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A Randomized, Controlled, Preliminary Study to Assess the Efficacy of Logic-Based Therapy in Reducing Anxiety and/or Depression in Family Caregivers

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Abstract

This paper analyzes the findings of a preliminary, controlled efficacy study conducted by the National Philosophical Counseling Association of a prominent modality of philosophical counseling, Logic-Based Therapy (LBT). In this study, the latter modality was compared to a mindfulness activity. The study included 20 caretakers randomly divided into experimental and control groups. The hypothesis investigated was that a one-hour LBT session is more effective in reducing the level of (state or trait) anxiety and/or depression in family caregivers than a one-hour mindfulness session. Utilizing data compiled from study participants' responses to the State Trait Anxiety Inventory and Beck Depression Inventory-II (BDI-2), two-way mixed ANOVA tests on three variables (state anxiety, trait anxiety, and depression (BDI-2) scores) were performed as well as paired analyses yielding the preliminary conclusion (pending a more extensive study) that LBT shows promise as an effective intervention for reducing state anxiety as compared to the control condition, the mindfulness activity.

Keywords Logic-based therapy · State anxiety · Trait anxiety · Depression · Philosophical counseling · Mindfulness · Caretaker

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Introduction

Controlled efficacy studies of philosophical counseling modalities have rarely, if ever, been conducted, yet there is currently an increasing number of counselors who are practicing philosophical counseling and attracting clients. In fact, philosophical counseling has recently been recognized as a new profession in Romania, including development of a master's degree program (conducted in English) at West University of Timisoara, as a qualification to practice (Hategan, 2022). The rise of philosophical counseling's popularity suggests an ethical need for counselors and their associations to provide evidence for their practices. To address this gap, the present study investigates whether a one-hour session of a prominent philosophical counseling approach known as Logic-Based Therapy (LBT) is more effective than a one-hour mindfulness session to reduce the level of state anxiety, trait anxiety, and/or depression, in family caregivers.

Key Distinctions Between LBT and REBT

LBT is a dynamic philosophical counseling modality developed by American philosopher Elliot D. Cohen derived from Rational-Emotive Behavior Therapy (REBT), the first form of cognitive-behavior therapy (CBT) created by psychologist Albert Ellis (Cohen, 1987, 1992, 2021; 2017; Ellis, 2001; DiGiuseppe et al., 2013; Carlson & Knaus, 2014; Knaus, 2014). Consisting of six systematic steps, its keynote is that people create their own behavioral and emotional problems by deducing self-defeating conclusions from irrational premises. It is such self-defeating practical inferences that drive self-defeating emotions such as intense anxiety, guilt, anger, and depression.

LBT syllogizes the ABC model of REBT (Cohen, 1987, 1992). While REBT's ABC model asserts a *causal* relationship between activating events (A), beliefs (B), and behavioral and emotional consequences (C) wherein A & B jointly cause C, LBT utilizes a model according to which a conclusion is *deduced* from a set of premises consisting of a rule and an empirical report (Cohen, 2006, 2021).

Accordingly, the model didactically teaches clients to use critical thinking in addressing a list of faulty thinking errors it calls "Cardinal Fallacies," which may occur in either the report or the rule premise. This list of fallacies includes irrational thinking identified by REBT; however, it also includes other fallacies typically included in treatments of critical thinking such as jumping on the bandwagon, manipulation (well poisoning, appeal to misery, argument of the club, etc.), personal attacks, and stereotyping, among others (Cohen, 2009a; Newhart, 2018).

LBT also introduces a set of guiding virtues based on an Aristotelian analysis, which it systematically pairs to respective Cardinal Fallacies. These virtues include courage, temperance, tolerance, decisiveness, metaphysical security (security about reality), respect for self, others, world, and life; objectivity, empathy, prudence, authenticity, and empowerment, among others (2009b; Cohen, 2021; Guajardo, 2021; Zinaich, 2019).

LBT further distinguishes itself from REBT by introducing a vast number of "uplifting philosophies" from the various philosophic traditions (East and West), which clients can use to interpret their guiding virtues (Chaukar, 2021; Drake, 2017; Du Plessis, 2019; Newhart, 2020; Patteson, 2015).

Six Steps of LBT

According to LBT, all emotions have intentional objects (O) and ratings (R) (Cohen, 2017; Husserl, 2001; Solomon, 1993). For example, in the present study, some caretakers experienced anxiety *about* not being able to help relieve their patients' distress (O) because they believed they would be "unworthy" if this were to happen (R). The six-step approach proceeded as follows:

The LBT facilitator helped participants to:

Step 1: Identify O+R through active listening and reflection, using the latter, in turn, to construct the premises of participants' valid (modus ponens) inferences ("emotional reasoning") consisting of an evaluative rule and an empirical report:

Rule	If I don't manage to improve my patient's situation if she's in distress, then I won't be worthy.
Report	If my patient is in distress, I won't manage to improve her situation.
Conclusion	I won't be worthy

Step 2: Identify (the fallacy of) *self-damnation* in the Rule ("I won't be worthy") (Ellis, 1975).

Step 3: *Refute* this fallacy by demonstrating its absurdity. "If not relieving the distress of your patient makes you unworthy, then what about every other caretaker who is not able to relieve the distress of some of their patients? Wouldn't that make *all* caretakers unworthy?".

Step 4: Match an appropriate "guiding virtue" to self-damnation, in this case *self-respect* (Cohen, 2017; Ellis, 2005).

Step 5: Find a philosophy that frames self-respect in a manner that resonates with participants' own world views (Cohen, 2007; 2021). For example, religious participants were free to frame self-respect in terms of being a child of God whose unconditional worth emanates from God's grace. On the other hand, secular participants were free to take non-religious perspectives such as an existential perspective stressing human subjectivity (the conscious capacity to freely choose) as the seat of self-respect. As such, the LBT facilitator did not impose philosophical perspectives on the participants but instead empowered them to pursue their own philosophical lights in aspiring to virtue.

Step 6: Apply participants' philosophies by developing and acting on a cognitive-behavioral plan. This plan could include such activities as refuting irrational premises, imagery exercises involving contemplating empowering philosophies instead

of self-deprecating premises; shame-attacking exercises; risk-taking exercises; linguistic changes ("I am a child of God" instead of "I am unworthy"), among other cognitive-behavioral assignments (Cohen, 2021; DiGuiseppi, 2013). Participants were, accordingly, asked to practice a set of such activities over the course of the next week.

In contrast to REBT, Step 1 of the above process uses the elements of O+R to construct a practical syllogism, which is a deductive argument with two premises, one being empirical, and the other, an evaluative rule (Hardie, 2011). Steps two through four, and Step 6, proceed like REBT. Unique to LBT are Steps 4 and 5, which, respectively, match an appropriate guiding virtue to the fallacy identified, and frame this virtue in terms of a philosophy that resonates with the client's worldview (Cohen, 2017, 2021).

