

# METAPHYSICS OF THE TEA CEREMONY: A RANDOMIZED TRIAL INVESTIGATING THE ROLES OF INTENTION AND BELIEF ON MOOD WHILE DRINKING TEA

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**Objective:** This study explored whether drinking tea “treated” with good intentions would enhance mood more than drinking ordinary tea, under double-blind, randomized conditions.

**Design:** Each evening, for seven days in a row, volunteers recorded their mood using the Profile of Mood States (POMS) questionnaire. On days three, four, and five of the test, each participant drank 600 mL of oolong tea in the morning and again in the afternoon. One randomly assigned group blindly received tea that had been intentionally treated by three Buddhist monks; the other group blindly received untreated tea from the same source. On the last day of the test, each person indicated what type of tea he/she believed he/she had been drinking.

**Participants:** Stratified, random sampling was used to assign 189 adults into two groups matched by age, gender, the psychological trait of neuroticism, and the amount of tea consumed on average per day. All participants were Taiwanese and lived in Kaohsiung, Taiwan, and the test was conducted over the course of one week to reduce mood

fluctuations due to changes in local weather and other common influences.

**Results:** Those who drank treated tea showed a greater increase in mood than those who drank untreated tea (Cohen's  $d = 0.65$ ,  $P = .02$ , two-tailed). Change in mood in those who believed that they were drinking treated tea was much better than those who did not believe (Cohen's  $d = 1.45$ ,  $P = .00002$ , two-tailed).

**Conclusion:** Tea treated with good intentions improved mood more than ordinary tea derived from the same source. Belief that one was drinking treated tea produced a large improvement in mood, but only if one was actually drinking the treated tea, indicating that belief and intentional enhancement interact. This also suggests that the esthetic and intentional qualities associated with the traditional tea ceremony may have subtle influences that extend beyond the ritual itself.

**Key words:** Intention, tea, mood, mind–matter interaction

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## INTRODUCTION

Why does mother's homemade soup seem to taste better than what is nominally the same soup extracted out of a tin can? Besides the use of fresher and perhaps more nutritious ingredients, homemade soup offers a component that is absent from commercial soups—mother's nurturing intentions. Do such intentions matter? A previously reported study investigated this question by exposing samples of chocolate, a natural mood enhancer,<sup>1,2</sup> to focused beneficial intentions, and then testing under double-blind conditions whether people eating the intentionally treated chocolate would report better mood as compared to people eating untreated chocolate from the same source.<sup>3</sup> The study's outcome supported the intention-enhancement hypothesis.

The present study further explored the possible mood-enhancing effects of intention by exploring the role of belief in modulating this effect. The study was conducted in Taiwan, thus to better conform to Chinese dietary habits, tea instead of chocolate was used as the intentional target. Tea is the most consumed beverage in the world after water,<sup>4</sup> and it has been the principal beverage in China for thousands of years.<sup>5</sup> The effects of tea on health have been studied extensively, and beneficial treatments have been claimed for a broad range of illnesses, from diabetes,<sup>6</sup> to cancer<sup>7</sup> and cardiovascular disease.<sup>8</sup> In addition, the moderate amounts of caffeine in tea combined with the amino acid L-theanine helps maintain alertness and focused attention, and similar to chocolate, it acts as a natural mood enhancer.<sup>4,9–11</sup>

We reasoned that tea was an especially appropriate substance for a study in Taiwan because of the ancient Chinese tradition of the tea ceremony, or “chadao.” That word may be translated as “the way of tea,” suggesting not only the refined esthetics associated with the ceremony itself, but also a subtle metaphysical aspect of being “one with the tea” in order to prepare, taste, and experience it properly.<sup>12,13</sup> Thus, in China tea is not just a beverage, it is also associated with an inherent intentional quality when prepared in a ritual context.

