factors: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. The Japanese Big Five scale used consists of 60 adjective items, with 12 items assessing each factor of Big Five personality. Participants rated each item on a seven-point Likert scale ranging from 1 ("does not apply at all") to 7 ("applies very well").

Procedure

Data collection was conducted over three days in September 2019 (September 3, 10, and 24). For participants who took part in the study on more than one of these days, only the responses from their first participation were included in the analysis. The number of participants included for each day of data collection was 26, 8, and 5. Immediately before the practical session of laughter yoga started, participants were handed a paper-based questionnaire battery for the present study. Participants completed the PANAS and the STAI (A-State) both immediately before and immediately after the practical session. In addition, at the post-session assessment, participants answered question items concerning their demographics and experience with laughter yoga, and the Big Five Inventory. Furthermore, as a follow-up assessment, participants also completed the PANAS and the STAI (A-State) one hour after the practical session ended. Because participants left the venue of practice after the session, the follow-up assessment was conducted while they were staying at a nearby restaurant for lunch.

The in-person practical session of laughter yoga lasted approximately 75 minutes and were conducted under the guidance of professional instructor(s) of laughter yoga who belonged to

the Japan Laughter Yoga Association. The practical sessions were structured based on Takada (2015) and consisted of three major parts: warm-up, laughter exercises (named "*Wara-Tre*" meaning "laughter training"), and cool-down (Table 1). The laughter exercises involved perform-

Table 1. Structure and intend benefits of the in-person practical session of laughter yoga.

Warm-up

Move the diaphragm actively, vocalize, and stimulate the palms with clapping. Clapping and the "returning to childlike playfulness" keywords are performed at the end of each laughter exercise.

    1. Clapping
    2. Deep breathing
    3. Childlike playfulness keywords

Laughter Exercise (i.e., "Wata-Tre")

    Breathing Laughter. Strengthen the respiratory muscles and improve oxygen intake efficiency, thereby enhancing blood circulation throughout the body. Posture and complexion also improve, showing external changes in the body.

    1. Namaste Laughter

    Stretching Laughter. Increase joint mobility, loosen the body, and promote relaxation. Vocalizing "Ha, ha, ha!" produces vibrations that make stretching easier.

    1. One-Meter Laughter

    Fitness-Enhancing Laughter. With continued practice, strengthen the core muscles and enhance cardiopulmonary function.

    1. Bicycle Laughter

    Positive Impression Laughter. Activate facial muscles by moving the eyes, mouth, and entire face somewhat exaggeratedly, generating energy from within. This improves complexion and stimulates brain activity.

    1. Pickled Plum Laughter
    2. Gargling Laughter

    Childlike Playfulness Laughter. Recalling humorous everyday situations enriches imagination, activates the brain, reduces stress, and encourages spontaneous laughter.

    1. Static Electricity Laughter
    2. Ice-on-the-Back Laughter
    3. Mobile Phone Laughter

    Super-Positive Laughter. Imagine laughing away unpleasant experiences to reduce negative thinking, release stress, and prevent depressive moods.

    1. Stress Garbage Can Laughter
    2. Smelly Sweat Laughter

Cool-down

Performed in a quiet setting, sitting upright with pelvis aligned and spine extended. Yogic breathing techniques help regulate the autonomic nervous system and promote relaxation of body and mind.

    1. Alternate Nostril Breathing
    2. Humming Breath

Typical components of the practical sessions are shown based on Takada (2015).

ing a variety of bodily movements while imagining various situations, while making use of "unconditional laughter." Specifically, the laughter exercises included several types of exercises such as "breathing laughter," "stretching laughter," "fitness-enhancing laughter," "positive impression laughter," "childlike-playfulness laughter," and "super-positive laughter," which were carried out in succession. While the basic structure of the practical session was identical across the three days, variations such as some specific types of laughter exercises were introduced on each day through improvisational elements.