Method

In the present study a randomized, controlled trial was conducted to study the efficacy of Logic Based Therapy in reducing anxiety and/or depression among caregivers who cared for others who were ill, disabled, frail, or otherwise incapable of caring for themselves. The primary selection criterion was that of being a caregiver, without regard to whether caregivers cared for patients in their homes, in hospital settings, or cared for their own family members. All methods and materials used in the study, including the protocol, the informed consent form signed by each participant, and assessment inventories, were approved by Advarra (n.d.), an independent institutional review board.

The study included 20 caregivers randomly divided (by flip of a coin) into experimental and control groups. Sample size was limited due to inability to recruit more participants for the study (see section on "Challenges to the Present Study"). Participants in the experimental group received a one-hour LBT session while participants in the control group received a one-hour mindfulness session. Pre-test, post-test, and one-week follow-up tests were given to participants in each group. All LBT sessions and mindfulness sessions were conducted by the same facilitator in Italy. This individual was certified in LBT by the National Philosophical Counseling Association (NPCA), having successfully completed a six-week training course, including a practicum, and a Ph.D. in philosophy (NPCA, n.d.).

The hypothesis investigated was that a one-hour LBT session is more effective in reducing the level of state-trait anxiety and/or depression in family caregivers than a one-hour mindfulness session. More specifically, the hypotheses investigated were:

H_1 A one-hour LBT session is more effective than a one-hour mindfulness session in reducing the mean state-anxiety score over time in family caregivers.

H_2 A one-hour LBT session is more effective than a one-hour mindfulness session in reducing the mean trait-anxiety score over time in family caregivers.

H_3 A one-hour LBT session is more effective than a one-hour mindfulness session in reducing the mean depression score over time in family caregivers.

Experimental Group

Participants in this group were informed that LBT is an approach to negative emotions according to which people often upset themselves by deducing self-defeating conclusions from irrational premises; and that the purpose of LBT is to help them (1) identify and overcome these irrational premises; (2) set new positive goals instead; and (3) make constructive life changes in line with these new goals.

Experimental group participants were informed that LBT can be used to try to help people reduce negative emotions arising in contexts of everyday life, such as anxiety, and that it is *not* the purpose of this study to use it to diagnose or treat mental illness. Following are the (verbatim) instructions the facilitator was given for conducting sessions with experimental group participants:

- Begin session
  Invite caretaker to discuss a problem related to his or her caretaking responsibilities that is creating significant stress.
- Take caretaker through the six (6) LBT steps
  Consultant facilitates:

1. Identification of caretaker's intentional object, rating of object, and emotional reasoning
2. Identification of irrational [fallacious] premise/s
3. Refutation of the irrational premise/s
4. Identification of guiding virtue/s
5. Caretaker adoption of an uplifting philosophy/ies
6. Caretaker application of philosophy

- Give caretaker daily homework assignment/s that aligns with step 6
  Give caretaker a daily assignment/s to practice applying his or her new philosophy/ies and guiding virtues to his or her life in seeking to overcome caretaking stresses.

Control Group

Control group participants were given a mindfulness exercise consisting of watching a YouTube nature video of nature scenes accompanied by sounds naturally associated with them. Aside from the abundant evidence demonstrating efficacy of mindfulness activities in relieving state anxiety and depression, there is also considerable

evidence that stimulation using nature scenes and/or sounds is conducive to relaxation and relief of stress (Hartwell, 2017; Jo et al., 2019a, 2019b; Song, et al., 2021). Accordingly, use of a nature video, as a control in the context of mindfulness practice, appears to provide a meaningful, comparative basis against which to measure the efficacy, or lack thereof, of LBT in reducing stress.

It was explained to the participants that mindfulness is an approach to reducing negative emotions such as anxiety that involves focusing attention on what is happening in the here-and-now, without judging it as good or bad; and that this would allow them to let go of the problems they may be experiencing by keeping their minds focused on the moment. Accordingly, the participants were instructed to calm their minds by focusing their attention on an object in the nature video. Following are the (verbatim) instructions the facilitator was given for conducting the mindfulness session with control group participants:

- Begin the session
  Ask the caretaker to seat himself/herself comfortably in front of a monitor screen that will display the You Tube nature video. Please preload and test the link in advance and before the caretaker arrives to avoid any technical problems.
- Give the caretaker the following instructions (5 min):

1. Seat yourself comfortably in front of the monitor screen that will display the nature video.
2. As soon as the nature video starts, focus your attention on just "seeing" each natural object or collection of natural objects (birds, flowers, turtles, insects, plants, etc.) as it is displayed. Focus your attention on and explore any aspect or aspects of the natural object you want such as the color, shape, size, motion, surrounding environment, relationships to other things in its environment, sounds emitted, music, or any other aspect of the object of experience. It is important that you immerse yourself in the here-and-now experience of the object so that it fills your awareness and there is nothing else but that object occupying your mind.
3. Just observe the objects; do not *judge* them as good or bad, beautiful or ugly, because this will only distract you from experiencing them *as they are*, not as you *want* them to be.
4. While you are focusing on the objects, your mind might start to wander. Thoughts might come into your mind such as problems you are having in your life, past events, or other things that can distract you from focusing on the natural objects. This is not a problem. Simply observe that this is happening and focus your attention back on the objects that are present in the here-and-now.
5. If you become distracted and find yourself unable to focus your attention back on the objects, take a mental break by sitting quietly for a few minutes until you are ready to resume.
6. You will be told when it is time to stop your mindfulness exercise.

- Start the video
- Stop video in 49 min from start
- Give caretaker daily homework assignment (1 min)
  Ask the caretaker to continue to practice his or her new mindfulness skill by taking at least a few minutes each day to focus his/her attention on a natural object of his/her choice.

Assessment Measures

All participants were assessed using three inventories:

1. Beck Depression Inventory -2 (BDI-2)
2. State Trait Anxiety Inventory (STAI)
3. Logic Based Therapy Assessment (LBTA)

The LBTA was created specifically to track skills LBT seeks to build. It is not currently a valid instrument, having not before been used. It is therefore not used in assessing the results of the present study.

Both the BDI-2 and STAI were administered to all participants just prior to their sessions (pre-test) and immediately after them (post-test). One week later, follow-up sessions were scheduled in which participants took these two inventories once again to track progress during the week.

