

The Effectiveness of Coloring in Reducing Anxiety and Improving PWB in Adolescents

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Abstract

Anxiety is a normal reaction to stressful situations. Excessive anxiety can affect various aspects of life, especially in adolescents. Adolescents who have anxiety tend to experience sleep disorders, substance abuse, and suicide. Therefore, intervention is needed for adolescents who experience anxiety. One of the appropriate interventions for adolescents is art therapy with coloring techniques. Previous research has obtained evidence that coloring can reduce anxiety and improve psychological well-being (PWB). This study aims to determine the effectiveness of coloring activities in reducing anxiety and increasing PWB in adolescents. By using a quasi-experimental design pretest-posttest, total participants in this study were 26 students aged 15-18 years, were divided into two groups, such as mandala and other shapes coloring groups. The State-Trait Anxiety Inventory (STAI) is used to measure anxiety and the PWB questionnaire is used to measure psychological well-being. Using paired sample t-test showed that both coloring groups experienced a decrease in state anxiety before and after the intervention, but there was no significant increase in PWB. Further analysis found that mandala coloring activities were more effective in reducing anxiety than other forms of coloring activities, and PWB of the two groups did not increase. It can be concluded that coloring activities can reduce state anxiety but has not been able to increase PWB.

Keywords: adolescent, anxiety, coloring, mandala, psychological well-being (PWB)

Anxiety is a normal reaction experienced by everyone as a sign of danger that threatens in the future (Akbar, Fanani & Herawati, 2015; Tiller, 2012). Anxiety will interfere individual activities if the anxiety is high and persistent. The number of individuals with anxiety problems in the world is 264 million people or 3.6% of the total population in the world in 2015 (World Health Organization [WHO], 2017). These results show an increase of 14.9% since 2005, which at that time amounted to 232 million people, as a result of population growth and aging (Vos et al., 2016; WHO, 2017). In Indonesia, individuals who experience anxiety account for 3.3% of the total population with a total of 8,114,774 cases in 2015 (WHO, 2017). WHO (2017) explains that anxiety is ranked sixth out of the top 10 causes of YLD (Years Lived with Disability) in all WHO Regions such as Australia, Brazil, Canada, and Indonesia.

Generally, many teenagers experience anxiety. The results of previous studies suggest that anxiety problems develop from childhood or adolescence (Tiller, 2012; Wittchen, Kessler, Pfister, Höfler & Lieb, 2000). According to the National Institute of Mental Health (cited in the American Psychological Association [APA], 2016) as many as 25% of adolescents in America aged 13-18 experience anxiety that interferes with daily activities. Syokwa, Aloka, and Ndunge (2014) conducted a study on children aged 9-17 years which showed that as many as 13 out of every 100 adolescents have anxiety problems. The anxiety experienced by adolescents is caused by a transition period from childhood to adulthood that lasts from 11 to 19 or 20 years of age (Papalia & Feldman, 2012). The impact of anxiety experienced by adolescents affects various aspects of life, such as affects thought processes, perceptions and learning so that it can reduce the ability to focus attention, reduce memory, and ability in association (Pangastuti, 2014). Adolescents experiencing anxiety problems can be associated with low self-esteem, developmental difficulties at school (such as absence and poor school performance), as well as disruptive behavior disorders (Silva Júnior & Gomes, 2015; Mathyssek, 2014).

Individuals who experience anxiety tend to have lower PWB (Maddock, Hevey, D'Alton, & Kirby, 2019; Rapheal & Paul, 2014). Research conducted by Iani, Quinto, Lauriola, Crosta, & Pozzi (2019) shows that individuals who experience anxiety have a negative relationship to PWB. This means that the higher the anxiety experienced by the individual, the lower the PWB, conversely, the lower the anxiety experienced by the individual, the higher the PWB. Ryff and Keyes (1995) describe PWB based on the extent to which individuals have goals in life, realize their potential, the quality of their relationships with others, and the extent to which they feel responsible for their own lives. Considering that the impact of anxiety can affect the lives of adolescents in general, appropriate interventions are needed to overcome the anxiety experienced by adolescents and improve PWB, one of which is art therapy.

Malchiodi (2012) explains that art therapy is the application of visual arts and creative processes in a therapeutic relationship to support, maintain and improve the psychosocial, physical, cognitive and spiritual health of individuals of all ages. Art is an excellent tool for communicating thoughts and feelings that are too painful to express in words. According to Ganim (2013) art is successfully used to reduce physiological stress that causes immune system dysfunction by connecting individuals with negative, painful, or scary emotions that trigger stress. After these emotions are accessed through guided visualization, these emotions can then be released by expressing them in the form of imagination through drawing, painting, making sculptures, or collages. Art therapy can be the right way to express emotions, such as feelings of anger, fear of rejection, anxiety, and low self-esteem (Permatasari, Marat, & Suparman, 2017). One of the art therapy techniques used to reduce anxiety is coloring. Coloring is also an art activity that is used as a means of self-expression that indirectly describes a person's mood,

feelings and emotions (Jung & Freud in Stefani, 2016). There are several kinds of coloring that can be done, such as coloring blank paper, coloring certain areas such as squares, copying colors from patterns that have been provided, coloring animal and natural motifs, and coloring in circles (mandalas) (Curry & Kasser, 2005; van der Vennet & Serice, 2012; Carsley, Heath, & Fajnerova, 2015; Eaton & Tieber, 2017; Flett et al., 2017).

