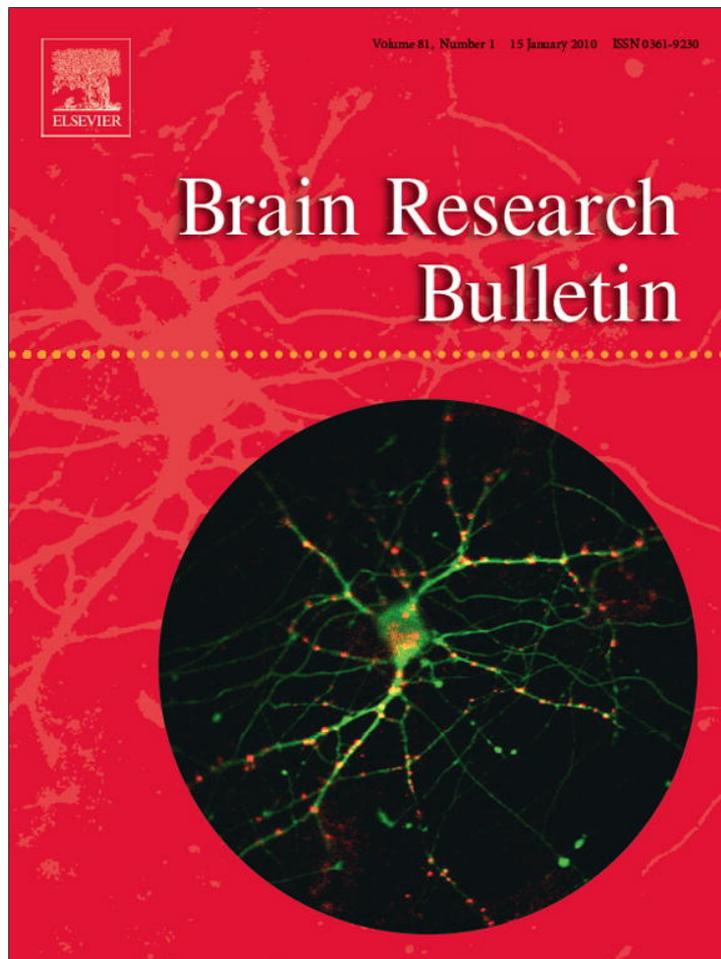


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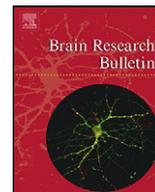
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Research report

A randomised controlled single-blind trial of the effects of Reiki and positive imagery on well-being and salivary cortisol

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ABSTRACT

The study investigated whether participants who received Reiki would show greater health and well-being benefits than a group who received no Reiki. A method of blinding participants to Reiki was also tested, where non-contact Reiki or No-Reiki with random assignment was given to 35 healthy psychology undergraduates whose attention was absorbed in one of three tasks involving self-hypnosis/relaxation. Participants experienced ten 20-min intervention sessions over a period of two and a half to 12 weeks. Reiki was directed by the experimenter who sat behind the participants as they were absorbed in the tasks. Self-report measures of illness symptoms, mood and sleep were assessed pre-post-intervention as was salivary cortisol. While the Reiki group had a tendency towards a reduction in illness symptoms, a substantive increase was seen in the No-Reiki. The Reiki group also had a near-significant comparative reduction in stress, although they also had significantly higher baseline illness symptoms and stress scores. The Reiki blinding was successful – the groups did not differ statistically in their beliefs regarding group membership. The results are suggestive that the Reiki buffered the substantive decline in health in the course of the academic year seen in the No-Reiki group.

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1. Introduction

Reiki is a biofield therapy akin to Qigong, therapeutic touch and Johrei; it is a system of laying on of hands which Reiki advocates believe has the capacity to heal the physical body and mind, and bring emotional and spiritual balance. Various studies have found Reiki to have a beneficial effect on well-being when compared to control groups who received no Reiki [15]. However, while immune system markers have been reported to respond to Qigong [4] and Johrei [11,16], no randomised controlled trials have been identified which have evaluated the effects of Reiki on well-being and health in conjunction with immune function. Importantly Johrei, which is a Reiki-like procedure, has produced reproducible beneficial effects on the immune system, effects which translated to well being [11,16]. Notably in one study Johrei was given to medical students experiencing exam-time stress [16]. The effects of stress were moderated in participants who learned Johrei, with 11/12 showing increases in CD3⁺CD56⁺ natural killer cell percentages

with decreased percentages of CD3⁺CD4. Benefits for mood were evinced in reduced anxiety, depression, anger, and loss of vigour and confusion [11]. Furthermore while evidence for specific physical benefits for health have yet to be demonstrated from Johrei practice, improved well-being in women with late stage breast cancer has been documented [3,12].