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We focused on the role of belief in the present study because of its known role in modulating many aspects of food and beverage consumption. For example, labels like “low sodium” on commercial foods are known to influence perception of saltiness,<sup>14</sup> and belief about having consumed caffeine is known to influence cognitive performance and mood.<sup>15</sup>

We were interested in two ways that belief might modulate mood under double-blind conditions. The first examined the role of participants' beliefs about what they were drinking while some drank treated tea and others drank untreated tea. We refer to this as a placebo-controlled comparison, because the “placebo,” or the expected outcome, was held constant while the type of tea was varied.<sup>16</sup> When participants believed that they were drinking untreated tea, we refer to this as a nocebo-controlled comparison.<sup>17</sup> While *placebo* and *nocebo* are often used to refer to positive and negative expectations, respectively, we use these terms in a more general sense as holding positive or negative beliefs.

The second case examined the effect of one's belief matching or mismatching the type of tea one was actually drinking. In the subgroup in which participants drank treated tea, we compared mood with congruent vs. incongruent beliefs. We refer to this as a placebo-enhanced comparison. That is, this comparison holds the type of tea constant while examining the effect of variations in belief. For the subgroup drinking untreated tea, we compared mood with congruent vs. incongruent beliefs, and we refer to this as a nocebo-enhanced comparison.

## METHOD

### Participants

Two hundred twenty-one adult members of a Buddhist book club of the Bliss Wisdom Foundation in the city of Kaohsiung, Taiwan, were recruited. All lived in Kaohsiung and were prepared to participate in the experiment at the same time to reduce potential effects of mood fluctuation due to changes in weather and other environmental factors. These volunteers were informed that the study was approved by the Chung-Ho Memorial Hospital Institutional Review Board of the Kaohsiung Medical University, and all the participants gave their informed consent. The previous successful study involving chocolate involved a total of 62 participants (Cohen's  $d = 0.45$ ,  $P = .04$ , one-tailed), so the present study was assumed to have sufficient statistical power to detect the hypothesized intentional effect.

### Questionnaires

Four questionnaires were employed to measure personality, mental health disturbances, well-being, and mood. The first was the Chinese Health Questionnaire (CHQ), a self-administered screening instrument commonly used to identify minor psychiatric disorders in non-psychiatric contexts. The CHQ was modified for use with a Chinese population from the General Health Questionnaire (GHQ) developed by Goldberg and Williams.<sup>18</sup> Cheng and Williams<sup>19</sup> used the structure and concept of the GHQ and modified it into a brief psychiatric screening test appropriate to Chinese culture. Cheng et al.<sup>20</sup> demonstrated a satisfactory internal

consistency of the CHQ (Cronbach's  $\alpha = 0.79$ ). Higher scores on this scale refer to higher mental health disturbances.

The Profile of Mood States (POMS) measured mood.<sup>21</sup> The Chinese version of POMS was modified by Chang and Lu.<sup>22</sup> The Chinese POMS Brief Form is a 37-item questionnaire measuring seven factors of mood, including tension, depression, anger, vigor, fatigue, confusion, and self-esteem<sup>22</sup>; this test has shown very good reliability and validity (Cronbach's  $\alpha = 0.98$ – $0.99$ ).<sup>23,24</sup> This scale is usually scored in terms of high scores indicating higher mood disturbance, but to avoid the confusion of double-negatives, we reversed the scale, so a higher score indicates better mood.

A Chinese version of the Eysenck Personality Questionnaire (EPQ), a 25-item inventory, measured the personality traits of extraversion and neuroticism.<sup>25,26</sup> There are 25 items in the EPQ—14 neuroticism items and 11 extraversion items. The Chinese version has claimed high internal consistency (Cronbach's  $\alpha = 0.90$ ) and good validity.<sup>26</sup> A higher score on the item of interest, neuroticism, indicates higher neuroticism. Only the Eysenck EPQs neuroticism subscale was used in the present study to control for the effect of neuroticism on mood (a known covariate).<sup>27</sup>

Finally, Lu<sup>28</sup> selected items from a 48-item Chinese Happiness Inventory<sup>29</sup> to form a 10-item Subjective Well-Being (SWB) subscale. The internal consistency reliability of SWB is good ( $\alpha = 0.87$ ). Higher scores indicate better well-being.