Results

The study was conducted with a 2×3 mixed factorial design having a between subjects factor of "group" (experimental vs control, i.e. LBT intervention vs. mindfulness exercise) and a repeated measures factor of "time of measurement" (pre-test vs. post-test vs. follow-up). Thus, mixed model two-way ANOVAs were conducted (with type III sum of squares) for all three outcome variables – state anxiety (STAI), trait anxiety (STAI), and depression levels (BDI-2). For each ANOVA analysis, generalized eta-squared (η_G^2) effect size was computed (as recommended by Bakeman, 2005; Kline, 2015; Olejnik & Algina, 2003) with 90% confidence intervals. Since effect size estimates, such as generalized eta-squared (η_G^2), follow a one-tailed hypothesis test, which means that their obtained value cannot be negative (as compared to other effect size estimates such as Cohen's *d* which can be both positive as well as negative), reporting 90% confidence intervals maintains the Type I error rate with the same alpha level $\alpha = 0.05$ (see Steiger, 2004; Wuensch, 2009, for more detailed discussion).

There were 10 participants in the experimental group and 10 participants in the control group. One participant from the experimental group and two participants from the control group had missing data for the STAI scores (measure for state anxiety & trait anxiety). For BDI-2 scores, two control group participants had missing data, whereas the data from all 10 participants in the experimental group were

complete. Since participants with missing data had all observations missing, that is, for all the three time points of measurement, they could not be included in any analyses.

Outlier Detection and Treatment and/or Winsorization

Before the analyses, the variable scores, at different measurement points (pre-test, post-test, and follow-up), were screened for univariate outliers with box & whisker plots. Further, whether these outliers were extreme was identified using the MAD (Median Absolute Deviation) method in '*Routliers*' package (Delacre & Klein, 2019) as well as Rosner's Generalized Extreme Studentized Deviate (ESD) test in the '*EnvStats*' package (Millard, 2013) in R.

The outliers screened & detected through the above methods have been reported in Appendix 1 for state anxiety, trait anxiety, and BDI-2 scores in Tables 11, 12, and 13, respectively.

Winsorization is a robustification procedure used for symmetric modification of extreme values in order to reduce sensitivity of mean and variance to the presence of outliers and to increase statistical efficiency (Ruppert et al., 2006, pp. 8765–8766; Howell, 2009, p. 341). With a small sample size in the current study, in order to retain the power as well as to improve statistical efficiency, Winsorization was favored over removing the extreme scores. Only with respect to BDI-2 scores, however, Winsorizing the data still yielded potential outliers. Hence the analyses on Winsorized data were conducted only for state and trait anxiety scores, respectively, and not for BDI-2 scores.

Since the outlier management strategy was not pre-registered, as per the recommendations of Leys et al., (2019, pp. 7–8), results were also analyzed both with and without including the outliers and have been reported for comparison. Hence, although the subsequent discussions mainly focus on analysis on Winsorized data for state and trait anxiety and with data including the outliers for BDI-2 scores, alternative analysis results obtained by removing or keeping the outliers, respectively (see Appendix 4-6), have also been discussed briefly for the three variables.

Assumptions of Mixed Model ANOVA

Following tests were conducted to confirm the assumptions of mixed model ANOVA: QQ-plots were screened and Shapiro–Wilk normality tests were conducted in order to check the normality of scores as well as normality of residuals. Homoscedasticity was checked using Levene's test of equality of variances. Homogeneity of covariance matrices was tested using Box's *M*–test (Murrar & Brauer, 2018). The assumption of sphericity in repeated measures analyses was satisfied in most cases. When it was violated, Greenhouse–Geisser correction was used to report adjusted degrees of freedom. The results from the above tests of assumptions are presented in Appendix 2 (with Winsorized data for state anxiety and trait anxiety scores, and the original data of BDI-2 scores including the outliers).

Table 1 Descriptive statistics (state anxiety)

Measurement	*n*	*M*	*SD*
Experimental group	9		
Pre-test		37.22	6.72
Post-test		30.00	4.24
Follow-up		29.00	4.18
Control group	8		
Pre-test		41.75	6.09
Post-test		38.50	8.18
Follow-up		38.13	6.03

Table 2 Two-way mixed ANOVA results for state anxiety

Effect	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Group	9.81	1, 15	**0.007**	**0.30**	**[0.03, 0.55]**
Time	9.39	2, 30	**0.001**	**0.18**	[0.00, 0.36]
Group x time	1.39	2, 30	0.265	0.03	[0.00, 0.07]

Bolding used to highlight significant data

Although there were minor violations of the normality assumption ($p < 0.05$) in state anxiety scores (Winsorized data) of the experimental group at pre-test and follow-up measurements (see Table 14), the QQ-plots and density plots indicated that both the sets of scores were approximately normal. Furthermore, it has been reported that analysis of variance is a robust statistical procedure even with such violations of normality (Howell, 2009, p. 334; Box, 1953; Boneau, 1960). The sphericity assumption was violated in the follow-up one-way ANOVA to test the simple effect of time, where the adjusted degrees of freedom have been reported. All other assumptions were satisfied, indicating the reliability of the model. Similarly, in the analysis of trait anxiety scores (Winsorized data), all the assumptions were satisfied. For BDI-2 scores, however, there were violations of various assumptions (even when outliers were removed). Hence the results from this specific analysis should be interpreted with caution.

Mixed Model ANOVA

STAI (State Anxiety)

The descriptive statistics for the state anxiety scores on the STAI for both groups at different measurements are shown in Table 1.

The results from the two-way mixed ANOVA conducted on state anxiety scores from the STAI are shown in Table 2.

As shown in Table 2, the main effects of both group and time factors were found to be significant. A large effect size was observed for both these effects (Cohen,

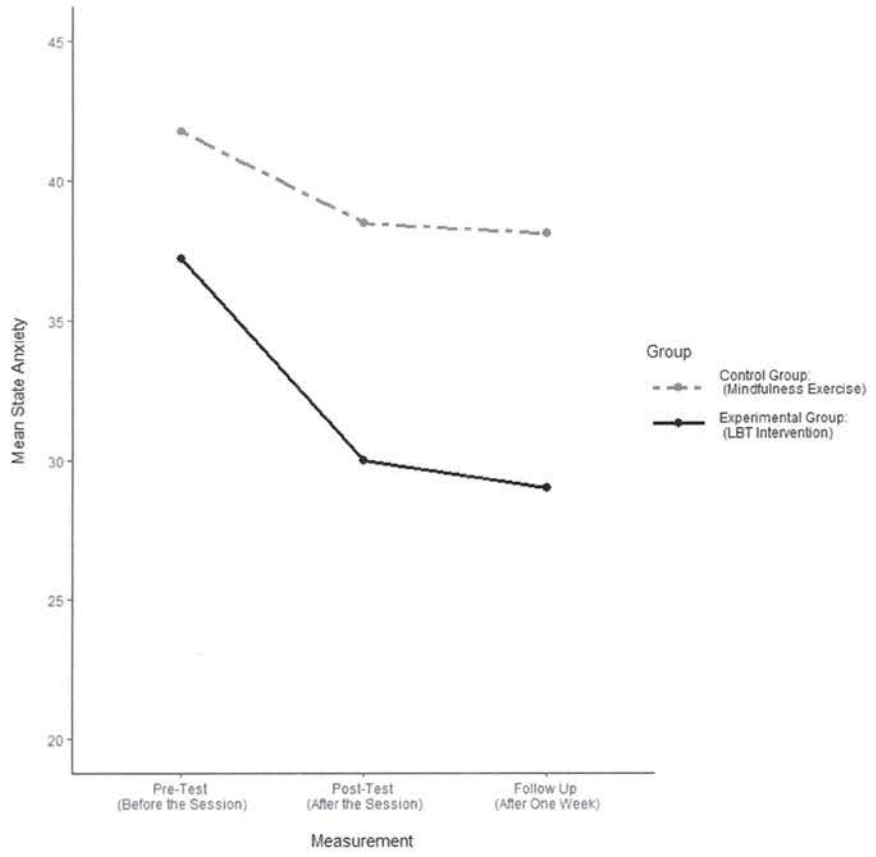

Fig. 1 Interaction plot for two-way mixed ANOVA (state anxiety)

