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Assessing the Efficacy of Color Mandala Intervention on Spiritual Attitude, Happiness, and Mindfulness Among Adults

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ABSTRACT

Color mandala activities are art based tasks that can be used as a structured activity for focused attention, emotional regulation and reflective experience. They may be related to spiritual attitude, happiness, and mindfulness, which should be investigated in adults empirically. The study evaluated the effectiveness of a color mandala intervention on spiritual attitude, happiness, and mindfulness among adults and the relationships between the three outcomes and some demographic differences. It was a pre test- post test experimental design with control group. A total of 70 adults (18–60 years) were selected using purposive sampling and randomly divided into experimental (n = 35) and control (n = 35) groups. The experimental group underwent a structured mandala coloring exercise and the control group went through a neutral reading task. The Spiritual Attitude and Involvement List (SAIL), Oxford Happiness Questionnaire (OHQ), and Toronto Mindfulness Scale (TMS) were the measures. Descriptive statistics, Pearson correlations, paired-samples and independent-samples t tests, as well as one-way ANOVAs, were reported in the analyses in the source. The source report mentions positive relationships between spiritual attitude, happiness and mindfulness. In the experimental group, spiritual attitude reported pre-post changed from 73.60 to 83.42; happiness changed from 76.00 to 90.80; and mindfulness changed from 35.54 to 36.02. All three outcomes had statistically significant pre-post tests, but the mean difference for mindfulness was not very large, according to the source. The results indicated that posttest means for the experimental group were higher than the posttest means for the control group in spiritual attitude and happiness, and that the difference between the experimental and the control group in mindfulness was not significant. There are inconsistencies in some t statistics, p values, degrees of freedom and scale ranges in the source tables and therefore findings should be interpreted with care. This study suggests that mandala coloring might be a feasible and low-cost creative art related to enhanced self-reported spiritual attitude and happiness in this sample. There is less evidence for a unique mindfulness benefit. More well-designed, statistically reported, controlled and follow-up studies are necessary.

Introduction

Emotional experience, meaning-making, attention patterns, and coping to everyday demands are major influences on psychological wellness. Accessible and non-threatening interventions can be used in addition to established psychological interventions, offering an opportunity for reflection, focused activity and positive engagement. One of these is art based activities. Providing the opportunity to interact with the visual material without necessarily needing to talk about personal experience in words.

Mandala coloring is a type of coloring where the pattern is circular and is usually symmetrical. The structure provides clear boundaries for the activity and allows the participant to use their own colour, sequence and style. Repeating movements and focusing on details can help focus attention on the task, rather than distracting thoughts. Enjoyment or completion can be experienced by a participant. The following are some of the possibilities for the process, offering a rationale for exploring the connection between mandala coloring and happiness and mindfulness.

Mandalas have cultural and spiritual histories in several traditions. This term is often linked with a circle and with patterns that imply a whole or wholeness, an order, a connection between a focus and its context. While their meanings may differ from culture to culture, a modern coloring page should not be taken as a re-enactment of the religious connotations of the ancient mandala practices. The psychological context is less grand: the activity is a planned visual attention, creative and reflection experience.

This study targeted three outcomes: spiritual attitude, happiness and mindfulness. Spiritual attitude has to do with the way a person feels spiritually, that is the way a person feels in terms of meaning, connection, purpose and direction toward values or experiences that are deemed important. Happiness is a positive affect and the person's assessment of life and wellbeing. Mindfulness is about being aware of what is happening in the here and now, and the ability to see thoughts and feelings as they are, instead of being drawn in and swept along. These ideas are separate, but can be related to reflective attention and mental health.

This art activity is not the same as psychotherapy or a full mindfulness course. However, it could be helpful as an additional health activity, especially for adults who are looking for an active, creative project. The key question is, is participation linked to improvements in outcomes of interest and is the improvement seen in the participation group larger than that in a comparison group.