An example of research on coloring other forms (in general) was carried out by Flett et al. (2017) and Eaton and Tieber (2017). Research by Flett et al. (2017) involved 104 women aged 18-38 years. Participants were divided into two groups, namely the coloring group and the puzzle group as a control group. The results of research by Flett et al. (2017) showed that the participants who colored significantly experienced a decrease in the level of depression and anxiety symptoms after the intervention, while the control group did not experience a decrease. Then, research conducted by Eaton and Tieber (2017) involved 85 students aged 18-44. The results showed a positive effect of coloring that is greater reduction of anxiety and evidence of higher persistence in the free-choice group compared to the forced-choice group. The research is divided into two conditions, namely the free-choice group and the forced-choice group. In the free-choice group, participants were asked to color the picture using the markers provided, while in the forced-choice group the participants were given a colored copy of the image and instructed to color their image as closely as possible according to the examples provided. Through the research of Eaton and Tieber (2017), it can be concluded that coloring in a relatively short time can reduce anxiety, and possibly increase persistence in difficult tasks.

Coloring mandala has been shown to reduce anxiety (Curry & Kasser, 2005; Kristina, 2017; Lee, 2018; van der Vennet & Serice, 2012). Mandala coloring is defined as an artistic design created in the context of a circle, because a circle represents oneself and helps individuals to organize and center themselves in a circle (Pisarik & Larson as cited in Anderson, 2017). According to Jung (in Holbrook and Comer, 2017) the mandala is part of the collective unconscious, and its physical manifestation is a psychological expression of the self. Through drawing a mandala, it allows individuals to gain more self-awareness and understands about one's self as a whole, and shows positive mental health (Anderson, 2017). Mandala have been adopted as an art therapy intervention for a wide variety of populations and purposes (Lee, 2018). Mandala have been used to relieve stress in adults with intellectual disabilities, to manage acute pain in pediatric patients, and to help children with cancer and their healthy siblings express their feelings (Schrade, Tronsky, & Kaiser, 2011; Sourkes as cited in Lee, 2018; Stinley, Norris, & Hinds, 2015).

Research conducted by Curry and Kasser (2005) on 84 students showed that the level of anxiety decreased in the group coloring mandalas and squares. Both groups were shown to show a greater reduction in anxiety than the free-form coloring group (coloring a blank sheet of paper). This is because coloring in a geometric pattern can cause a calm condition so that it can reduce anxiety (Curry & Kasser, 2005). Then, van der Vennet and Serice (2012) did a research replication of Curry and Kasser (2005) to 50 psychology students or graduates. The results of this study indicate that coloring mandalas reduces anxiety levels much more than coloring plaid designs or coloring on blank paper. In addition, Lee (2018) conducted a study on 95 students aged 18-26 years. This study divided participants into four groups, namely coloring the mandala freely, coloring the mandala with a predetermined color, coloring the mandala freely in a predetermined circle, and coloring the rectangle with a predetermined color. The results of Lee (2018) study show that all three mandala conditions reduce anxiety compared to control conditions.

Besides from reducing anxiety, mandala exercises can also significantly improve mood and PWB in the general population (Babouchkina & Robbins, 2015; Pisarik & Larson, 2011). Savage (as cited in Rapheal & Paul, 2014) explains that adolescents who have PWB show a sense of satisfaction with their lives and experience many positive emotions. In addition, PWB is also associated with maximum academic functioning, social competence and support and physical health. Therefore, adolescents who have good PWB are adolescents who are not only physically fit but also mentally healthy. Therefore, adolescents who have good psychological well-being are adolescents who are not only physically fit but also mentally healthy. Previous research has shown that the process of making mandalas can improve psychological well-being (Harter as cited in Pisarik & Larson, 2011); and effective for reducing stress (Duong, Stargell, & Mauk, 2018).