### Procedure

Before the experiment began, each volunteer filled out the EPQ questionnaire and provided answers to questions about gender, age, and amount of tea consumed on average per day. The second author, who was not involved in the data collection aspects of the study, used stratified, random sampling to distribute the participants into two groups matched according to the demographic variables, amount of tea consumed on an average per day, and the EPQs neuroticism score.

One group was randomly assigned to drink intentionally enhanced tea and the other to drink ordinary tea from the same source, under double-blind conditions (the treatment method is described below). Each person volunteering for the test received a package containing seven copies of the CHQ, SWB, and POMS questionnaires and six bottles of tea, each 600 mL or about 20 fluid ounces in volume. Participants were asked not to drink any other tea during the week-long experiment.

In the evening of each day, participants were asked to fill out the three questionnaires. On the three middle days of the week (days three, four, and five), they were instructed to drink one bottle of tea at 10 AM and a second bottle at 3 PM. On day seven, they also indicated whether they believed they were drinking the intentionally treated or untreated tea, or unknown.

Tea was consumed three days in a row because previous studies involving intention suggest that these effects are generally small in magnitude,<sup>30</sup> and as such, it was assumed that repeated consumption of intentionally influenced tea might improve our ability to detect an effect. Based on the experiment involving intentionally enhanced chocolate,<sup>3</sup> the specific effect of interest—improved mood—was predicted to appear on the third day of drinking tea.

**Table 1.** Means (and Standard Errors) Comparing Demographic and Personality Variables Between the Two Randomly Stratified Groups; P-Values are Two-Tailed

	Treated Group ( <i>n</i> = 95)	Untreated Group ( <i>n</i> = 94)	F(1,183)	P-Value
Neuroticism score	3.34 (0.27)	3.18 (0.28)	0.57	0.45
Age	44.8 (1.32)	45.5 (1.28)	0.15	0.77
Gender (one male, two female)	1.68 (0.06)	1.63 (0.05)	0.46	0.50
Tea consumed (mL)	457.1 (62.8)	551.1 (60.8)	1.16	0.28

**Intentional treatment method.** The tea was an organic variety of oolong (*Camellia sinensis*). To ensure that the same tea was provided to the two groups, a single batch of tea was first prepared in a large container. It was then poured into separate 600 mL bottles. The tea manufacturer (Touch Down Inc.) provided assurance that the brewed tea was safe to maintain in room temperature for the one-week duration of the study. The bottles of tea were then distributed to the two groups according to the stratified, random sampling scheme described above—the *treated* group receiving intentionally enhanced tea and the *untreated* group receiving ordinary tea.

The intentional treatment was produced via focused concentration by Master Lu Cheng, a well-respected monk in Taiwan and Director of the Bliss Wisdom Buddhist Foundation, along with two other senior monks from the same Foundation. All three were accomplished meditators with experience in maintaining prolonged concentration. The intention they were asked to use was as follows: “An individual who consumes this tea will manifest optimal health and functioning at physical, emotional and mental levels, and in particular they will enjoy an increased sense of energy, vigor and well-being.” The monks mentally directed these beneficial intentions toward the tea for 22 min. To avoid including the untreated tea in the intentional process, the untreated bottles were placed in a distant room, and an additional, closing intention was added to the monks’ instructions: “This enhancement is only to this batch of tea,” referring to the treated bottles.

**Blinding and data-recording procedure.** After the treated bottles of tea had been prepared, a research assistant with no affiliation to the monks or the participants arranged the bottles of tea and sets of questionnaires into packages appropriate for the treated and the untreated group. The assistant then sent the prepared packages, labeled A or B, to the first author (Y.J.S.), who was unaware which labels corresponded to which group. Y.J.S. distributed the packages to the participants according to the stratified, random sampling scheme. After the week-long study was complete, a second assistant, also blinded to the condition assignments,

entered the data from the participants’ daily questionnaires into a database. Those entries were double checked by a third assistant who also was blind to the condition assignments. At this point, Y.J.S. contacted the first research assistant to break the blinding code, and the unblinded data were analyzed by the second author.