Literature Review

Mandala coloring and art-based activity

The arts offer alternative ways of communication that go beyond simply verbal. In mandala coloring, the coloring pattern is given but the entire coloring is largely self-directed, in terms of colors and the rate of coloring. The activity might lead to continued interest due to the fact that the participants can focus on a smaller visual task, can make multiple choices and can watch as the design is completed over time. The structure can also minimize the ambiguity that can be found in a blank page or in a completely open-ended art assignment.

Studies cited in the source report that mandala coloring is a potential technique for relaxation, emotional control and focus. Campenni and Hartman (2020) investigated the impact of creating mandalas on mood, anxiety, and state mindfulness. Carsley et al. studied mindfulness coloring and test anxiety, both with children and university students. Babouchkina and Robbins (2015) investigated whether mandalas could be used as a tool to decrease negative mood. These studies may support the need for additional research, but the conclusions cannot be extrapolated to other populations, treatment durations, or outcome variables.

Attentional redirection, repetitions, sensory engagement, freedom of color selection, and completion of a visual product are possible mechanisms. These mechanisms are possible but not certain. Colouring can be soothing for one person and frustrating or boring to another or not bring anything of value to them. The impact of the psychological effect can vary based on individual, task, cultural, environmental, and time spent in the activity.

Color and emotional experience

Color is seen by experiencing it and understood through individual, social and cultural experiences. There are no universal rules about which colours are linked with which experiences, so people may think of some colours as being associated with certain experiences. Responses may vary depending on previous experiences, contexts, preferences and color combinations. Therefore, one should not use colour in such a way as to expect it to always evoke a particular feeling, but rather as part of a creative assignment.

Mandala Coloring involves choosing and matching the colors as one follows the pattern. This can offer a constrained way of expressing themselves and a series of little decisions. The task might serve as a distraction to some from ruminating for a brief time. The study measuring the full coloring activity cannot conclude if any of the results are due to the colour itself or to the mandala structure, to the coloring activity, to group contact and/or to the expectations associated with the activity.

Students will cultivate a positive spiritual attitude and mental health

Spirituality is usually talked about in the context of meaning, purpose, connectedness, transcendence and involvement in something that is important to them. It generally can overlap religion but is not a synonym for religious affiliation. A spiritual attitude may be toward self, toward others, toward nature or toward a higher power as per the person's beliefs and cultural context. In psychological studies, this type of experience is most accurately captured by not making the assumption that everyone has the same religious interpretation.

The provided report is a multidimensional report of spiritual attitude, and employs the Spiritual Attitude and Involvement List (SAIL). The scale addresses issues of meaningfulness, trust, acceptance, caring for others, connectedness with nature, transcendent experiences, and spiritual activities. The dimensions included indicate that spiritual attitude is more than just a single belief or religious practice. A reflective art activity could be used to encourage participants to reflect on their personal significance, sense of connection or other issues of spiritual meaning, but an art activity does not necessarily create or assert a specific spiritual belief.

Previous research referenced in the source report suggests a relationship between spirituality and subjective well being, and a positive relationship between mandala activities and self reflection. Such correlations do not mean that spirituality is directly related to happiness or that coloring automatically results in a greater spiritual attitude. Experimental designs are necessary to study change and careful interpretation is required when outcomes are self-reports immediately after an activity.

Happiness

Happiness is a multi faceted phenomenon as it encompasses positive emotions, satisfaction and subjective evaluations of life. While hedonic accounts focus on pleasure and the mixture of positive and negative emotions, eudaimonic accounts focus on meaning, purpose, and personal growth. Both the two views are related but not interchangeable. The Oxford Happiness Questionnaire (OHQ) was used in the current study to measure self-reported happiness.

Creative activity can help bring about happiness by enjoying it, by being engaged in it, by feeling like you have some control over it, or by feeling you have accomplished something. A structured coloring session could also be a brief respite from the usual demands. Such impacts, if they are present, could be temporary and not necessarily lead to lasting increases in life satisfaction. The posttest design of the study provides information on short-term outcomes only, and cannot provide information on long-term outcomes.