Table 3 Pairwise T-tests with Bonferroni adjustments to p-values: between group comparisons (state anxiety)

Group 1	Group 2	Time	Mean difference	*p*	95% CI	
					Lower bound	Upper bound
Experimental	Control	Pre-Test	−4.53	0.168	−11.19	2.14
Experimental	Control	Post-Test	**−8.50**	**0.015**	**−15.12**	**−1.89**
Experimental	Control	Follow-up	**−9.13**	**0.002**	**−14.44**	**−3.81**

1988); however, the 90% CI for the effect of time included the null, and the interaction effect was not significant. Both the significant main effects warranted further interpretation. To understand where exactly the differences were present in the significant main effects, further follow-up tests were conducted (Howell, 2002). Figure 1 shows the interaction plot for the two-way mixed ANOVA.

Table 4 One-way ANOVAs for simple effects of time in each group (state anxiety)

Group	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Experimental	14.80	1.13, 9.03	**0.006**	**0.36**	**[0.03, 0.58]**
Control	1.20	2, 14	0.664	0.06	[0.00, 0.26]

Greenhouse Geisser correction to degrees of freedom was applied in case of non-sphericity. *P*-values were adjusted with Bonferroni correction

Table 5 Pairwise T-tests with Bonferroni adjustments to p-values: within group comparisons (state anxiety)

Group	Time point 1	Time point 2	Mean difference	*p*	95% CI	
					Lower bound	Upper bound
Experimental	Pre-Test	Post-Test	**7.22**	**0.021**	**1.61**	**12.84**
Experimental	Pre-Test	Follow-up	**8.22**	**0.009**	**2.63**	**13.82**
Experimental	Post-Test	Follow-up	1.00	0.366	−3.21	5.21
Control	Pre-Test	Post-Test	3.25	0.639	−4.48	10.98
Control	Pre-Test	Follow-up	3.63	0.558	−2.88	10.13
Control	Post-Test	Follow-up	0.38	1.000	−7.33	8.08

To further analyze the significant main effect of groups, pairwise T-test comparisons were conducted between both groups at each measurement (time point). They are presented in Table 3. The two groups did not have a significant difference at baseline (pre-test). In other words, the state anxiety levels of the experimental and control groups were similar prior to the interventions. However, at post-test, after the LBT intervention, the experimental group showed significantly less state anxiety levels as compared to the control group ($p < 0.05$), which was engaged in the mindfulness exercise, as a comparable control condition. This difference was even stronger ($p < 0.01$) at follow-up.

To also analyze the significant main effect of time, its simple effects in both the groups were computed using one-way repeated measures ANOVAs (Howell, 2002). The results for the same are shown in Table 4. The simple effect of time was found to be significant ($p < 0.01$) only in the experimental group, also having a large effect size.

In order to identify whether a significant reduction in state anxiety across time points occurred due to LBT intervention in the experimental group, pairwise comparisons were conducted as shown in Table 5. (The control group pairwise comparisons have also been reported only for the purpose of comparison).

The significant differences in pre-test vs. post-test ($p < 0.05$), and pre-test vs. follow-up ($p < 0.01$), in the experimental group, are important to note. Especially, the significant reduction in state anxiety, from the baseline to the follow-up, has promising, positive implications for the LBT intervention. Figure 2 illustrates the before-after plots of individual state-anxiety scores for comparisons between three measurements for both groups. As observed in the plots, a trend of reductions in state

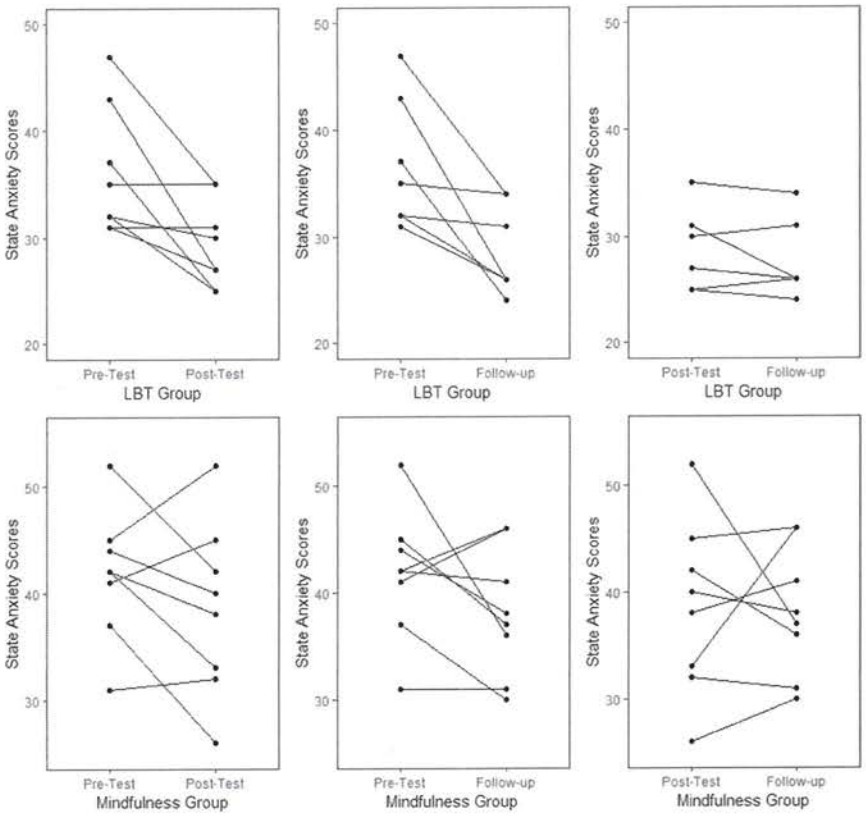

Fig. 2 Before & after Plots for the LBT intervention (experimental) group & mindfulness exercise (control) group between measurements (state anxiety)

anxiety can be observed, especially from pre-test to post-test and pre-test to follow-up, for the LBT intervention group, suggesting improvement in the state-anxiety.