## RESULTS

Of the 221 people who volunteered for the experiment, three dropped out before the experiment began. Of the remainder, 15 did not fill in any of the daily questionnaire data and 14 filled in fewer than 60 of 63 required daily values (i.e., nine questionnaire scales  $\times$  seven days). One person’s group assignment was not indicated on the datasheet. All of these individuals were dropped from further analysis. Of the remaining 189 participants, 95 had been assigned to the treated group and 94 to the untreated group.

Participants were asked to fill out a total of 11,907 items in the various questionnaires (189 people  $\times$  63 items each). Of these items, 29 values were missing; each missing value was estimated by taking the average of the participant’s responses to the same questionnaire item from adjacent days, or if the missing value came from the first or last day of the experiment then the second day or sixth day value was used.

Because 32 people had been dropped from the initial 221 volunteers, the first step of the analysis was to recheck the group assignments to see if they remained adequately matched on neuroticism, age, gender, and tea consumed on an average. As shown in Table 1, no significant differences were observed.

The groups of 189 participants were created by each participant’s reported belief in what they were drinking (three types) by what they actually drank (two types), thus  $2 \times 3 = 6$  subgroups. The number of participants in each group is shown in Table 2.

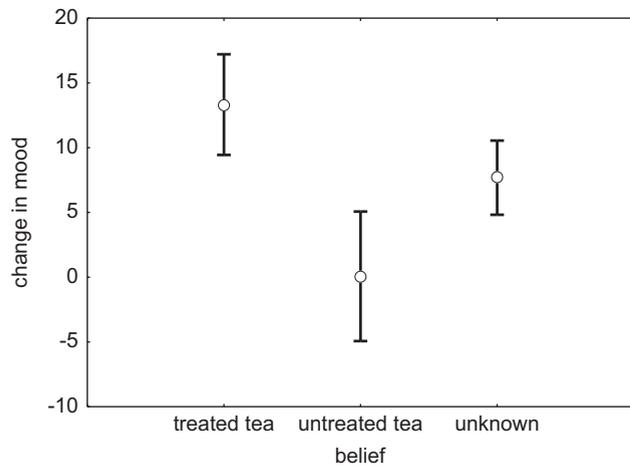
Examination of the absolute mood values recorded on days one and two indicated that within the placebo-controlled comparison—those who believed they were receiving treated tea and in fact were vs. were not—had significantly different averages (see Table 3). This difference was likely due to

**Table 2.** Number of Participants in Each Experimental Subgroup

	Placebo Control	Nocebo Control	Guess: Unknown
Group assignment	Belief: Treated tea	Belief: Untreated tea	
Tea type: Treated	25	16	54
Tea type: Untreated	30	17	47

**Table 3.** Mean Mood (and Standard Errors) on Days One and Two for Participants in the Placebo-Controlled Subgroups and Two-Tailed P-Values Based on a *t*-test of the Difference

	Day One	Day Two
Treated tea	-7.6 (4.6)	-9.5 (5.0)
Untreated tea	5.3 (4.2)	6.7 (4.5)
Difference <i>P</i> -value	0.03	0.006