There is a limited but growing body of evidence that all biofield therapies can influence a variety of cellular and other biological systems [1,15], with the Reiki studies consisting mostly of descriptive studies, case reports and randomised controlled trials (RCTs) conducted with a small sample of participants. There is some evidence that Reiki can induce physiological changes in human participants, although it comes from research that has methodological shortcomings. In a non-controlled study of the effects of Reiki on immune function, Wardell and Engebretson employed a single group repeated measure design to investigate the effects of 30-min of Reiki on 23 healthy participants [23]. Biochemical changes in the direction of increased relaxation and immune responsiveness were reported, with a statistically significant reduction in state anxiety, drop in systolic blood pressure, and increase in salivary IgA levels, and a non-significant reduction in salivary cortisol. However, due to the lack of a control group, it cannot be determined whether the changes observed were due to a Reiki energy exchange, or whether they arose due to expectation, relaxation and receiving the attention of the Reiki Master. In another study with design limitations,

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Wetzel investigated whether touch therapies increase oxygen-carrying capabilities as measured through changes in hemoglobin and hematocrit values [24]. Changes were measured in these values over a 24-h period, during which the intervention group, 48 essentially healthy adults, participated in First Degree Reiki training. The intervention group demonstrated statistically significant changes in both hemoglobin and hematocrit values, as compared to a small no-treatment control group of 10 healthy medical professionals, which demonstrated no change. However, the benefits seen in the intervention group may have been due to placebo and relaxation, since the control group did not control for these factors. Additionally, the participants were not randomly assigned to the groups which may have introduced bias.

Amongst the handful of studies that controlled for placebo effects, Wirth et al. investigated the efficacy of Reiki combined with several other biofield therapies and distant healing, reporting statistically significant reductions in pain [26] and blood urea nitrogen and a trend towards normalization of blood glucose for participants that had above normal levels [27]. While various design limitations were present including a sample size of only 14 Participants [26], these studies were the first of their kind to employ randomised, double-blind designs, where healing was administered distantly or through a one-way screen. A randomised design that avoided expectation effects was employed by Rubic et al. [17] to investigate how Reiki affects the growth of overnight cultures of heat-shocked *Escherichia coli* K12 bacteria in vitro compared with untreated control cultures. In the experiments where the practitioners gave healing to a pain patient before treating the bacteria, the Reiki treated cultures exhibited statistically significantly more bacteria than controls. In another double-blind RCT, Baldwin and Schwartz [2] compared a group of four rats exposed to excessive white noise and Reiki treatment to groups exposed to 'sham' Reiki and noise alone, finding in all the three experiments conducted that Reiki statistically significantly reduced microvascular leakage compared to noise and 'sham' Reiki or noise alone. Sham Reiki consists of someone whom has not been initiated into Reiki mimicking a Reiki practitioner giving a Reiki treatment, and it has been reported to be a successful method of blinding participants to the receipt of Reiki [14,20]. Reiki initiation is a vital component of a practitioner's training and consists of their receiving an 'attunement' – a ritual performed on a training practitioner by a Reiki Master, believed to facilitate the participant's connection to the Reiki energy source so that they may channel Reiki for healing. A sham practitioner may have undergone identical training to a genuine Reiki practitioner, except for being initiated, which the sham and genuine practitioners may be blinded to in order to make a study double-blind [20].

In the present study, a method was developed for blinding participants to whether or not they were receiving Reiki. The practitioner sat behind each participant and sent non-contact Reiki to only those in the Reiki group, allowing closer contact between the practitioner and participant than with the use of a screen [26]. In summary, we set out to examine in a controlled study in normally healthy participants exposed to putatively enduring stress, the possible benefits of Reiki for health, mood and a hormonal immunological marker. Establishing effects of Reiki in the three domains of measurement – health, mood and immunology – especially health, is important in order to convey *significance* in the case of mood change, and at the same time to provide *validity* for hormonal immunological change, whose direction is ambiguous given such a tightly controlled, multiply determined system [8]. Our participants were mostly university freshers; attending university in the first year has been shown to be an ecologically valid stressor [25]. The dependent variables included mood, health and sleep as assessed by self-report questionnaires and immune system functioning as measured by salivary cortisol. The study was designed

to determine whether Reiki could be influential, above and beyond placebo and relaxation effects. If this were found to be the case, then assuming that conditions could be held constant in the present single-blind design, the possibility that the reported effectiveness of Reiki may be partly attributable to a subtle energy exchange would be worth exploring further.

2. Methodology

2.1. Participants

Following approval from the Goldsmiths Ethics Committee, 41 healthy Psychology undergraduates were recruited to participate, of whom 40 were in their first year of study. However, only 35 participants completed the study due to six drop-outs (1 Reiki; 5 non-Reiki). The age of the participants ranged from 18 to 30 years (27 female; 7 male). Participants were given information sheets and then, once informed consent had been obtained, were randomly allocated to the intervention groups. The students were awarded course credits or £30 on completion of the study.

2.2. Design and procedure

The participants were randomly assigned to six subgroups – three hypnotic/relaxation groups as for the adjunct study, each subdivided by Reiki or No-Reiki. The three hypnotic/relaxation groups were:

1. conventional self-hypnotic relaxation coupled with visualisation of healthy immune function based on Gruzelier et al. [9],
2. the same self-hypnosis procedure with the verbal immune instructions replaced by an animated scenario of healthy immune function,
3. verbal instructions of deep relaxation, designed to control for any beneficial effects of the self-hypnosis due to relaxation and expectation. Each of the three groups were randomised to Reiki or No-Reiki groups with six participants in each subgroup, except for the No-Reiki relaxation subgroup which had five participants due to a drop out. Thus there were 18 Reiki and 17 No-Reiki participants.

The participants belonging to each group are shown in Table 1 as well as those that withdrew from the study. There was very little difference in the mean ages of the Reiki and No-Reiki groups (Reiki: 23.5 (SD = 3.1); No-Reiki: 22.5 (SD = 3.9)), nor in the sexes of the groups (Reiki: 15 female, 3 male; No-Reiki: 14 female, 3 male).