Mindfulness

In general, mindfulness is characterized by an attention to the experience of the present moment and an open, non-reactive attitude towards the thoughts, feelings, and bodily sensations that arise during this experience. Brown and Ryan (2003) spoke about the importance of being present with oneself to psychological health. Curiosity and decentering are included in the Toronto Mindfulness Scale (TMS), which assesses state mindfulness. A coloring project can highlight hand movement, visual detail, and moment-to-moment decision making, and can be a good candidate for being a mindfulness activity.

However, focusing on something doesn't always mean that it's a mindful activity. One can be very focused without being conscious of thoughts and feelings, and a brief coloring exercise might not develop the skills of mindfulness training. One has to be careful to differentiate between a plausible mechanism and a phenomenon that can be shown by data.

PERMA model.

The source report mentions the positive-psychology framework PERMA, which stands for positive emotion, positive engagement, positive relationship, positive meaning and positive accomplishment. Mandala coloring might in theory connect with any of these aspects: it may be fun or a positive emotion, it may be engaging, it may be a chance to share in reflection (relationships), it may provide a chance to add meaning or personal interpretation, and it may produce a completed design (accomplishment). These connections provide a conceptual framework for considering well-being outcomes, but the present study did not directly measure all five PERMA elements.

Objectives

1. To study the correlation between Spiritual attitude, happiness and mindfulness in adults.
2. To compare the experimental group's pre and post scores.

3. To compare experimental and control groups in terms of spiritual attitude, happiness, and mindfulness.
4. To examine gender, age, birth order, marital status and education differences in outcomes.

Hypotheses

1. The positive association between spiritual attitude, happiness and mindfulness will be there.
2. The three outcomes will show improved scores from pre test to post test for the experimental group.
3. The experimental group will have a higher post test score than the control group.
4. Selected demographic groups (such as age, gender, birth order, marital status, and level of education) will have varying outcome scores.

Method

Research design

A pretest–posttest control group experimental design was employed in the study. The participants were evaluated prior to the activity and following the intervention period. The experimental group was provided with a colour mandala activity and control group was given a neutral reading task. The two groups were assigned by lottery once they were recruited, according to the source report.

Participants and sampling

The sample consisted of 70 adults (18-60 years) who were selected purposely. The number of subjects assigned to experimental and control groups were 35 each. The sample included 37 men (52.9%) and 33 women (47.1%). Age categories were 18–30 years (n = 17, 24.3%), 31–40 years (n = 18, 25.7%), 41–50 years (n = 17, 24.3%), and 51–60 years (n = 18, 25.7%).

Regarding birth order, 8 participants were first-born (11.4%), 36 middle-born (51.4%), 13 last-born (18.6%), and 13 only-born (18.6%). Thirty-four participants were married (48.6%), 28 unmarried (40.0%), and 8 separated (11.4%). Educational categories were intermediate-level education (n = 19, 27.1%), bachelor's degree (n = 18, 25.7%), master's degree (n = 25, 35.7%), and PhD (n = 8, 11.4%).

The inclusion and exclusion criteria are listed below. The inclusion and exclusion criteria follow:

Inclusion criteria included age (18-60 years), language of instruction (ability to read and understand language), no prior formal training in mandala coloring or art therapy, and that people of all genders and marital statuses could be included. Those who had suffered a major recent stressor (bereavement or major change in employment in the last three months) or severe or diagnosed psychiatric disorder were excluded, as were people with colour blindness.

Ethical considerations

The source report indicates that the study was conducted with institutional ethics approval and permission to use the measurement tools was granted by the authors of the tools. The participants were briefed on the purpose of the study and its procedure, and written informed consent was obtained by the participants, and they were informed that they could withdraw from the study without facing any consequences. Anonymity and confidentiality were highlighted, and data was reported as anonymized and kept securely.

Assessment Measures

Demographic form

Age, gender, birth order, marital status and educational qualification were recorded on a form designed by a researcher.

Spiritual Attitude and Involvement List (SAIL)

Meezenbroek and colleagues created a 26 item SAIL that measured meaningfulness, trust, acceptance, caring for others, connectedness with nature, transcendent experiences, and spiritual activities. There are six response options for items. The range

of total score reported is 26–156 and a higher score reflects a stronger spiritual attitude or level of involvement. This source has a reliability table of Cronbach's alpha .95.