Statistical Analysis Methods

Statistical analyses were conducted using the free statistical software HAD Version 16 (Shimizu, 2016). Regarding each psychological scale, the proportion of unanswered items was as follows: for the PANAS, 4.5 % at pre-session, 9.1 % at post-session, and 58.7 % at follow-up; for the STAI (A-State), 2.9 % at pre-session, 5.3 % at post-session, and 58.7 % at follow-up; and for the Big Five Inventory, 7.4 %. For cases with missing items, the total scores of the respective scale or subscale were treated as missing values and excluded from analysis. The number of participants excluded from the analyses at each measurement period was as follows: for the PA from the PANAS, 7, 8, and 26 participants; for the NA from the PANAS, 6, 7, and 26 participants; for STAI (A-State), 5, 6, and 25 participants; and for the factors from the Big Five Inventory, 3–7 participants.

First, we compared scores from psychological state scales at the three measurement periods between continued practitioners and non-practitioners of laughter yoga. A two-way mixed-design analysis of variance (ANOVA) was conducted for each scale (PA and NA from the PANAS-NA, and STAI [A-State]), with group (2 levels) as a between-participants factor and measurement period (3 levels) as a within-participant factor. Due to the relatively large number of participants who dropped out at the follow-up assessment, we additionally conducted comparable two-way ANOVAs that excluded data from the follow-up period (i.e., 2 levels for measurement period), to separately examine changes from the pre- to post-session measurements. Also, for each factor of the Big Five Inventory, group differences between continued practitioners and non-practitioners of laughter yoga were examined using Welch's t-tests for independent samples. Next, to examine associations between psychological states and personality traits, correlation coefficients (Pearson's rs) were calculated between scores from the psychological state scales and those of each Big Five factor at each measurement period. Practitioners and non-practitioners of laughter yoga were pooled for these analyses.

Furthermore, to examine associations between laughter yoga practice and both psychological states and personality traits at each measurement period, correlation coefficients (Pearson's rs) were calculated between the indices of laughter yoga practice and the scores from the psychological state scales and the Big Five factors. These analyses were conducted only for the continuous practitioners of laughter yoga. The three indices of practice were all based on self-report by the participants: (1) *practice period* (i.e., in months since starting practice of laughter yoga), (2) *practice frequency* (i.e., number of practice days per month), and (3) *practice time* (i.e., total duration of practice per month). Because the distributions of these indices were positively skewed (skewness = 0.935, 1.101, and 0.622, respectively), they were log-transformed (base e) prior to statistical analyses to approximate normal distributions.

Results

Changes in Psychological States Across the Measurement Periods

Results from the two-way ANOVAs including the three measurement periods showed that, for the PA from the PANAS, neither main effect of group (F [1, 9] = 0.390, p = .548), main effect of measurement period (F [2, 18] = 1.518, p = .250), nor interaction between group and measurement period (F [2, 18] = 0.218, p = .734) were statistically significant. For the NA from the PANAS, neither main effect of group (F [1, 11] = 0.508, p = .491), main effect of measurement period (F [2, 22] = 0.174, p = .737), nor interaction between group and measurement period (F [2, 22] = 0.174, p = .737) revealed statistical significance. For the STAI (A-State), again, neither main effect of group (F [1, 10] = 0.430, p = .527), main effect of measurement period (F [2, 20] = 1.671, p = .225), nor interaction between group and measurement period (F [2, 20] = 0.292, p = .632) were significant.

Results from the two-way ANOVAs that excluded the follow-up assessment (i.e., 2 levels for measurement period) revealed that, for the PA from the PANAS, main effect of measurement period was statistically significant (F [1, 27] = 16.662, p < .001), while neither main effect of group (F [1, 27] = 2.376, p = .135) nor interaction between group and measurement period (F [1, 27] = 0.092, p = .764) was statistically significant. These data show that, for both groups of participants, positive affect was significantly higher at the post-session than at the pre-session assessment (Figure 1). For the NA from the PANAS, main effect of measurement period was again statistically significant (F [1, 27] = 15.324, p < .001), although neither main effect of group (F [1, 27] = 0.002, p = .965) nor interaction between these factors (F [1, 27] = 0.288, p = .596) was significant. Thus, for both groups, negative affect was significantly lower at the post- than pre-