Taken together, these results suggest that further studies with larger samples, having sufficient power, need to be conducted. In particular, although a significant interaction effect would provide more direct support for LBT's efficacy in reducing transient anxiety states, i.e. state-anxiety in individuals, the results from the current study are still important in yielding a rationale for LBT as a promising intervention for the same. Still, these results need to be interpreted with caution in the absence of a significant interaction effect as well as the 90% CI of main effect of time including the null.

Similar analysis conducted, removing the outliers from the data, yielded similar results such as above (see Appendix 4). However unlike the above results, when the extreme scores from a single participant across measurements were removed, significant differences for the experimental group (LBT intervention) between time points were not found; possibly indicating the impact of loss of power. Hence further

studies with prior sample size calculation may address the current limitations of a small sample, and test further the effectiveness of LBT intervention in reducing state anxiety.

STAI (Trait Anxiety)

The descriptive statistics for the trait anxiety scores on the STAI for both groups at different measurements are shown in Table 6.

The results from the two-way mixed ANOVA, conducted on trait anxiety scores from the STAI, are shown in Table 7.

It can be observed in Table 6 that the mean scores for trait anxiety in the control group were found to be relatively higher across measurements. On similar lines, the two-way mixed ANOVA (Table 7) indicated a significant main effect of group. However, no effect was found for time as well as interaction. In order to understand where exactly the differences were, between the groups, pairwise comparisons

Table 6 Descriptive statistics (trait anxiety)

Measurement	*n*	*M*	*SD*
Experimental group	9		
Pre-test		35.78	7.53
Post-test		36.00	12.17
Follow-up		35.67	6.86
Control group	8		
Pre-test		44.88	3.52
Post-test		43.63	7.19
Follow-up		40.88	10.13

Table 7 Two-way mixed ANOVA results for trait anxiety

Effect	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Group	4.68	1, 15	**0.047**	0.18	[0.00, 0.45]
Time	0.58	2, 30	0.566	0.01	[0.00, 0.08]
Group x time	0.49	2, 30	0.618	0.01	[0.00, 0.07]

Table 8 Pairwise T-tests with Bonferroni adjustments to p-values: Between Group Comparisons (Trait Anxiety)

Group 1	Group 2	Time	Mean difference	*p*	95% CI	
					Lower bound	Upper bound
Experimental	Control	Pre-Test	−9.10	**0.007**	−15.31	−2.88
Experimental	Control	Post-Test	−7.63	0.143	−18.14	2.89
Experimental	Control	Follow-up	−5.21	0.229	−14.06	3.64

Table 9 Descriptive statistics (BDI-2)

Measurement	*n*	*M*	*SD*
Experimental group	10		
Pre-test		9.50	8.64
Post-test		7.40	8.06
Follow-up		8.50	7.28
Control group	8		
Pre-test		11.25	11.13
Post-test		8.38	8.45
Follow-up		10.63	10.51

Table 10 Two-way mixed ANOVA results for BDI-2

Effect	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Group	0.16	1, 16	0.695	0.01	[0.00, 0.19]
Time	2.51	2, 32	0.097	0.02	[0.00, 0.09]
Group x time	0.13	2, 32	0.875	0.00	[0.00, 0.00]

across three measurements were conducted. The results for the same are shown in Table 8.

The significant difference between the groups in trait anxiety scores ($p < 0.01$) was observed only at the baseline. The trait-anxiety remained constant in the LBT group (as one would expect with trait-level factors). Similarly, although there was a steady decline in the control group, it was not significant across measurements. The heightened baseline trait-anxiety in the case of the control group might be the effect of the sample characteristics or some uncontrolled bias; hence this significant difference at baseline between the groups was not interpreted further. The interaction plot for the analysis is presented in Appendix 3 (Fig. 3) for reference.

Other than the significant difference in trait-anxiety between both groups at baseline, the scores of both groups across measurements were in line with the notion that traits are relatively stable characteristics in individuals. This also indicated that the LBT intervention (at least with the design followed in this study, such as the amount of exposure to the intervention) is not as effective in reducing trait anxiety as it is in reducing state anxiety. Further research to test the potential effects of more prolonged exposure to LBT, in reducing trait anxiety, is needed.

The analysis conducted after removing the outliers yielded similar results as the above. The analyses output with and without outlier removal is presented in Appendix 5 for comparison.

BDI-2

The descriptive statistics for the BDI-2 scores for both groups at different measurements are shown in Table 9.

The results, from the two-way mixed ANOVA conducted on BDI-2 scores, are shown in Table 10.

As seen in Table 10, neither the main effects (of group or time), nor the interaction effect, were found to be significant—indicating no difference in the LBT and the mindfulness control group to cause improvements in BDI-2 scores across measurements. The interaction plot for this analysis is also presented in Appendix 3 (Fig. 3) for reference.

Similar analysis conducted after removing the outliers provided no different results than the above (see Appendix 6). Both models had various assumptions violated, as stated above, and therefore should be interpreted carefully.

It is also important to note that a total of six scores were identified as extreme cases during outlier detection. Three of these scores were from the experimental group of the same participant who had extreme state anxiety scores across measurements. Due to such a pattern of high scores, these three extreme scores were removed before the analysis. However, three other scores by different participants in the control group (pre-test measurement) were also identified as extreme scores (see Table 13 in Appendix 1). Due to lack of a theoretical rationale for dropping these cases, as well as the limitation of an already small sample size in the control group ($n = 8$), these outliers were retained in the analysis. Hence the analysis should only be considered for the purpose of comparison.

Discussion

While there appears to be an increasing number of clients seeking out philosophical counselors to help them deal with the stresses of ordinary life, there has been little or no empirical evidence that such counseling modalities have efficacy (Love, 2021). The results of this study strike a consonant chord for the prospects of philosophical counseling in suggesting that LBT, a form of philosophical counseling derived from REBT, may have a positive impact on the level of state anxiety individuals experience due to emotionally challenging life circumstances—in the present case, those experienced by caregivers. However, these preliminary results need to be taken with caution. As noted, the 90% CI for effect size estimates for the significant main effect of time, on state anxiety, did include the null. Additionally, if the interaction effect had been found significant, it would have provided more direct support for the efficacy of the LBT intervention in reducing state anxiety. However, the interaction effect was found to be insignificant, possibly due to an insufficient sample size.

Follow up tests on significant main effects, however, did indicate promise for LBT as an effective intervention for reducing state anxiety. These results included significantly less state anxiety in the LBT group as compared to the mindfulness (control) group at post-test and follow-up – even though both the groups were comparable at baseline. Furthermore, the significant simple effect of time with a large effect size only in the LBT group was also supported by the pairwise comparisons between different measurements indicating a significant decrease

in state anxiety from pre-test to post-test as well as pre-test to follow-up. Both these trends, when compared to the control group, provide a supporting rationale for further studies to test the effectiveness of LBT in reducing state anxiety (see Fig. 3).