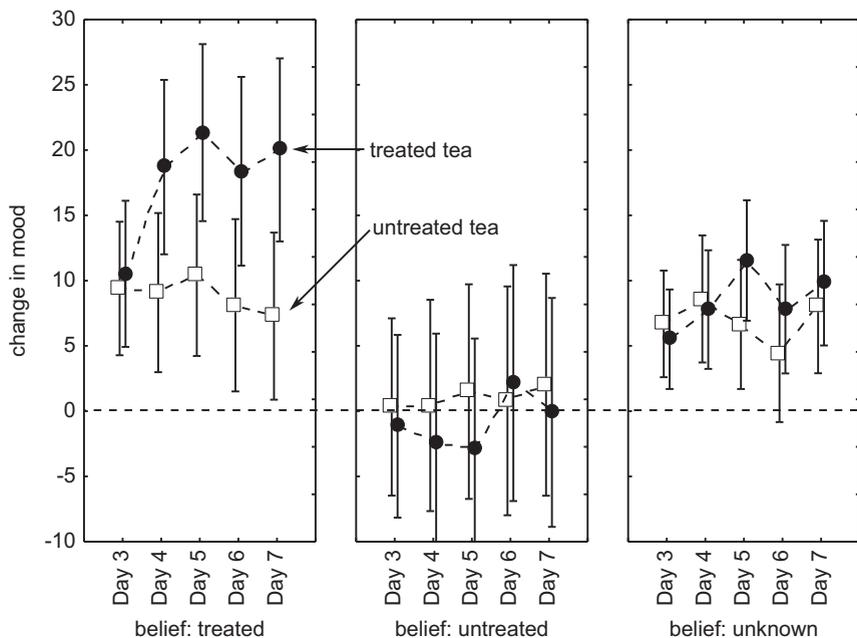
**Figure 1.** Mean change in mood by belief with 95% confidence intervals.

random fluctuations, as in the matched groups shown in Table 1, within this placebo-controlled subgroup, there were also no significant differences in comparisons of age, gender, tea consumed, or neuroticism scores. To adjust for these baseline mood differences, for each participant mood scores on days one and two were averaged and then the *change in mood* from that value was determined for days three through seven. All subsequent analyses were performed on these change values.

Comparison of change in mood by belief, independent of the type of tea consumed, showed that those who believed they were drinking treated tea ( $n = 55$ ) showed a strong positive improvement in mood, those who were unsure showed a modestly positive improvement ( $n = 101$ ), and those who believed that they were drinking untreated tea ( $n = 33$ ) showed no change in mood from baseline measures (see Figure 1, Analysis of Variance  $F(2, 183) = 8.6, P = .0003$ ).

There were four comparisons of interest:

- (1) The *placebo-controlled* condition compared participants who correctly believed that they were drinking treated tea vs. those whose belief was mistaken. That is, the type of *belief* was held constant while the two treatments were compared.
- (2) The *nocebo-controlled* condition compared participants who correctly believed that they were drinking untreated tea vs. those whose belief was mistaken.
- (3) The *placebo-enhanced* condition compared participants who drank treated tea and correctly believed they were drinking treated tea, vs. those whose belief was incorrect. That is, the type of *treatment* was held constant while the two types of beliefs were compared.
- (4) The *nocebo-enhanced* condition compared participants who drank untreated tea and correctly believed they were



**Figure 2.** Means and 95% confidence intervals for tea type vs. belief.

**Table 4.** Mean Change in Mood (Standard Error) and Planned *t*-test Comparisons on Third Day of Drinking Tea (Day Five of Experiment), by Assigned Tea Type and Belief; Two-Tailed *P*-Values

	Placebo Belief: Treated	Nocebo Belief: Untreated	<i>t</i> -test ( <i>P</i> )	Cohen's <i>d</i>
Tea type: Treated	21.3 (3.4) <i>n</i> = 25	-2.90 (4.3) <i>n</i> = 16	4.41 (0.00002)	1.45
Tea type: Untreated	10.4 (3.1) <i>n</i> = 30	1.50 (4.2) <i>n</i> = 17	1.71 (0.09)	0.53
<i>t</i> -test	2.35	-0.74		
<i>P</i>	0.02	0.46		
Cohen's <i>d</i>	0.65	-0.27		

drinking untreated tea, vs. those whose belief was incorrect.

Figure 2 shows daily means and 95% confidence intervals for change in mood among the six subgroups. As previously mentioned, to avoid complications associated with multiple comparisons only the third day of drinking tea was predicted to show a maximal effect,<sup>3</sup> so planned comparisons were conducted only for that day. Those comparisons revealed the following results (also see Table 4):

- (1) *Placebo control*: Mood improved (*P* = .02).
- (2) *Nocebo control*: Mood showed no difference (*P* = .46).
- (3) *Placebo enhanced*: Mood substantially improved (*P* = .00002).
- (4) *Nocebo enhanced*: Mood showed no difference (*P* = .09).