It was calculated using G-Power that that numbers of participants in the Reiki and No-Reiki groups were sufficient for a significant difference between two independent samples of equal size to be observed. The prediction was that there would be a very large effect size, since statistically significant effects have been observed in energy healing studies employing similar or smaller sample sizes [4,15,16]. Thus, with an effect size of 1, an error probability of 0.05, and an allocation ratio of 1, the necessary sample size is 17 in each group. Therefore, the study was correctly powered to detect an effect size of the predicted magnitude.

The randomisation procedure consisted of the experimenter throwing a six-sided die to assign the first six participants recruited to each of the six subgroups as indicated by the die throw, so that there was one in each group. This procedure was then repeated with the following six students who were to begin their sessions, and then the next set of six students until the study was completed. The experimenter who conducted the randomisation had not met the participants and was naive to the scores of their pre-assessment measures.

After a 60 min pre-assessment, the participants attended 10 half-hour treatment sessions, where the hypnotic/relaxation procedures were approximately 20 min in length. The aim had been for participants to complete the treatment sessions over a period of 4–6 weeks, with roughly two sessions a week, which is a typical session frequency for both Reiki [15] and training in self-hypnosis [8]. However, the differing availability of participants led to the participation period ranging from 2 to 12 and a half weeks. After completing the testing sessions participants attended a post-assessment similar to the pre-assessment. The pre- and post-assessment were conducted by a co-experimenter who was unaware of which participants were in the Reiki group.

In order to control for expectation regarding receiving Reiki, all participants were blinded as to whether or not they were in a Reiki group and were told prior to the start of the intervention that they may or may not receive non-contact Reiki. The experimenter, who was a Reiki Master and administered the Reiki in the study, was present throughout all sessions for all groups and sat several feet behind each student whilst they experienced self-hypnosis or relaxation control. During the sessions with the participants in the Reiki group the experimenter directed Reiki towards the student by holding her hands 3–30 in. above their head or towards their back, through their chair. During the sessions with the No-Reiki participants the experimenter did not send Reiki and sat impassively. The participants had little sensory input of the experimenter, as in addition to being absorbed in the self-hypnosis or guided relaxation, the participants wore headphones and those in the verbal imagery hypnosis and control groups were blindfolded, while those in the Animation group wore a headset which served the purpose of a blindfold due to its size.

Table 1
Numbers of female (F) and male (M) participants in each of the six subgroups.^a

	Animation group			Verbal group			Relaxation group			Total		
	F	M	Total	F	M	Total	F	M	Total	F	M	Total
Reiki	5 (0) ^a	1 (0)	6 (0)	6 (1)	0 (0)	6 (1)	4 (0)	2 (0)	6 (0)	15 (1)	3 (0)	18 (1)
No-Reiki	5 (0)	1 (0)	6 (0)	5 (2)	1 (0)	6 (2)	4 (2)	1 (1)	5 (3)	14 (4)	3 (1)	17 (5)
Total	10 (0)	2 (0)		10 (2)	1 (0)		4 (3)	3 (1)		30 (5)	6 (1)	

^a Numbers of participants in each of the subgroups who withdrew from the study are shown in parentheses.

The effectiveness of the blinding technique was monitored by a questionnaire completed mid-way through the intervention and again at post-assessment, designed to evaluate whether participants believed themselves to be in a Reiki group or not. The questionnaire also assessed belief regarding the impact of the intervention on well-being, in order to take account of expectation effects.

In order to promote relaxation, testing sessions were conducted in a quiet testing room with dimmed lights, and participants were seated in a comfortable chair with a foot rest. Conditions in the room such as lighting and temperature were kept as constant as possible, as was the interaction between the participants and experimenter.

2.3. Reiki method

The structure of Usui Reiki taught in the West today is practiced at the First degree, Second degree, and Master degree level. The Master level is often taught over two levels, 3a and 3b, where training in level 3b qualifies a Reiki Master to teach Reiki to others. Fundamental to training in both second and third degree Reiki is the learning of certain Reiki symbols, each of which is believed to facilitate particular healing effects when used during a healing session. The Reiki in the present study was administered by the experimenter who conducted the intervention sessions with participants. The Experimenter trained in Usui Reiki to Master-Teacher level, and had received attunements for Seichim, Violet Flame and Ascension Reiki, but had no training in any other biofield therapies. She employed a combination of Reiki techniques, in particular Ascension Reiki, which was developed by Grahame Wyllie in 1998 and involves using Ascension Reiki symbols [28]. The experimenter used the Reiki techniques and symbols which she intuitively felt to be the most appropriate for each participant. Since, the aim of the study was not to test the effectiveness of a particular healing technique, but rather its aim was to test whether an energy-healing effect can be observed in human participants once placebo and relaxation effects have been controlled for.

2.4. Psychological measures

Psychological measures were taken prior to the intervention, and again at a post-assessment session after the 10 intervention sessions had been completed.

2.4.1. Illness Symptoms Questionnaire

The ISQ is a simple 20-item questionnaire that was used in the study to assess the presence of illness symptoms (fever, chills, general malaise, loss of appetite, muscle ache, cough, headache, skin rash, dizziness, shortness in breath/difficulty in breathing, phlegm, night sweat, diarrhoea, runny nose, nausea, vomiting, abdominal pain, cold sores, painful lymph nodes). Participants stated how many days in the previous 2 weeks each symptom had been experienced. The absence of a symptom corresponded to a score of 0, a symptom present for 1–2 days corresponded to a score of 1, a symptom present for 3–4 days warranted a score of 2, a symptom experienced for 4–6 days received a score of 3, and a symptom present for 7–14 days corresponded to a score of 4. The severity score of each symptom was then summed to form a Total Illness score for each participant.