There was no evidence found, however, for LBT's efficacy in reducing depression scores on the BDI-2. In fact, baseline scores of both control and experimental groups, except for one participant in the former group and one in the latter group, were in the range of 0 to 13, which is interpreted as "minimal," meaning below the level of depression (Beck et al., 1996). However, it appears that "the minimal clinically important difference (MCID)" in the BDI-2 is dependent on *baseline severity* (Button et al., 2015). This suggests that it would be unlikely to find an MCID from such low baseline scores. Hence, needed is a more diversified sample that includes a sufficient number of participants across both control and experimental groups with baseline scores in the range of 14 to 63, which would include levels of depression ranging from mild to severe.

While the results of the present study point to the need for further studies based on larger sample sizes, there is also some *qualitative* evidence that appears to support the efficacy of LBT. This evidence is provided below.

A New Way of Reasoning

Some participants in the experimental group spoke of "relief due to a new way of reasoning" they had learned in their sessions. Such an expression of "relief," presumably from the experience of anxiety, is consistent with the fact that state anxiety levels in the experimental group were less than in the control group at both post-test and follow-up.

In this regard, it is significant that the latter result pertains to *state* assessment, not trait assessment. While the former measures how participants feel at the time (for example, calm, secure, tense, strained), the latter measures how they *generally* feel (for example, pleasant, nervous, restless, satisfied with themselves, not as happy as others). Indeed, based on the results of the present study, one week of follow-up after an LBT session does not appear to be efficacious in reducing trait anxiety. This may be unremarkable, however, "because in order to replace a habit we need to practice it more often than the old habit and sustain this practice relatively consistently for a period of time" (Wirga et al., 2020, p. 406). Accordingly, subsequent studies could incorporate a more extended time period for participants in the experimental group to practice the skills learned in their LBT sessions before follow-up occurs, for example, several weeks.

Challenges to the Present Study

Randomization in this trial proceeded by way of the facilitator flipping a coin. Once a group reached 10 participants, the remaining participants were assigned to the other group. However, randomization of baseline factors might have produced a more representative sample. For example, some participants in the study worked

in hospitals while others were caretakers in homes. While it is not clear that this factor, among others, affected study outcomes, stratified randomization could have been used to randomize such potentially significant factors.

While the number of participants in each group was initially 10, incomplete data among some participants required their elimination, thereby leading to groups with unequal numbers of participants. It is not clear that participants who were missing data varied from other participants in ways that could affect outcomes. For example, one participant reported having forgotten to complete everything. Nevertheless, given the small sample of participants, the elimination of one or two participants from the groups further reduced the statistical power. This challenge can be addressed in the next study with a prior power analysis and a justified sample size. One factor that presented a challenge to achieving the latter was finding participants who were willing to participate in the study. Caregivers who did express an interest often did not follow up. This was the case despite a concerted effort to recruit caregivers for the study across eight different cities in the United States (Northcutt, 2018).

Another consideration has been whether to use a placebo with no apparent therapeutic potential instead of a mindfulness exercise. Inasmuch as this was an initial study of a modality of counseling not previously studied, the use of such a placebo might have been preferrable. In a subsequent study, the latter alteration in protocol could prove to be constructive.

A further issue, arising in the present study, was that some participants spoke Spanish as their native language whereas the inventory questions were in Italian. Although the facilitator offered help with translation, when participants had difficulties with comprehending specific questions, it is not clear whether and to what extent this affected outcomes.

Cultural and subcultural distinctions may have also played a role in outcomes, and it is not clear how generalizable they are across other cultures. Further, since subcultural distinctions (for instance, Hispanic versus non-Hispanic Italians) were not taken as baseline data to be randomized, it is not clear whether this also had an effect on outcomes.

Conclusion

Controlled, efficacy studies have rarely, if ever, been performed on modalities of philosophical counseling. In this study, two-way mixed ANOVA tests were conducted on three variables (state anxiety, trait anxiety, and depression scores) to test the hypothesis that a one-hour LBT session is more effective in reducing the level of (state or trait) anxiety and/or depression in family caregivers than a one-hour mindfulness session.

State anxiety levels were found to be significantly less in the LBT experimental group than the control group at post-test as well as follow-up. There was also a substantial decrease in state anxiety scores due to the LBT intervention across time as found in the statistically significant main effect of time. When this significant main effect was further examined with simple effects in each group, the significant decrease was only found in the group that received LBT (the experimental group). However, these optimistic results should be interpreted with caution; and support

from further studies is necessary to reach a strong conclusion, regarding the same, due to factors previously noted in the discussion.

There was no evidence of LBT's efficacy in reducing trait anxiety. Since traits are relatively stable characteristics acquired over time, further study that includes more extended follow-up may shed further light on whether LBT has efficacy in reducing trait anxiety.

There was also no evidence found for LBT's efficacy in reducing depression scores on the BDI-2. However, as suggested, this may have been due to failure of the sample to include enough baseline scores that were high enough to show minimal clinically important improvement at post-test and follow-up. Stratified randomization of baseline factors might have produced a more representative sample.

Accordingly, the results of this preliminary study are encouraging regarding the efficacy of LBT to reduce state anxiety. They are also instructive regarding how to arrange further, future investigation into its efficacy.

Appendix 1 Outliers

See Tables 11, 12, 13.

Table 11 Outliers detected (State anxiety scores)

State anxiety		Box & Whisker Plot (Screening)	Rosner's Generalized (ESD) Test	Median Absolute Deviation (MAD)	Direction
Experimental	Pre-test	S532 = 63	**S532 = 63**	**S532 = 63**	**Higher**
Experimental	Post-test	S532 = 56	**S532 = 56**	**S532 = 56**	**Higher**
Experimental	Follow-up	S532 = 50	**S532 = 50**	**S532 = 50**	**Higher**
Control	Pre-test	None	None	None	NA
Control	Post-test	None	None	None	NA
Control	Follow-up	None	None	None	NA

Bold values indicate that the extreme cases have either undergone outlier treatment or Winsorization in the respective analyses

Table 12 Outliers detected (trait anxiety scores)

Trait anxiety		Box & whisker plot (screening)	Rosner's generalized (ESD) test	Median Absolute Deviation (MAD)	Direction
Experimental	Pre-test	S532 = 63	**S532 = 63**	**S532 = 63**	**Higher**
Experimental	Post-test	None	None	None	NA
Experimental	Follow-up	None	None	None	NA
Control	Pre-test	B013 = 63	None	**B013 = 63**	**Higher**
Control	Post-test	B013 = 58	None	None	NA
Control	Follow-up	None	None	None	NA