session assessment (Figure 1). For the STAI (A-State), both main effect of group (F [1, 28] = 58.621, p < .001) and main effect of measurement period (F [1, 28] = 4.497, p = .043) were statistically significant, although interaction between these factors were not (F [1, 28] = 0.012, p = 913). In these data, state anxiety was significantly lower at the post- than pre-session assessment, while state anxiety was significantly higher for non-practitioners than for practitioners of laughter yoga through these measurement periods (Figure 1).
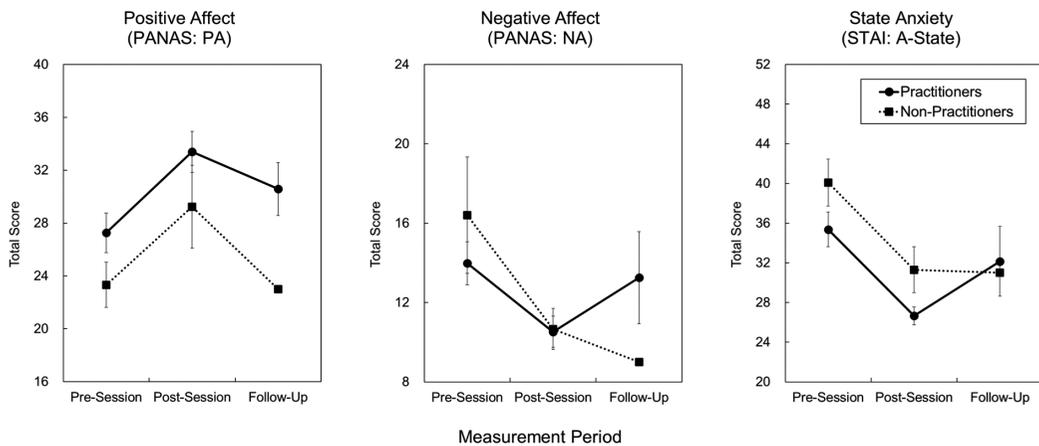
Figure 1. Mean scores for each scale on psychological state (PANAS, STAI) at each measurement period. Data from continued practitioners and non-practitioners of laughter yoga are shown separately. Error bars indicate standard errors of the mean.

Comparisons Between Personality Traits Across the Groups

Mean scores (*SDs*) for each factor from the Big Five Inventory for participants in each group were as follows: Neuroticism, 44.6 (10.95) for continued practitioners of laughter yoga and 46.1 (12.84) for non-practitioners; Extraversion, 58.3 (11.36) for practitioners and 60.2 (11.64) for non-practitioners; Openness to experience, 52.6 (10.00) for practitioners and 58.9 (6.71) for non-practitioners; Agreeableness, 57.9 (8.47) for practitioners and 63.6 (7.16) for non-practitioners; and conscientiousness, 51.8 (8.36) for practitioners and 55.0 (6.21) for non-practitioners. None of these differences between continued practitioners and non-practitioners of laughter yoga were statistically significant (t = 0.317–2.003, all ps > .05, corrected).

Correlations Between Personality Traits and Psychological States

Correlation analyses revealed that Neuroticism was significantly positively correlated with the NA from the PANAS at the pre-session and follow-up periods, as well as with the STAI

(A-State) at the post-session and follow-up periods (Table 2). Extraversion showed a significant positive correlation with the PA from the PANAS at the pre-session period and a significant negative correlation with the A-State at the post-session period. Openness to Experience was significantly positively correlated with the PA at the pre-session period. Agreeableness was significantly positively correlated with the PA at the post-session and follow-up periods, and significantly negatively correlated with the NA and the A-State at the follow-up period. Conscientiousness showed significant positive correlations with the PA at both the pre-session and post-session periods. These results show that the Big Five personality traits were significantly correlated with the psychological states at multiple measurement periods. Except from these, no other statistically significant correlations were observed (Table 2).

Table 2. Correlation coefficients (Pearson's *rs*) between each subscale score from the Big Five Inventory and psychological state measures.