2.4.2. Depression, Anxiety And Stress Scale (DASS) [22]

The DASS21 Mood questionnaire is a 21-item questionnaire scale designed to measure negative emotional states of depression, anxiety and stress. Participants answer from 0 (not at all) to 3 (most of the time) on the series of 21 statements.

2.4.3. Activation-deactivation adjective check list [21]

In addition to the scales completed at the pre- and post-assessment sessions, participants completed the AD-ACL immediately before and after each of the 10 intervention sessions. The AD-ACL is a multidimensional self-rating test intended to measure four arousal states of General Activation, Deactivation-Sleep, High Activation and General Deactivation. Respondents rate how well a list of 26 adjectives (e.g. tense) describe how they currently feel on a scale of 1 (definitely do not feel) to 4 (definitely feel). The four sub-scale scores are computed by summing scores on each of the corresponding subscales.

2.4.4. Pittsburgh Sleep Quality Index [5]

The Pittsburgh Sleep Quality Index (PSQI) is a multi-item questionnaire which was used in the current study to measure several sleep components over the previous month including: sleep quality, sleep disturbances, medication use, tiredness

and apathy. The post-assessment version of the scale also assessed sleep over the previous week in order to detect any effects of the self-hypnosis.

2.4.5. Reiki-blinding and expectation questionnaire

Participants completed a short questionnaire, designed for the purposes of the study, before their sixth intervention session and again at post-assessment which asked whether they believed they were receiving Reiki and whether the intervention was positively affecting their well-being. An answer of “no” corresponded to a score of 0, the answer “don't know” corresponded to a score 1, and the answer “yes” received a score of 2.

2.5. Cortisol measure

Measures of salivary cortisol were taken at pre–post-assessment. Cortisol is understood to be a stress hormone and also to play a role in immunological defence [7], and salivary cortisol has been demonstrated to provide an accurate index of blood cortisol [6].

It was predicted that Reiki would affect cortisol levels, since Naito and co-workers found Johrei to buffer the decline of immune markers in students experiencing exam-time stress and benefit well-being [11]. However, there were no predictions regarding the direction of any effects that Reiki may have on cortisol levels, for Reiki may bring about a dissociation of the negative effects of cortisol on mood, as has been observed in hypnosis studies [8]. Studies have found that the raised cortisol levels of hypnosis participants did not correlate with raised tiredness and anxiety, which was the trend seen in controls, but instead correlated positively with increases in NKC and helper T-lymphocytes [9,10].

Cortisol levels (nmol/l) were assessed through saliva samples, where participants were required to chew Sarstedt salivettes containing a cotton wool swab for 1–2 min. All samples were stored in a 1 °C fridge until the end of the study, when cortisol was extracted and sent to The Freeman Hospital to be analysed using ELISA assay kits. Steps were taken to maximise the reliability of cortisol readings, incorporating the collection of two saliva samples at both pre- and post-assessment. The first sample was collected 10 min after the participant's arrival at the laboratory, then the second sample 40 min into a pre-assessment or 20 min into a post-assessment. Additionally, saliva was collected between 11 a.m. and 3 p.m., during which times cortisol levels are relatively stable, with pre-assessment collection times matched to post-assessment collection times. Finally, participants were requested to abstain from caffeine, alcohol, food and exercise 2 h prior to assessment to minimise the potential influence of these variables on cortisol readings [13]. Although not physiologically validated, all participants completed a short check-list reporting compliance with restrictions. Sleep time and level were also assessed by a check list.

2.6. Statistics

The primary method of data analysis used was mixed ANOVA, which was the intended method of analysis at the time of the planning of the experiment. Mixed ANOVAs were used to compare the differences between the scores of participants who received Reiki and those who did not for each of the measures completed at both pre (Pre) and post (Post) assessment (the DASS, the ISQ, the PSQI and also for the salivary cortisol). The between-subjects factor was Reiki-Group (Reiki or No-Reiki) and the within-subjects factor was Session^A (Pre and Post). In addition to mixed ANOVA, paired *t*-tests were carried out to compare the Pre and Post intervention scores of the Reiki and No-Reiki groups separately for each of the measures completed, as is standard procedure.

For the AD-ACL which was completed before and after each of the 10 sessions, mixed ANOVAs were performed as with the other scales, but with the within-subjects factor of Session^B (Total Pre-Session and Total Post-Session), where Total corresponds to the sum of the AD-ACL scores of all 10 sessions.

The main consideration here was the comparative effects of Reiki versus non-Reiki; the comparative effects of the visualisation imagery procedures were planned as the subject of a separate report.

3. Results

Roughly half of the participants had heard of Reiki before taking part in the study, and there were no statistical differences between the Reiki and No-Reiki groups in this respect as

Table 2

Means and standard deviations^a of the Pre and Post scores of the sum total of the ISQ items Total Illness.^b

	Pre	Post
Reiki	10 (5.5) ^a	7.353 (4.227)
No-Reiki	3.875 (3.981)	9.5 (7.941)
Total	7.03 (5.676)	8.394 (6.3)

^a Standard deviations are shown in parentheses.