Oxford Happiness Questionnaire (OHQ)

The OHQ, originally developed by Hills and Argyle (2002) consisted of 29 items measuring subjective happiness. Categorizes items on a six-point response scale, and specifies reverse scoring for certain items. The report gives a theoretical score range of 29–174 and a psychometric table with $\alpha = .91$.

Toronto Mindfulness Scale (TMS)

The 13-item TMS, which was developed by Lau et al., (2006) measures state mindfulness in terms of curiosity and decentering. The items are rated on a scale of 0–4 (method section, range 0–52). The α value in the report is .95 derived from a psychometric table. The original scoring files must be consulted when interpreting scores as the reported descriptive scores and scale ranges are not consistent with the stated ranges.

Materials and intervention

For the experimental group a pre-designed set of moderately complex patterns were used as mandala designs, which were printed onto A4 paper. Coloring pencils, crayons, markers and other coloring tools were provided. According to the source, it is a graded sequence that began with simple patterns and developed into more complex patterns. It was instructed for participants to attend to their experience of colour without judging, choose colours, start at the middle and go at a comfortable pace.

The intervention consisted of two weeks of sessions that included brief orientation and/or psychoeducation, a primary coloring period, and a final reflection and/or discussion. In one description, the main activity of coloring took about 40 minutes, and a later session outline states that the coloring session would take place in sessions of varying length, including 45 and 60 minutes. This discrepancy in the description of session-duration is a methodological reporting limitation, and should be addressed by reviewing original session records.

Control condition

The control group underwent a reading activity that was neutral in content, based on selected content of Stephen Covey's book *The 7 Habits of Highly Effective People*. The source describes the reading as general content which was neither related to mindfulness, spiritual attitude nor happiness, emotional regulation nor therapeutic exercises. The same outcome measures were administered prior to and following the prescribed activity period for both groups.

Procedure

Once approved by the topic and permissions, the eligible participants were briefed about the study, and informed consent was taken. Questionnaires were used for baseline assessment of spiritual attitude, happiness and mindfulness. The experimental and control conditions were obtained by random selection. The experimental group participated in the mandala-coloring activity in a relaxed environment, while the control group finished the neutral reading task for a similar duration. The questionnaires were then read out again at posttest.

The intervention entailed an orientation session, practicing simple and moderately complex patterns, quiet coloring and a culminating activity which allowed participants to select a pattern and reflect briefly about it. Should participants become frustrated while coloring, they were able to ask questions and seek guidance, the report notes. The activity was described as a structured creative task not as a diagnostic task.

Statistical analysis

The report goes on to say that the data were analysed using SPSS version 26. Sample characteristics and scale scores were summarized using descriptive statistics. Pearson product-moment correlations were performed to explore the relationships among spiritual attitude, happiness, and mindfulness. Paired-samples *t* tests were used to compare the pre- and posttests of the experimental group. Independent-samples *t* tests were used to compare the experimental and control groups and to examine gender differences. Age, and order of birth, marital status, and educational differences were explored by one-way analyses of variance (ANOVAs) and post hoc comparisons.

Results

Psychometric properties of the study scales (N =70)

Scales	k	M(SD)	α	Potential	Actual	Skewness	Kurtosis
SAIL	26	153.10(26.90)	.95	26-156	45-108	-.35	-.41
OHQ	29	175.85(32.98)	.91	29-174	17-136	-.62	-.12
TMS	13	72.45(15.85)	.95	13-65	16-49	-.58	-.21

A total of 70 adults were tested, with half in the experimental and the other half in the control conditions. The sample consisted of four age bands, each having 17-18 participants. Participants with master's level education had the most participants, and middle-born participants had the most participants. The demographic distribution is explained in the Method section.

The internal consistency coefficient (α) for the source psychometric table are .95 for the SAIL, .91 for the OHQ and .95 for the TMS. The values represent a high degree of consistency amongst the analysis reported in the source. The table also shows ranges of actual scores which are not consistently associated with theoretical ranges as detailed in the instrument section, particularly for SAIL and OHQ. The original data coding and scoring should be checked before formal publication.