Scale		Neuroticism	Extraversion	Openness to Experience	Agreeableness	Conscientiousness
PANAS: PA	Pre-Session	–.168	**.429***	**.442***	.297	**.535****
	Post-Session	–.283	.349	.286	**.412***	**.401***
	Follow-Up	–.385	.202	.373	**.582***	.186
PANAS: NA	Pre-Session	**.424***	–.261	–.308	–.171	–.250
	Post-Session	.185	–.286	–.231	–.186	–.189
	Follow-Up	**.597***	–.470	–.359	**–.585***	.126
STAI (A-State)	Pre-Session	.292	–.219	–.320	–.221	–.267
	Post-Session	**.388***	**–.418***	–.309	–.289	–.241
	Follow-Up	**.566***	–.313	–.325	**–.567***	–.164

PANAS = Positive and Negative Affect Schedule, PA = Positive Affect, NA = Negative Affect, STAI = State-Trait Anxiety Inventory, A-State = State Anxiety. Bold characters show statistically significant correlations.
*$p < .05$, ** $p < .01$

Correlations Between Measures of Laughter Yoga Practice and Psychological Scales

Correlation analyses revealed that, among the continued practitioners of laugher yoga, practice period was significantly positively correlated with the scores for the Openness to Experience factor from the Big Five Inventory (Table 3). Also, practice frequency was significantly positively correlated with the PA from the PANAS at the post-session period, and significantly negatively correlated with the NA from the PANAS at the pre-session period. Thus, at least for the duration and frequency of laugher yoga practice, measures on practice

revealed statistically significant correlations with either personality trait or psychological states. Aside from these, no other statistically significant correlations were found between measures on laughter yoga practice and psychological states or personality traits (Table 3).

Table 3. Correlation coefficients (Pearson's *rs*) between each measure on laughter yoga practice and scores from psychological scales among continued practitioners of laughter yoga.

Scale		Practice Period	Practice Frequency	Practice Time
PANAS: PA	Pre-Session	–.187	.273	–.007
	Post-Session	–.008	**.456***	.225
	Follow-Up	.248	.386	.037
PANAS: NA	Pre-Session	.008	–.302	–.254
	Post-Session	–.176	–.325	–.355
	Follow-Up	–.285	–.332	–.274
STAI (A-State)	Pre-Session	–.105	**–.454***	.040
	Post-Session	–.216	–.426	–.259
	Follow-Up	–.301	–.341	–.023
Big Five Inventory	Neuroticism	–.108	–.191	.150
	Extraversion	.051	.161	–.404
	Openness to Experience	**.414***	.003	.054
	Agreeableness	–.041	.230	.281
	Conscientiousness	.168	.124	.178

PANAS = Positive and Negative Affect Schedule, PA = Positive Affect, NA = Negative Affect, STAI = State-Trait Anxiety Inventory, A-State = State Anxiety. Bold characters show statistically significant correlations.
*$p < .05$

Discussion

Summary of Results

The present study was conducted as a replication of Miyata et al. (2023), examining changes in psychological states associated with in-person practice of laughter yoga and its relation to the Big Five personality traits, including follow-up assessments. Consistent with Miyata et al. (2023), positive affect significantly increased, while negative affect and state anxiety significantly decreased from pre- to post-session. Although state anxiety was higher among continued practitioners of laughter yoga compared to non-practitioners through the pre- and post-session assessments, patterns of change in psychological states did not significantly differ

between the groups. At the follow-up, the dropout rate was higher than at other measurement periods, and although statistical support was not obtained, numerical trends suggested that psychological states were either generally maintained at the post-session level or tended to return to the pre-session levels. Regarding personality traits, no significant group differences were found; however, multiple significant correlations were observed between the traits and both psychological states at each measurement period as well as measures of laughter yoga practice. These findings indicate that, while some trends diverged from those of Miyata et al. (2023), the psychological effects of laughter yoga practice were, overall, consistent with the results of the previous study.