^b Lower scores indicate lower symptom severity.

was disclosed by a Chi-Squared test (12/18 Reiki, 7/17 No-Reiki; $\chi^2 = 2.289, P = 0.13$). Very small percentages of participants in both groups had previously experienced Reiki (4/18 Reiki, 1/17 No-Reiki; $\chi^2 = 1.906, P = 0.167$) or hypnosis (2/18 Reiki, 2/17 No-Reiki; $\chi^2 = 0.004, P = 0.952$).

While not anticipated, the possibility of additive or synergistic effects of Reiki and hypnotic/relaxation were nevertheless examined. Specifically mixed ANOVAs were conducted for each of the pre-post-assessment measures, where the within-subjects factor was Session^A (Pre and Post) and the between-subjects factors were Reiki-Group (Reiki or No-Reiki) and Imagery-Group (Animation, Verbal and Relaxation). However, no significant Session \times Reiki-Group \times Imagery-Group interactions were found.

3.1. The Illness Symptoms Questionnaire

Table 2 displays the means and standard deviations of the Pre and Post intervention total and subscale scores of the ISQ for the total group, the Reiki group, and the No-Reiki group. The outlying data of two participants were excluded from the ISQ analysis: a No-Reiki participant whose Pre Total Illness score was 3.123 standard deviations above the sample mean and a Reiki participant whose Post Total Illness score was 2.727 standard deviations above the sample mean. These were mild levels of illness severity as students were fit enough to be attending university.

A mixed ANOVA found there to be no main effect of Session for the mean Total Illness score ($F(1,31) = 0.817, ns$). However, there was a significant interaction between Session^A and Reiki-Group ($F(1,31) = 12.439, P = 0.001$). As can be seen in Fig. 1, and corroborated by paired *t*-tests, while the mean Total Illness score of Reiki participants had somewhat improved ($t = -3.051; P = 0.091$), the mean No-Reiki score was substantively worse following the intervention ($t = 1.797; P = 0.008$), leading to the highly significant advantage to the Reiki group ($P = 0.001$).

At baseline, however, an independent samples *t*-test found the Reiki group's mean score was significantly higher than the No-Reiki group's ($t(31) = -3.644, P = 0.001$). This allowed them a greater degree of improvement, and while this may have accounted for the marginal improvement of the Reiki participants, it cannot explain the highly significant increase in the Total Illness score of the No-Reiki group. A significant Pearson's correlation was found between the Reiki group's baseline Total Illness scores and the degree of change that occurred, where the higher the score at baseline the greater was the improvement ($r = -0.737, P = 0.001$). However, there was no correlation between the baseline Total

Table 3

Means and standard deviations^a of the Pre and Post DASS scores.^b

	Stress		Depression		Anxiety		Total DASS	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Reiki	9.06 (3.56) ^a	5.65 (2.98)	6.06 (3.82)	4.35 (3.59)	3.59 (2.74)	2.41 (2.21)	18.71 (8.46)	12.41 (6.51)
No-Reiki	4.82 (3.21)	3.88 (2.89)	3.06 (2.84)	2.94 (2.77)	2.53 (3.78)	1.82 (2.53)	10.41 (7.81)	8.65 (6.74)
Total	6.94 (3.97)	4.76 (3.03)	4.56 (3.64)	3.65 (3.24)	3.06 (3.29)	2.12 (2.36)	14.56 (9.06)	10.53 (6.8)

^a Standard deviations are shown below means in parentheses.

^b Lower scores indicate better mood.

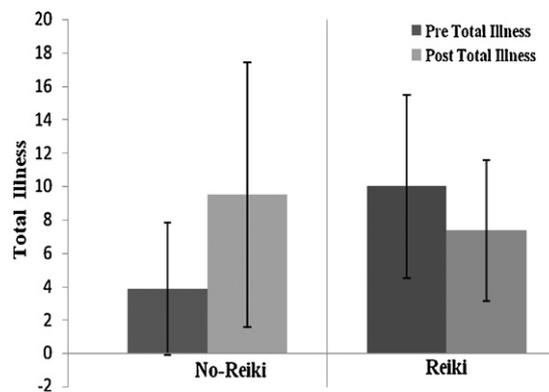


Fig. 1. Means (SD) Pre and Post scores for the sum total of ISQ items, Total Illness, of the Reiki and No-Reiki participants.

Illness scores of the No-Reiki group and the subsequent change ($r = -0.122, P = 0.653$), with participants with both high and low baseline scores tending to have an increase in illness symptoms.

Additionally, an analysis of covariance was conducted where the dependant variable was Post Total Illness, the fixed factor was Reiki-Group (Reiki or No-Reiki) and the covariate was Pre-Total Illness, in order to take the differing baseline scores of the Reiki and No-Reiki groups into account. In line with hypotheses a comparatively greater improvement in the Reiki Group was found ($F(1, 31) = 2.97, P < 0.05$, one-tailed).

3.2. The depression, anxiety and stress scale

Table 3 displays the means and standard deviations of the Pre and Post intervention total and subscale scores of the DASS for the total group, the Reiki group, and the No-Reiki group.

In a mixed ANOVA there was a significant main effect of Session ($F(1, 32) = 10.079, P = 0.003$); the mean Total DASS score (the sum total of DASS items) was substantively lower after the intervention. Separate ANOVAs on the DASS subscales found statistically significant within-subject decreases in the mean scores for both Stress ($F(1,32) = 12.068, P = 0.001$) and Anxiety ($F(1,32) = 4.724, P = 0.037$), while Depression scores were in the same direction but the difference fell short of significance ($F(1,32) = 2.833, P = 0.102$).