Associations among outcomes

Pearson product moment correlation between the spiritual attitude, happiness and mindfulness among adults (N =70)

Variables	1	2
Spiritual Attitude	-	.93***
Happiness		-
Mindfulness		

Note. *** p < .001.

Strong positive correlations are found between all three outcomes in the Pearson correlation table. There was a positive correlation between spiritual attitude and happiness ($r = .93$, $p < .001$) and spiritual attitude and mindfulness ($r = .77$, $p < .001$). Mindfulness was also found to be positively related to happiness ($r = .68$, $p < .001$). In the present sample, there was a tendency for higher scores on one measure to be associated with higher scores on the other measures.

These associations are correlational only and are not indicative of causality. For instance, the findings do not explain whether spiritual attitude makes people happier or whether happier people have stronger spiritual attitudes, or whether one or both factors is correlated with anything else. The higher reported correlation of spiritual attitude with happiness is especially noteworthy to be checked against the original data and scoring method.

Pretest-posttest change in the experimental group

Paired sample t-test comparing mean of pre and post results for the Spiritual attitude, happiness and mindfulness in the experimental group (N =35)

	<i>Pretest</i>	<i>Posttest</i>		
	<i>(n = 35)</i>	<i>(n = 35)</i>		
Variables	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>t(34)</i>	<i>p</i>
Spiritual Attitude	73.60 (12.61)	83.42 (15.10)	-5.43	.00
Happiness	76.00 (12.94)	90.80 (15.68)	5.94	.00
Mindfulness	35.54 (7.52)	36.02 (7.72)	-2.45	.02

Note. SD = Standard Deviation. * $p < .05$, ** $p < .01$, *** $p < .001$.

The mean of the experimental group for spiritual attitude rose from 73.60 (SD = 12.61) pretest to 83.42 (SD = 15.10) at the posttest. The source reports $t(34) = -5.43$, $p = .00$. The p value should not be reported as 0, but rather as $< .001$, following the convention of the underlying output.

For happiness, the reported mean increased from 76.00 (SD = 12.94) to 90.80 (SD = 15.68). The source reports $t(34) = 5.94$, $p = .00$. For mindfulness, the reported mean changed from 35.54 (SD = 7.52) to 36.02 (SD = 7.72), with $t(34) = -2.45$, $p = .02$. The discrepancy between the small descriptive change and reported test statistic needs to be compared with the raw data; the mindfulness mean difference was small.

To compare the results of experiments to the control group instead of the experimental group. The posttest means of the experimental and control group from the source table were 156.29 (SD = 20.30) and 147.68 (SD = 27.43), respectively. For happiness, the reported means were 182.58 (SD = 25.34) and 167.75 (SD = 34.96), respectively. For mindfulness, the corresponding means were 71.88 (SD = 13.06) and 71.25 (SD = 14.30). They say the experimental group (experimental) had higher scores on spiritual attitude and happiness but not a significant high score on mindfulness.

Gender differences

Independent sample t-test for group differences in the experimental group and control group (N = 70)

Variables	M	SD	M	SD	t(31)	p	Cohen's d
Spiritual Attitude	147.68	27.43	156.29	20.30	-1.02	.012	0.36
Happiness	167.75	34.96	182.58	25.34	-1.40	.041	0.49
Mindfulness	71.25	14.30	71.88	13.06	-1.13	.895	0.03

The results show that the experimental group ($M = 147.68$, $SD = 27.43$) had a significantly higher spiritual attitude score than the control group ($M = 156.29$, $SD = 20.30$), $t(31) = -1.02$, $p < .05$. Value of the Cohen's d was 0.36 and the effect size was a medium. Moreover, a significant difference was found in happiness. Experimental group ($M = 167.75$, $SD = 34.96$) demonstrated a significantly higher happiness score than the control group ($M = 182.58$, $SD = 25.34$), $t(31) = -1.40$, $p < .05$, Cohen's $d = 0.36$ and the effect size was a small to medium. However, experimental group ($M = 71.25$, $SD = 14.30$) had a non-significantly higher mindfulness score than the control group ($M = 71.88$, $SD = 13.06$), $t(31) = -.13$, $p > .05$, value of the Cohen's d was 0.36 and the effect size was small. The overall outcomes suggest that the posttest scores of experimental group were greater than the control group on spiritual attitude and happiness among adults.