Bold values indicate that the extreme cases have either undergone outlier treatment or Winsorization in the respective analyses

Table 13 Outliers detected (BDI-2 scores)

Depression (BDI-2) score		Box & whisker plot (Screening)	Rosner's generalized (ESD) test	Median absolute deviation (MAD)	Direction
Experimental	Pre-test	S532 = 30	**S532 = 30**	None	**Higher**
Experimental	Post-test	S532 = 28	**S532 = 28**	**S532 = 28**	**Higher**
Experimental	Follow-up	S532 = 26	**S532 = 26**	**S532 = 26**	**Higher**
Control	Pre-test	B013 = 37	**B013 = 37, W431 = 01, LY727 = 02**	**B013 = 37, W431 = 01, LY727 = 02**	**1 Higher, 2 Lower respectively**
Control	Post-test	B013 = 26	None	None	NA
Control	Follow-up	None	None	None	NA

Bold values indicate that the extreme cases have either undergone outlier treatment or Winsorization in the respective analyses

Appendix 2 Tests of Assumptions Tables

See Tables 14, 15, 16, 17, 18, 19, 20, 21.

Table 14 Shapiro–wilk test of normality (state anxiety scores—winsorized data)

Group	Time	Statistic	*p*
Experimental	Pre-test	0.824	0.04
Control	Pre-test	0.957	0.79
Experimental	Post-test	0.855	0.08
Control	Post-test	0.991	1.00
Experimental	Follow-up	0.794	0.02
Control	Follow-up	0.925	0.48

Table 15 Levene's test of equality of variances (state anxiety scores—winsorized data)

Time	*df*	Statistic	*p*
Pre-test	1, 15	0.401	0.54
Post-test	1, 15	2.460	0.14
Follow-up	1, 15	0.440	0.52

Table 16 Shapiro–wilk test of normality (trait anxiety scores—winsorized data)

Group	Time	Statistic	*p*
Experimental	Pre-test	0.902	0.26
Control	Pre-test	0.895	0.26
Experimental	Post-test	0.915	0.35
Control	Post-test	0.919	0.42
Experimental	Follow-up	0.911	0.32
Control	Follow-up	0.941	0.62

Table 17 Levene's test of equality of variances (trait anxiety scores—winsorized data)

Time	*df*	Statistic	*p*
Pre-test	1, 15	3.410	0.08
Post-test	1, 15	2.070	0.17
Follow-up	1, 15	0.750	0.40

Table 18 Shapiro–wilk test of normality (BDI-2 scores—outliers kept)

Group	Time	Statistic	*p*
Experimental	Pre-test	0.855	0.07
Control	Pre-test	0.731	< 0.01
Experimental	Post-test	0.750	< 0.01
Control	Post-test	0.829	0.06
Experimental	Follow-up	0.846	0.05
Control	Follow-up	0.893	0.25

Table 19 Levene's test of equality of variances (BDI-2 scores—outliers kept)

Time	*df*	Statistic	*p*
Pre-Test	1, 16	0.001	0.98
Post-Test	1, 16	0.079	0.78
Follow-up	1, 16	0.943	0.35

Table 20 Shapiro–wilk normality test of residuals

Two-way mixed ANOVA model	Statistic	*p*
State anxiety (winsorized data)	0.984	0.72
Trait anxiety (winsorized data)	0.978	0.45
BDI-2 (outliers kept)	0.8508	< 0.001

Table 21 Box's M-test of homogeneity of covariance matrices

Variable	Statistic	*P*
State anxiety (winsorized data)	0.153	0.696
Trait anxiety (winsorized data)	0.794	0.373
BDI-2 (outliers kept)	1.270	0.260

Appendix 3 Additional Figures—Interaction Plots for Trait Anxiety & BDI-2 Analysis

See Fig. 3.

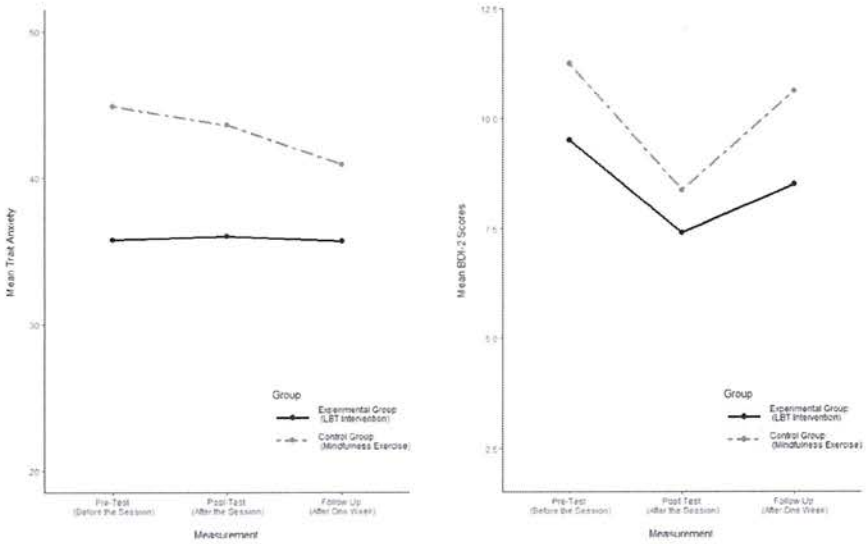

Fig. 3 Interaction plots for two way mixed ANOVAs: trait anxiety & BDI-2 scores

Appendix 4 Alternative Analysis Results (State Anxiety)

4.1. Analysis on State Anxiety Scores with Outliers Dropped from the Data

See Tables 22, 23, 24, 25, 26.

Table 22 Descriptive statistics (state anxiety—outliers removed)

Measurement	*n*	*M*	*SD*
Experimental group	8		
Pre-test		35.75	6.30
Post-test		29.13	4.29
Follow-up		27.50	5.29
Control group	8		
Pre-test		41.75	6.09
Post-test		38.50	8.18
Follow-up		38.13	6.03

Table 23 Two-way mixed ANOVA results (state anxiety—outliers removed)

Effect	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Group	13.35	1, 14	**0.003**	**0.36**	**[0.06, 0.61]**
Time	7.08	2, 28	**0.003**	**0.17**	[0.00, 0.36]
Group x time	1.00	2, 28	0.380	0.03	[0.00, 0.06]

Table 24 Pairwise T-tests with Bonferroni adjustments to p-values: between group comparisons (state anxiety—outliers removed)

Group 1	Group 2	Time	Mean difference	*p*	95% CI	
					Lower bound	Upper bound
Experimental	Control	Pre-Test	−6.00	0.073	−12.64	0.64
Experimental	Control	Post-Test	**−9.38**	**0.012**	**−16.38**	**−2.37**
Experimental	Control	Follow-up	**−10.63**	**0.002**	**−16.71**	**−4.54**