Regarding differential effects of training group shown by Reiki-Group \times Session^A effects, there was a slight trend for there to be a greater comparative improvement in the mean Total DASS score of the Reiki participants ($F(1,32) = 3.184, P = 0.084$), as is shown in Fig. 2. Consideration of the three DASS subscales separately also indicated a near-significant interaction with Stress ($F(1,32) = 3.88, P = 0.057$). The differential patterns of change for the Stress subscale between the Reiki and No-Reiki groups are shown in Fig. 3. While only one Reiki participant had an increase in Stress over the course of the intervention, the Stress scores of seven No-Reiki participants increased ($\chi^2(1,33) = 5.885, P = 0.015$). Although the Reiki Group also showed comparatively greater mean improvement in the other two subscales, these effects did not reach significance – (Depression: $F(1,32) = 2.149, P = 0.152$; Anxiety: $F(1,32) = 0.295, ns$).

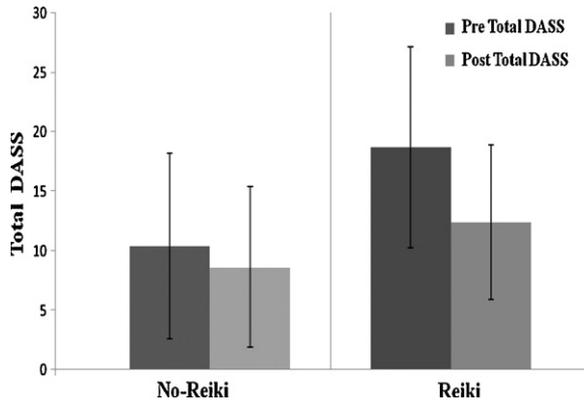


Fig. 2. Mean (SD) Pre and Post scores for the sum total of DASS items Total DASS for the Reiki and No-Reiki Groups.

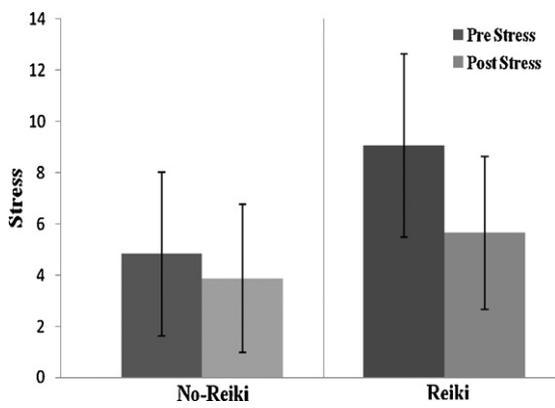


Fig. 3. Mean (SD) Pre and Post scores for the DASS subscale Stress for the Reiki and No-Reiki Groups.

However, as was found to be the case with the Illness Symptoms Questionnaire, independent samples *t*-tests found the mean Stress score of the Reiki participants at baseline (Pre-Stress) to be significantly greater than that of the No-Reiki participants ($t(1,32) = -3.644, P = 0.001$), as was their mean Total DASS score ($t(1,32) = -2.970, P = 0.006$). In order to ascertain whether there was a correlation between participant's Pre-Stress scores and the level of improvement that occurred, a Pearson's correlation was obtained between the two variables Pre-Stress and Stress-Change (the mean Post-Stress–Pre-Stress score). A highly significant correlation was found ($r = -0.698, P < 0.001$), so that on average the higher the Stress score at baseline, the greater the reduction over the course of the intervention. This correlation is shown in Fig. 4 and can be seen to be consistent for Reiki and No-Reiki participants, suggesting that a higher mean Pre-Stress score likely contributed to the greater comparative improvement of the Reiki Group. Unlike the Illness Symptom scale there was no worsening of mood in the No-Reiki group.

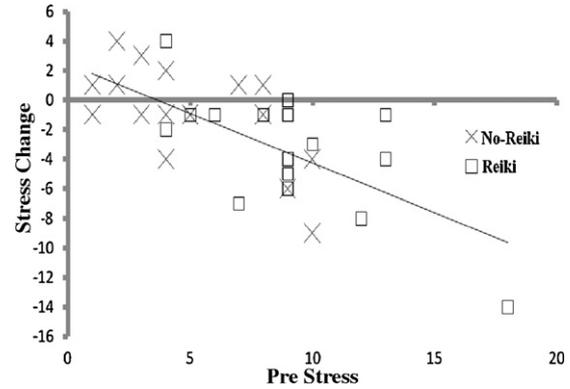


Fig. 4. Scatter plot showing the correlation between the mean Pre-Stress score (x-axis) and mean Stress-Change score (y-axis) of the Reiki and No-Reiki participants, where a negative change in Stress corresponds to a Stress reduction.

Table 5

Mean Pre and Post scores and standard deviations^a of the PSQI item Tiredness.^b

	Pre	Post
Reiki	0.524 (0.992) ^a	0.944 (1.662)
No-Reiki	0.514 (0.992)	1.118 (1.409)
Total	0.52 (0.977)	1.029 (1.524)

^a Standard deviations are shown in parentheses.

^b Higher scores indicate greater tiredness.