Laughter Yoga Practice and Psychological States

Regarding changes in psychological states before and after the practice of laughter yoga, the results largely replicated those of the previous study (Miyata et al., 2023), showing significant increase in positive affect and decreases in negative affect and state anxiety. Although the number of participants at the follow-up measurement was smaller than at the pre- and post-session measurements, at least among continued practitioners there was a numerical tendency for the psychological states observed at the end of the session to be maintained to some extent at the follow-up asseeement. These findings are consistent with previous studies on laughter yoga (Ellis et al., 2017; Hashimoto, 2015; Nishida & Fukushima, 2012) and suggest that desirable changes in psychological states occur reliably with participation in each practical session. While it is possible that participants' psychological states may return to baseline levels after a certain period of time following the practical session, the results indicate that the effects of practice on psychological states may persist for some time after the session has ended.

Laughter Yoga Practice and Personality Traits

No statistically significant differences were observed for the scores from the Big Five personality factors between continued practitioners of laughter yoga and non-practitioners. However, significant associations were found between personality traits and psychological states at multiple measurement periods. Specifically, higher neuroticism was associated with higher negative affect and state anxiety, while higher agreeableness was associated with higher positive affect at multiple measurement periods and lower negative affect and state anxiety at the follow-up assessment. These findings are consistent with previous research (Miyata et al., 2023) and suggest that participants' baseline personality tendencies may influence their psycho-

logical states and their changes when engaging in the laughter yoga practice.

Furthermore, results indicated a potential association between laughter yoga practice and personality traits; for example, longer practice period was significantly correlated with higher openness to experience on the Big Five Inventory. Because the present study examined only zero-order correlations at a single time point, it is difficult to determine whether continued practice of laughter yoga increases openness to experience or whether individuals with higher baseline openness are more likely to engage in continued practice. Previous studies have reported that practices such as Zen meditation and Tai Chi may induce changes in personality traits including openness to experience (Pokorski & Suchorzynska, 2018), highlighting the need for future longitudinal research to examine the relationship between practice and personality traits.

In the previous study, Miyata et al. (2023) also reported correlations suggesting an opposite trend, where longer practice was associated with higher neuroticism and lower openness. In contrast, the present study found only limited correlations between measures on laughter yoga practice and psychological measures, and no statistically significant correlations between practice time and personality traits. While it is not easy identify differences between the samples of practitioners in the previous and present studies, it might be possible that the characteristics of continued practitioners more or less varied depending on the time period in which the data collection was conducted.

Limitations and Future Perspectives

As described above, the present study provided replication data of the previous study as well as several new insights; however, several limitations should also be noted. First, although a follow-up assessment was added in addition to replicating Miyata et al. (2023), the proportion of participants who did not complete the follow-up was relatively high. This was likely due to situational constraints, as the data collection was conducted in a restaurant during lunch immediately after the practical session, when participants had already left the practice venue. In fact, among the non-practitioners, who attended the laughter yoga session for the first time on the day of the survey, only 1 out of 10 participants completed the follow-up survey. Improvements in data collection procedures, such as allowing participants to respond online by using smartphones or other devices, may help reduce attrition in the future.

Second, the methods of comparing continued practitioners and non-practitioners of laughter yoga warrant further consideration. In both Miyata et al. (2023) and the present study,

participants who attended the laughter yoga session on the survey day were post-hoc divided into groups of continued practitioners and non-practitioners based on self-reports. While this approach reflects the actual practical settings, the characteristics of non-practitioners may vary depending on contextual factors such as the survey day and/or the purpose of the event. Indeed, differences in trends were observed between Miyata et al. (2023) and the present study in terms of changes in psychological states across these groups. In the present study, no consistent group differences were found overall; however, on the survey day, a TA program had just introduced laughter yoga, which may have led some participants to join with a pre-existing affirmative image of the practice. Such external factors could have influenced participants' psychological states before and after the session, as well as their underlying personality traits. Thus, when group comparisons are based on participants who happened to attend a session on a given day, characteristics of the control group are likely to be influenced by various situational influences. Introducing randomized controlled trials that control for demographic variables could enable more rigorous group comparisons (see also Miyata & Takada, 2024).