Table 25 One-way ANOVAs for simple effects of time in each group (state anxiety—outliers removed)

Group	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Experimental	8.01	1.22, 8.54	**0.036**	0.34	[0.00, 0.57]
Control	1.20	2, 14	0.664	0.06	[0.00, 0.26]

Greenhouse Geisser correction to degrees of freedom was applied in case of non-sphericity. *P*-values were adjusted with Bonferroni correction

Table 26 Pairwise T-tests with Bonferroni adjustments to p-values: within group comparisons (state anxiety—outliers removed)

Group	Time point 1	Time point 2	Mean difference	*p*	95% CI	
					Lower bound	Upper bound
Experimental	Pre-Test	Post-Test	6.63	0.090	0.85	12.40
Experimental	Pre-Test	Follow-up	8.25	0.056	2.01	14.49
Experimental	Post-Test	Follow-up	1.63	0.462	−3.54	6.79
Control	Pre-Test	Post-Test	3.25	0.639	−4.48	10.98
Control	Pre-Test	Follow-up	3.63	0.558	−2.88	10.13
Control	Post-Test	Follow-up	0.38	1.000	−7.33	8.08

4.2. Analysis on State Anxiety Scores with Outliers Kept in the Data

See Tables 27, 28, 29, 30.

Table 27 Descriptive statistics (state anxiety—outliers kept)

Measurement	*n*	*M*	*SD*
Experimental group	9		
Pre-test		38.78	10.83
Post-test		32.11	9.82
Follow-up		30.00	8.99
Control group	8		
Pre-test		41.75	6.09
Post-test		38.50	8.18
Follow-up		38.13	6.03

Table 28 Two-way mixed ANOVA results (state anxiety—outliers kept)

Effect	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Group	2.41	1, 15	0.141	0.12	[0.00, 0.39]
Time	8.39	2, 30	**0.001**	**0.10**	[0.00, 0.26]
Group x time	1.34	2, 30	0.277	0.02	[0.00, 0.10]

Table 29 One-way ANOVAs for simple effects of time in each group (state anxiety—outliers kept)

Group	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Experimental	10.82	1.27, 10.16	**0.012**	0.14	[0.00, 0.37]
Control	1.20	2, 14	0.664	0.06	[0.00, 0.26]

Greenhouse Geisser correction to degrees of freedom was applied in case of non-sphericity. *P*-values were adjusted with Bonferroni correction

Table 30 Pairwise T-tests with Bonferroni adjustments to p-values: within group comparisons (state anxiety—outliers kept)

Group	Time point 1	Time point 2	Mean difference	*p*	95% CI	
					Lower bound	Upper bound
Experimental	Pre-Test	Post-Test	**6.67**	**0.044**	**−3.66**	**16.99**
Experimental	Pre-Test	Follow-up	**8.78**	**0.021**	**−1.16**	**18.72**
Experimental	Post-Test	Follow-up	2.11	0.217	−7.29	11.52
Control	Pre-Test	Post-Test	3.25	0.639	−4.48	10.98
Control	Pre-Test	Follow-up	3.63	0.558	−2.88	10.13
Control	Post-Test	Follow-up	0.38	1.000	−7.33	8.08

Appendix 5 Alternative Results (Trait Anxiety)

5.1. Analysis on Trait Anxiety Scores with Outliers Dropped from the Data

See Tables 31, 32, 33.

Table 31 Descriptive statistics (trait anxiety—outliers removed)

Measurement	*n*	*M*	*SD*
Experimental group	8		
Pre-test		34.25	6.84
Post-test		34.00	11.31
Follow-up		34.00	5.01
Control group	7		
Pre-test		43.43	5.00
Post-test		41.57	4.58
Follow-up		39.14	9.58

Table 32 Two-way mixed ANOVA results (trait anxiety—outliers removed)

Effect	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Group	5.99	1, 13	**0.029**	**0.21**	[0.00, 0.50]
Time	0.54	2, 26	0.591	0.02	[0.00, 0.11]
Group x time	0.43	2, 26	0.655	0.01	[0.00, 0.09]

Table 33 Pairwise T-tests with Bonferroni adjustments to p-values: between group comparisons (trait anxiety—outliers removed)

Group 1	Group 2	Time	Mean difference	*p*	95% CI	
					Lower bound	Upper bound
Experimental	Control	Pre-Test	**−9.18**	**0.012**	**−15.95**	**−2.40**
Experimental	Control	Post-Test	−7.57	0.123	−17.48	2.34
Experimental	Control	Follow-up	−5.14	0.207	−13.50	3.22

5.2. Analysis on Trait Anxiety Scores with Outliers Kept in the Data

See Tables 34, 35.

Table 34 Descriptive statistics (Trait anxiety—outliers kept)

Measurement	*n*	*M*	*SD*
Experimental group	9		
Pre-test		37.44	11.52
Post-test		36.00	12.17
Follow-up		35.67	6.86
Control group	8		
Pre-test		45.88	8.32
Post-test		43.63	7.19
Follow-up		40.88	10.13

Table 35 Two-way mixed ANOVA results (trait anxiety—outliers kept)

Effect	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Group	3.04	1, 15	0.102	0.13	[0.00, 0.40]
Time	1.41	2, 30	0.260	0.02	[0.00, 0.12]
Group x time	0.34	2, 30	0.712	0.01	[0.00, 0.03]

Appendix 6 Alternative Results (BDI-2)

With a Pattern of Extreme Scores (Outliers) in Experimental Group Dropped from the Data

See Tables 36, 37.

Table 36 Descriptive statistics (BDI-2—Outliers removed)

Measurement	*n*	*M*	*SD*
Experimental group	9		
Pre-Test		7.22	5.07
Post-Test		5.11	3.76
Follow-up		6.56	4.13
Control group	8		
Pre-Test		11.25	11.13
Post-Test		8.38	8.45
Follow-up		10.63	10.51

Table 37 Two-way mixed ANOVA results (BDI-2—Outliers removed)

Effect	*F* ratio	*df*	*p*	η_G^2	η_G^2 90% CI
Group	1.22	1, 15	0.287	0.07	[0.00, 0.32]
Time	2.38	2, 30	0.110	0.02	[0.00, 0.12]
Group x time	0.07	2, 30	0.930	0.00	[0.00, 0.00]

Data Availability All data and analysis code are available at https://osf.io/my2ev/?view_only=e0e4a2f86cff45578ef83576dc6742d0.

Declarations

Conflict of interest Author Elliot D. Cohen is Executive Director of National Philosophical Counseling Association.

Ethical Approval An independent psychological statistician reviewed the protocol for this study and three independent statisticians analyzed the data. The National Philosophical Counseling Association also retained an independent ethics consultant who advised regarding the ethics of the study.

Informed Consent The study received oversight by a commercial IRB and all subjects provided informed consent.

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