3.3. The activation-deactivation adjective check list (AD-ACL)

Table 4 displays the means and standard deviations of the Pre and Post intervention total and subscale scores of the AD-ACL for the total group and the Reiki and No-Reiki groups.

Separate mixed ANOVAs for the AD-ACL subscales disclosed highly significant effects of Session^B (Total Pre-Intervention-Session and Total Post-Intervention-Session) for all four subscales, with reductions in Tension ($F(2,33) = 27.024, P < 0.001$) and Energy ($F(2,33) = 19.027, P < 0.001$), increases in Calmness ($F(2,33) = 74.492, P < 0.001$), but also increases in Tiredness ($F(2,33) = 8.464, P = 0.006$). The subscales yielded no significant interactions between Reiki-Group and Session^B.

3.4. The Pittsburgh Sleep Quality Index

Comparisons of the Reiki and No-Reiki groups disclosed no significant effects, and in terms of the participants as a whole there was a tendency to more tiredness after the intervention than at its start (Tiredness: $F(1,32) = 3.892, P = 0.057$). The pre- and post-mean Tiredness scores of the participants are shown in Table 5.

3.5. Salivary cortisol

A mixed ANOVA found no main effect of Session for salivary cortisol ($F(1,32) = 0.842, P = 0.367$), and the Reiki-Group \times Session

Table 4

Means and standard deviations^a of the Pre and Post subscale scores of the AD-ACL.^b

	Tension		Calmness		Energy		Tiredness	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Reiki	85.78 (24.73) ^a	71.06 (16.57)	110.72 (22.29)	149.39 (26.81)	123.06 (28.89)	100.39 (27.23)	97.17 (20.25)	117.22 (30.34)
No-Reiki	74.35 (17.67)	63.35 (11.55)	102.18 (21.56)	137.12 (20.53)	109.18 (18.78)	94.59 (25.84)	106.76 (16.81)	118.29 (33.33)
Total	80.23 (22.05)	67.31 (14.67)	106.57 (22.05)	143.43 (24.42)	116.31 (25.16)	97.57 (26.34)	101.83 (19.02)	117.74 (31.36)

^a Standard deviations are shown below means in parentheses.

^b Higher scores indicate the increased presence of a symptom.

Table 6
Numbers of participants in each intersession interval range in days.

Group	Low-intersession interval			High-intersession interval					Total
	1–2	2–3	3–4	5–6	6–7	7–8	8–9	9–10	
Reiki	0	7	3	1	2	2	3	1	18
No-Reiki	1	4	3	0	2	3	3	0	17
Total	1	11	6	1	4	5	6	1	35

interaction was non-significant ($F(1,32)=0.123$, $P=0.728$). There were no correlations between cortisol change and mood and illness scores.

3.6. The Reiki-blinding and expectation questionnaire

Reiki and No-Reiki participants on average, both mid-way through the intervention and at post-assessment, tended towards the belief that they were not in a Reiki group, mostly stating either that they did not think that they were receiving Reiki (10/18 Reiki; 11/17 No-Reiki participants asserted this) or that they did not know (6/18 Reiki; 5/17 No-Reiki participants). Using a Chi-Square test to assess whether the groups differed in their beliefs regarding this, after five intervention sessions very little difference was found between the two groups ($\chi^2(2,31)=0.444$, $P=0.801$). When the questionnaire was administered again at post-assessment, while more Reiki participants tended more towards the belief that they were in a Reiki group (8/17 Reiki; 3/16 No-Reiki participants believed this to be the case), the groups did not differ statistically ($\chi^2(2,31)=4.285$, $P=0.117$).

There was also no significant difference mid-intervention in the Reiki and No-Reiki Groups' Expectations Questionnaire administered to participants regarding whether they believed the intervention was having a positive effect on their well-being ($F(2,33)=1.973$, $P=0.373$). At post-assessment, while the groups did not differ statistically ($F(2,31)=3.162$, $P=0.206$), the Reiki Group on average believed more than the No-Reiki Group that the intervention had been more beneficial (8/17 Reiki; 3/16 No-Reiki felt the intervention had benefitted their well-being), in line with the outcomes of the DASS and the ISQ.

3.7. The effect of intersession interval

Due to the variation in the period over which participants completed the intervention, mixed ANOVAs were conducted to ascertain whether the effects of the intervention varied with average intersession interval. The mean intersession interval of each participant was calculated, then participants were divided at the median (3.4 days) into those with mean intersession intervals that were high (High-Interval – 8 Reiki; 9 No-Reiki) and low (Low-Interval – 10 Reiki; 8 No-Reiki). The time over which the Low-Interval participants completed the intervention ranged from 2.4 to 4.4 weeks, while that of the High-Interval group ranged from 7.3 to 12.1 weeks. The intersession intervals of participants are detailed in Table 6, showing the numbers of participants in each intersession interval range in days for the Reiki and No-Reiki groups.

Mixed ANOVAs with a between-subjects factor of Interval (High and Low) were conducted for each of the scales completed, finding there to be no significant Interval \times Session interactions for any of the scales completed at pre-post-assessment ($F < 1.5$; $P > 0.24$). Furthermore, an independent samples t -test found that mean intersession interval did not differ between the Reiki and No-Reiki groups ($t = 0.72$, ns).