Third, similar to Miyata et al. (2023), the present study used a cross-sectional design at one time point, which makes it difficult to draw strong conclusions about medium- to long-term changes associated with continued practice Similar limitations also apply for data from other, related mind-body practices (Miyata & Sasaki, 2019; Miyata et al., 2015, 2020). Particularly regarding personality traits, it remains unclear whether the results reflect enduring baseline characteristics or whether personality traits themselves may change through continued practice. This issue, especially the latter, would be best addressed by introducing longitudinal studies.

Finally, additional factors not examined in the present study should also be explored. Recently, Miyata and Takada (2024) reported the effects of movie-based laughter yoga practice in a randomized controlled trial with university students. Future research may also examine such effects among continued practitioners. Furthermore, extending the investigation beyond psychological measures to include physiological, endocrine, behavioral, and neural indices (for a review, see Ohira, 2020) is expected not only to help clarify the mechanisms of effects of laughter yoga more comprehensively but also to contribute to its more effective implementation in society.

References

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice Hall.

Beckman, S. L., Regier, N. G., & Young, C. (2007). Effects of a workplace laughter intervention on optimism, self-efficacy, and positive affect. *Journal of Primary Prevention, 28*(2), 167–182.

Bennett, M. P., Zeller, J. M., Rosenberg, L., & McCann, J. (2003). The effect of mirthful laughter on stress and natural killer cell activity. *Alternative Therapies in Health and Medicine, 9*(2), 38–45.

Berk, L. S., Tan, S. A., Fry, W. F., Napier, B. J., Lee, J. W., Hubbard, R. W., Lewis, J. E., & Eby, W. C. (1989). Neuroendocrine and stress hormone changes during mirthful laughter. *American Journal of the Medical Sciences, 298*(6), 390–396.

Cha, M. Y., & Hongs, J. S. (2015). Effects of laughter therapy on serotonin concentration, depression, and quality of life in elderly women. *Journal of Korean Academy of Nursing, 45*(2), 221–230.

Cho, E. A., & Oh, H. S. (2011). Effects of laughter therapy on depression, cognition and sleep among the community-dwelling elderly. *Journal of Korean Gerontological Nursing, 13*(2), 103–112.

Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO-PI-R) and NEO five-factor inventory (NEO-FFI) professional manual*. Psychological Assessment Resources.

Dillon, K. M., Minchoff, B., & Baker, K. H. (1985). Positive emotional states and enhancement of the immune system. *International Journal of Psychiatry in Medicine, 15*(1), 13–18.

Ellis, J. M., Ben-Moshe, R., & Teshuva, K. (2017). Laughter yoga activities for older people living in residential aged care homes: A feasibility study. *Australasian Journal on Ageing, 36*(3), E28–E31.

Farifteh, F., Mohammadi-Aria, A., & Mohammadi, M. (2014). Laughter therapy and its effects on stress. *Journal of Psychology and Behavioral Science, 2*(2), 71–78.

Fukushima, T. (2008). Effects of laughter yoga on anxiety, mood, and stress responses. *Japanese Journal of Complementary and Alternative Medicine, 5*(2), 67–74 (in Japanese).

Fukushima, T. (2016). Psychological effects of laughter yoga: Buffering against fear responses. *Japanese Journal of Health Psychology, 29*(1), 1–10 (in Japanese).

Hashimoto, T. (2015). The effects of laughter yoga on self-esteem and state anxiety among Japanese university students. *Journal of Human Environmental Studies, 13*(2), 155–162 (in Japanese).

Hayashi, K., Nagai, C., & Tada, A. (2003). Laughter has beneficial effects on postprandial blood glucose and HbA1c in patients with type 2 diabetes. *Diabetes Care, 26*(5), 1651–1652.

Itami, K., Nishino, H., & Harada, T. (1994). Immune responses induced by laughter in cancer patients. *Journal of*

Japanese Society for Cancer Therapy, 29(4), 547–553 (in Japanese).

Lee, S. H. (2010). The role of serotonin in regulating impulsivity and anxiety. *Korean Journal of Psychopharmacology, 21*(2), 77–84 (in Korean).