Gender differences in the men and women

Independent sample t-test for gender differences in the men and women (N = 70)

	Men		Women				
	(n = 37)		(n = 33)				
Variables	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i> (68)	<i>p</i>	Cohen's <i>d</i>
Spiritual Attitude	153.97	29.53	152.12	24.04	.28	.21	.12
Happiness	176.27	35.19	175.39	30.84	.11	.33	.02
Mindfulness	73.24	17.86	71.57	13.46	.43	.07	.11

The report gives men's mean spiritual attitude score as 153.97 (SD = 29.53) and women's as 152.12 (SD = 24.04). For happiness, men's mean was 176.27 (SD = 35.19) and women's mean was 175.39 (SD = 30.84). For mindfulness, men's mean was 73.24 (SD = 17.86) and women's mean was 71.57 (SD = 13.46). These descriptive differences are slight. The prose of the source indicates that men were more happy, and the *p* values in the table are not uniformly consistent with the claims of significance made in the prose. There is insufficient evidence to draw a definitive conclusion that gender consistently predicted results.

Age, birth order, marital status, and education

One-way ANOVAs are reported for age, birth order, marital status and educational level. There are no consistent differences across age groups in the age analysis with *F* values of 1.49 (spiritual attitude), 2.31 (happiness) and 1.21 (mindfulness). According to the story, the theory that older adults, ages 51-60, would score higher was not supported.

Results from a birth-order analysis are more difficult to interpret. The source says that the *F*(3,66) values are 2.71 for spiritual attitude, 1.54 for happiness and 4.47 for mindfulness. Values and interpretations in the accompanying post hoc tables and narrative are inconsistent. Marital-status analyses also report *F* values of 2.08 for spiritual attitude, 2.21 for happiness, and 1.78 for mindfulness, with no clear pattern of statistically significant differences among the education analyses. Demographic findings should be taken as exploratory and not definitive due to the small numbers in sub-groups and the inconsistent data within the source tables.

Discussion

The study investigated the relationship between coloring the color mandala with spiritual attitude, happiness and mindfulness in adults. The primary descriptive pattern was an increase in spiritual attitude and happiness scores following the intervention in the experimental group and a small increase in mindfulness. The source also found that all three outcomes were positively correlated. The results support the notion that a structured creative activity may offer a temporary opportunity to engage in focused attention, enjoyment, and reflection. The conclusions drawn, however, are constrained by some inconsistencies in the statistical output reported.

Spiritual attitude

A reported increase in the spiritual attitude of the experimental group may be indicative of the opportunity for reflection, choice and awareness of meanings participants gave to their activity. A mandala can create a contained visual structure that can suggest an order of harmony, the feeling of a whole; and the process of color selection can help the individual express himself. The outcome is relevant to the purpose of the study, as well as to the literature presented in the source report on studies with mandalas and spiritual well-being.

However, this reading should be taken with a grain of salt. Spiritual attitude is a general attitude within the person and can be shaped by culture, beliefs, relationships and life situations. It was not determined which part of the activity caused the change, and the intervention was short, so it is not reasonable to assume that it will result in long-term spiritual growth. The verification of the scale's scores and between-group inferential statistics are also needed.

Happiness

The increase in happiness was greater in terms of being described rather than the change in mindfulness. Coloring could be a fun distraction from the day, a doable task, and a visual record of achievement. These experiences could potentially lead to positive affect that is experienced during or shortly after the activity. The overall finding is consistent with positive psychology explanations that positive emotion and engagement are factors that promote well-being.

Meanwhile, changes in baseline happiness right after an intervention could be attributable to demand characteristics, expectations, social environment, novelty etc. of the intervention itself. A neutral reading group is a group that holds control over some time and attention, but not necessarily on expectations or the interest in a creative task. Use of an appropriately active comparison with another interesting activity would make it easier to determine if the effects are mandala coloring specific.