4. Discussion

Participants as a whole benefited by improvements in mood over the course of the study. These benefits took the form of improvements on self-report scales of stress, anxiety, tension, energy and calmness, and with a tendency towards reduced depression. At the same time there was an increase in tiredness as indexed by both the Thayer [21] and Pittsburg [5] scales, perhaps attributable to the rigors of the academic year [25]. Indeed for some the trial lasted several months due to recruitment and varying availability of participants, but the range in participation from two and a half to 12 weeks did not influence the results. There were no changes in salivary cortisol nor correlations between cortisol and mood and health changes. This may be due to possible bidirectional changes in cortisol, as was shown in a comparison of self-hypnosis and relaxation training [9,10]. For while cortisol is commonly regarded as a stress hormone, an optimal level is necessary for everyday function, as evinced by its surge on waking [18].

Reiki's main advantage was found in a tendency towards an improvement in health as shown by the reduction in symptoms of illness, albeit symptoms being at mild levels in students attending university. This contrasted with the symptoms of the No-Reiki group whose total Illness Symptoms Questionnaire scores disclosed a substantive and reliable increase in symptoms ($P=0.008$). These differential effects led to a highly significant distinction between the training groups ($P=0.001$). In addition, following Reiki there were persuasive reductions in the total Depression, Anxiety and Stress Scale, especially the Stress subscale, which were greater than in the No-Reiki group.

Despite random allocation, baseline differences between the groups showed higher Illness Symptom scores in the Reiki participants, and accordingly this left more room for potential improvement in the Reiki group. This baseline disadvantage was also seen in the Total DASS and Stress Scale scores, where for the sample as a whole there was a correlation between degree of stress reduction and baseline stress level ($r=0.487$, $P < 0.001$). While the matching of groups at baseline would be essential in a constructive replication study, suffice it to say that baseline disadvantage for the Reiki group cannot by itself explain why there was such a pervasive increase in symptoms in the No-Reiki group. Further, while there was a correlation between the Reiki groups' baseline illness symptom scores and the degree of change, no such correlation was found for the No-Reiki group, with the health of all participants in the No-Reiki group tending to decline irrespective of their baseline scores.

Another goal of the study was to access the efficacy of the untested method of blinding participants to Reiki, whereby non-contact Reiki was given to students whose attention was occupied by undergoing self-hypnosis or guided relaxation. Upon analysis of the Expectation questionnaire completed by students mid-way through the intervention, very little difference was found between the Reiki and No-Reiki groups in their beliefs as to whether or not they were in a Reiki group. At post-assessment the groups also did not differ statistically, although the Reiki participants were on average less sure than the No-Reiki participants that they were not in a Reiki group, but these numbers were small (4/17 Reiki versus 0/16 No-Reiki participants believed that they had received Reiki). While the Reiki-blinding method employed did not permit the physical contact that is often used in Reiki therapy, it has advantages over the "sham" Reiki method. Since, the effectiveness of the sham Reiki method relies on the assumption that any therapeutic effects of Reiki that are not due to expectation and relaxation must arise due to purported healing abilities bestowed on a training practitioner when they receive an attunement. If indeed the observed effectiveness of Reiki is not solely attributable to placebo

and relaxation effects, it is possible that other aspects of a Reiki practitioner's training which may be shared by a sham practitioner – such as meditation and visualisation exercises or natural healing abilities possessed prior to training in Reiki – may be factors in its efficacy. Thus considering the previously mentioned comparative advantages of the applied method to the sham Reiki method, and also the fact that participants in double-blind drug trials have been found to often correctly guess which condition they are in [19], replication of the presented blinding technique seems justified.

A shortcoming of the trial was that the investigator who was present throughout all intervention sessions also administered the Reiki, and so knew the groups of participants. Thus, the study was not double-blind. While the investigator endeavoured to interact in an identical manner with the Reiki and No-Reiki participants, it is possible that there may have been unintentional verbal or physical clues. Importantly this was not the case for the co-experimenter whose role was to conduct the majority of the pre- and post-assessments, as he was blind to group allocation. A possible way to reduce the chances of experimenter bias would be for the experimenter to quietly leave the room after seating and blindfolding the participants and starting the audio file, whereupon a separate Reiki practitioner would enter the room to administer the Reiki or just be present in the case of the No-Reiki participants. The experimenter would then return at the end of the session once the Reiki Master had left. If the Reiki practitioner had no contact with the participants or experimenter – to avoid unintentional clues – then the experimenter would be blind to the groups of the participants and thus not behave differently towards them.

Notwithstanding, the 350 treatment sessions, the comprehensive pre- and post-assessments and the relatively large sample size for this research field constitute a substantive study. While no effects could be demonstrated on salivary cortisol, there were differential effects on health in the form of mild everyday illnesses. These advantages took the form of a tendency for the Reiki group to improve whereas the health of the No-Reiki group declined. Furthermore this advantage was accompanied by comparatively greater mood benefits for the Reiki group. In the light of the highly significant results and the wider context, further controlled studies on the efficacy of biofield therapies are clearly warranted. This is especially so when seen in the context of the unambiguous immunological upregulation and improvement in well-being demonstrated in a controlled study of Johrei, a Reiki-like practice [11,16]. Thus our controlled study of Reiki contributes to the small, but growing literature on beneficial influences of biofield interventions on health and well-being.

Potential conflict of interest

Regarding potential conflict of interest, the first author is a Reiki Master as well as a scholar of physics, philosophy and psychology, the second author is a psychologist and psychotherapist, and the third author is a cognitive neuroscientist and among other things a specialist in hypnosis. Potential confounding issues are fully considered in Section 4.

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