Similar comparisons were performed for the Chinese Health Questionnaire, Subjective Well-Being scale, and the seven subscales of the Chinese version of POMS. These tests indicated significant improvements in well-being, and the POMS subscales of anger and confusion contributed the most to overall mood improvement (see Table 5).

## DISCUSSION

Under randomized, double-blind conditions, adult volunteers who drank intentionally enhanced tea experienced improved mood and well-being as compared to people who drank untreated tea from the same source. This outcome supported the results of an earlier study that used chocolate as the target of intentional enhancement.<sup>3</sup>

Because there were four tests of interest, a Bonferroni adjustment would require a *P* = .05/4 = .0125 to reach conventional levels of significance. Of course, mental health and well-being measures are not wholly independent of mood, so it is not surprising to find similar outcomes among those three measures. With this in mind, the placebo-controlled outcome did not quite reach the adjusted threshold for significance. A post-hoc comparison that included mood scores averaged over days four through seven rather than just on day five resulted in a difference associated with *P* = .01. If that comparison were planned in advance, it would have (just barely) survived a Bonferroni correction.

While the placebo-controlled outcome provides only modest statistical support for the intentional hypothesis, in practical terms the treated tea still resulted in a 200% improvement in mood as compared to the untreated tea, and the Cohen's *d* of 0.65 is considered a medium effect

**Table 5.** Planned Comparison *P*-Values (Two-Tailed) on the Third Day of Drinking Tea for the Chinese Health Questionnaire (CHQ), Subjective Well-Being (SWB), Profile of Mood States (POMS), and Seven Subscales of POMS, in Each Case for the Four Conditions of Interest: Placebo-Controlled, Nocebo-Controlled, Placebo-Enhanced, and Nocebo-Enhanced Conditions

	Placebo Controlled	Nocebo Controlled	Placebo Enhanced	Nocebo Enhanced
CHQ	0.40	0.39	0.007	0.27
SWB	0.05	0.38	0.0002	0.22
POMS (mood)	0.02	0.46	0.00002	0.09
<i>POMS subscales</i>				
Vigor	0.14	0.67	0.07	0.27
Fatigue	0.12	0.71	0.002	0.16
Anger	0.04	0.26	0.00005	0.20
Tension	0.12	0.03	0.00001	0.45
Depression	0.06	0.32	0.0001	0.20
Self-esteem	0.20	0.26	0.52	0.40
Confusion	0.04	0.24	0.00001	0.11

size.<sup>31</sup> By contrast, the placebo-controlled comparison showed no statistical difference in mood.

The results of the placebo-enhanced comparison was clearer ( $P = .00002$ ), with a large Cohen's  $d$  of 1.45 that easily survived the multiple comparison correction. The combination of believing that one was drinking treated tea and actually drinking it was associated with a 700% improvement in mood over those who drank treated tea but believed that they were drinking untreated tea. By contrast, believing that one was drinking untreated tea—the placebo-enhanced condition—showed no statistical effect of the intentional treatment. This suggests that a key modulator of this type of intentional phenomenon is the participant's belief.<sup>32</sup>

It should be noted that belief, as used in the present study, was not in the sense of an assigned or a primed expectation, but rather guesses or inferences based on each participant's experiences while drinking the tea. Among the 95 people who received the treated tea, 31% believed that they were drinking treated tea and 16% believed that they were drinking untreated tea. Among the 94 people in the untreated tea group, 32% believed that they were drinking treated tea and 18% believed that they were drinking untreated tea. The similarity in percentages indicates that these beliefs were not based on consciously reasoned inferences or by somehow determining which group they had been assigned to.

A future experiment might test whether intentions influence the chemical composition of food or beverage, but beyond the underlying mechanisms of this phenomenon, the empirical results of the present test suggests that mother's soup tastes better because it does contain a secret ingredient: loving intentions.

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