Miyata, H., Kobayashi, D., Sonoda, A., Motoike, H., & Akatsuka, S. (2020). Mindfulness and psychological health in practitioners of Japanese martial arts: A cross-sectional study. *BMC Sports Science, Medicine and Rehabilitation, 12,* 75.

Miyata, H., Okanoya, K., & Kawai, N. (2015). Mindfulness and psychological status of Japanese yoga practitioners: A cross-sectional study. *Mindfulness, 6*(3), 560–571.

Miyata, H., & Sasaki, T. (2019). The Park-Sasaki method of speed-reading and mindfulness: A cross-sectional study. *WASEDA RILAS JOURNAL, 7,* 235–248.

Miyata, H., & Takada, Y. (2024). Psychological effects and personality traits of practicing laughter yoga using on-demand videos: A randomized controlled trial with university students. *Journal of Laughter and Humor Studies, 31,* 39–51 (in Japanese).

Miyata, H., Takada, Y., & Sase, Y. (2023). Changes in psychological states and associations with personality traits through in-person practice of laughter yoga. *Journal of Laughter and Humor Studies, 30,* 19–34 (in Japanese).

Nishida, T., & Fukushima, T. (2012). Effects of laughter yoga on psychological well-being: A study with Japanese adults. *Journal of Health Psychology Research, 25*(3), 123–132 (in Japanese).

Nishida, T., Taguchi, T., & Sato, T. (2001). Immune responses to laughter: Changes in NK cell activity after rakugo. *Japanese Journal of Psychosomatic Medicine, 41*(1), 17–23 (in Japanese).

Ohira, H. (2017). Laughter and glucose metabolism. *Japanese Journal of Physiological Psychology and Psychophysiology, 35*(2), 87–94 (in Japanese).

Ohira, T. (2020). Recent research trends in the association between laughter and biopsychological health and disease (a literature review): Observational and intervention studies from 2010 to 2020. *Journal of Laughter Studies, 27,* 3–18 (in Japanese).

Pokorski, M., & Suchorzynska, A. (2018). Psychobehavioral effects of meditation. *Advances in Experimental Medicine and Biology, 1023,* 85–91.

Sakuragi, S., Sugiyama, Y., & Takeuchi, K. (2002). Effects of laughter on cardiovascular function. *Japanese Journal of Hygiene, 57*(3), 563–569 (in Japanese).

Sato, A., & Yasuda, A. (2001). Development of the Japanese version of Positive and Negative Affect Schedule (PANAS) scales. *Japanese Journal of Personality, 9*(2), 138–139 (in Japanese).

Shahidi, M., Mojtahed, A., Modabbernia, A., Mojtahed, M., Shafiabady, A., Delavar, A., & Honari, H. (2011). Laughter yoga versus group exercise program in elderly depressed women: A randomized controlled trial. *International Journal of Geriatric Psychiatry, 26*(3), 322–327.

Shimizu, H. (2016). Free statistical software HAD: Suggested functions and usages for statistical learning, education, and research practice. *Media, Information and Communication Studies, 1,* 59–73 (in Japanese).

Shimizu, H., & Imae, K. (1981). State-Trait Anxiety Inventory no nihongoban ni kansuru kenkyū [A study of the Japanese version of the State-Trait Anxiety Inventory]. *Japanese Journal of Educational Psychology, 29*(4), 348–353 (in Japanese).

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Anxiety Inventory.* Consulting Psychologists Press.

Takada, Y. (2015). *Otona no wara tore (Laughter exercise training for adults).* Golf Digest Sha (in Japanese).

Wada, S. (1996). Nihongoban Big Five shakudo no sakusei [Construction of the Japanese Big Five scale]. *Japanese*

Journal of Psychology, 67(1), 61–67 (in Japanese).

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.

Yamamura, Y., & Hirata, K. (2015). Physiological and psychological effects of laughter yoga in elderly people. *Japanese Journal of Geriatric Psychiatry, 26*(5), 529–537 (in Japanese).

Zhao, J., Yin, H., & Chen, Q. (2019). Laughter and humor interventions for depression, anxiety, and sleep: A meta-analysis. *Journal of Psychiatric Research, 115*, 123–131.