Mindfulness

The reported mean of mindfulness was very modestly raised. The source's paired test is stated as being statistically significant, but the difference in description is minimal and there is some confusion in the table, which makes the size of the effect and the certainty of its reliability uncertain. This is key: a task can elicit focused attention without enhancing the overall abilities assessed by a mindfulness scale.

Further training in mindfulness may need to be done at a deeper level of practice, with more explicit instruction to attend to thoughts and feelings, and with helped reflection. More research will be needed to differentiate the state from more general mindfulness over time. Replication may indicate if the effect lasts beyond the post test.

The way the three outcomes are related.

- The positive correlations indicate that spiritual attitude, happiness and mindfulness, were co-variant in this sample.
- Conceptually, the relationship between happiness and mindfulness seems reasonable, because the focused awareness of the present moment can occur in conjunction with positive appraisal and emotional regulation.
- Spiritual attitude also can be linked with meaning, connectedness, and acceptance. These interpretations, however, are tentative: correlation does not imply cause and effect, and extremely high correlations may also be caused by common method variance, by common item content, by scoring errors, or by restricted variation within the correlation sample.

Demographic findings

The study examined differences in age, gender, birth order, marital status and educational differences. A consistent statistical pattern is not provided by the source to make strong demographic conclusions. A small number of subgroup comparisons were conducted, especially for first-born and separated participants. These estimates are unreliable and can be affected by individual observations. A set of potential demographic theories should be pre-registered, enough sub-groups should be included, confidence intervals should be provided and non-significant trends should not be interpreted as significant group differences.

Practical implications

Mandala coloring is inexpensive, not too much equipment is required and could be delivered in educational, community, and/or well-being environments. It is recommended that it is used as an optional relaxation or reflective activity for adults who enjoy visual art and is not offered as a replacement for assessment or evidence-based treatment. The activity should also be culturally responsive- mandalas are a picture language with multiple meanings, depending on culture; do not restrict participation by requiring participants to choose between different patterns, if they wish to choose another.

A practical session could involve a brief introduction of the process, using comfortable materials and a quiet learning space, allowing the choice of colours and noticing the process without making judgements about the quality of the final picture. A closing reflection of a few minutes duration can provide a forum for participants to express what they were feeling and what they were learning, but should not be used to press participants to reveal their personal or spiritual beliefs. The current results are more of an exploratory nature and should be interpreted as such rather than as proof of therapeutic efficacy.

Strengths and limitations

Strengths include use of a comparison group, pretest/post test design, use of standardized self-report measures, and a sample across multiple adult age categories. The random assignment of the schools to the experimental and control groups, as reported, is also an appropriate design feature. A study of three related but distinct outcomes and of demographic patterns.

Some limitations are a relatively small purposive sample, self-report measures, lack of follow-up data, and a control condition that might not be representative of the experimental condition in terms of enjoyment or expectations. There are inconsistencies in how the length of the interventions is described in the report and errors in some of the statistical tables. The reported score ranges for measures also need checking. These differences cannot be confidently addressed without the participant level data set and original analysis output.

It may also be difficult to generalize the findings of the study to adults who are distressed or have psychiatric disorders. Results are not applicable to clinical samples nor to all cultural groups. Lastly, several demographic analyses raise the likelihood of chance results, particularly if the sample sizes of the subgroups are small.

Conclusion

The present study compared the effect of color mandala intervention on spiritual attitude, happiness and mindfulness in 70 adults. Positive correlations were reported among the three outcomes, and positive pretest–posttest mean differences reported for spiritual attitude and happiness, with a smaller mean change reported for mindfulness, for the experimental group. Overall, the broad pattern indicates that mandala coloring could be considered an acceptable creative activity and related to short-term self-reported well-being.

The evidence is insufficient to make any firm claims that the mandala coloring exercise is effective for all three outcomes. Some inconsistencies exist in several of the statistical values and scale-score descriptions in the source report and need to be verified. The most convincing conclusion is that the intervention is worthy of more research, especially when used as a supporting exercise for other forms of psychological intervention or therapy, rather than as a sole therapy.

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