Previous research has more measured coloring activities to reduce anxiety in the adult population (Curry & Kasser, 2005; Eaton & Tieber, 2017; Flett et al., 2017; Kristina, 2017; Lee, 2018; van der Venet & Serice, 2012), however there have been no studies regarding the effectiveness of coloring activities in the adolescent population. In addition, research on the impact of coloring mandala on the PWB of adolescents with anxiety is still very limited. Therefore, the aims of this study is to determine the effectiveness of coloring activities in reducing anxiety and increasing PWB in adolescents. There are three assumptions in this study, such as (a) coloring activities can reduce anxiety in adolescents, (b) mandala coloring activities are more effective in reducing anxiety than other coloring activities for adolescents, and (c) mandala coloring activities can improve PWB in adolescents.

Methods

Study Design

This study used a pretest-posttest quasi-experimental design by dividing the participants into two groups. The first group was asked to color the mandala pattern while the second group was asked to color rectangle pattern. The selection of participants used a purposive sampling technique by selecting participants based on specific criteria set by the researcher.

Participants

The participants in this study had the following criteria (a) adolescents aged 15-18 years, (b) experienced anxiety at a moderate level (40-59) and a severe level (60-80) based on the STAI score (State-Trait Anxiety Inventory), (c) male and female adolescents can participate in this study. Researchers did not include participants who (a) used drugs or were under the influence of drugs such as antidepressants and alcohol, (b) had physical limitations, and (c) color blindness.

Study Settings and Procedures

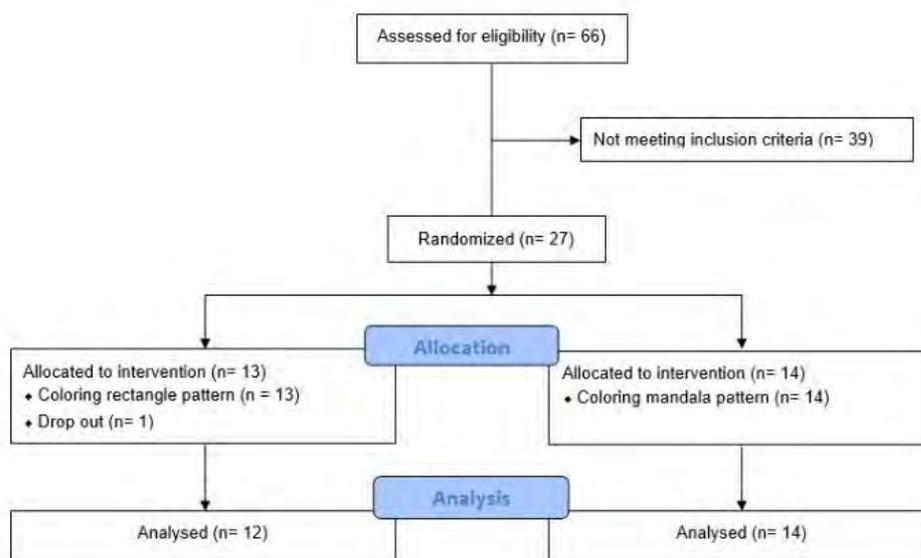
Participants were students 10 and 12 grades recruited from one school in Jakarta, Indonesia. Participants who meet the inclusion criteria were contacted through school for the baseline measure and the randomization process to one of the coloring mandala pattern or rectangle pattern, and also for post-test at the end of the intervention. This coloring activity was carried out for three days with each group getting one pattern each day. The duration for each session is 30 minutes. After 30 minutes the participants were asked to stop and not continue coloring. Previously, the participants had been told that the coloring activity lasted only 30 minutes and every 15 minutes the researcher wrote on the blackboard so that the participants knew the time that had passed. On the third day after completion of the intervention, participants were given two questionnaire again that are STAI and PWB. After collecting the data, the participants

were given a souvenir as a thank you. The flow diagram of the participants is presented in Figure 1.

After collecting the data, the researcher should have spread out the questionnaire to 11th grade vocational high school students and high school students. However, researchers were unable to retrieve data because of the Covid-19 problem, which requires learning activities by online.

Figure 1

Flow Diagram of the Participants



Outcome Measures

All outcome measures were collected at baseline (T_0) and after 3 days of participating in the coloring activity (T_1). Anxiety was assessed using the State-Trait Anxiety Inventory (STAI) developed by Spielberger, Gorsuch, Lushene, and Vagg, Jacob (1983). This anxiety measurement tool has been adapted by the research and measurement section of the Faculty of Psychology at Tarumanagara University with an alpha cronbach value of 0.941 for state anxiety and 0.902 for trait anxiety. It contains 40 statements that is 20 statement items to measure state anxiety and the next 20 statement items to measure trait anxiety. The STAI are rated on a four-point Likert scale using response categories from 1 (not at all) to 4 (very much so).

PWB was assessed using PWB questionnaire developed by Carol D. Ryff (1996) which has been adapted by the research and measurement section of the Faculty of Psychology Tarumanagara University. It contains 31 statements which are rated on a five-point Likert scale using response categories from 1 (disagree) to 5 (strongly agree). The instrument covers six domains, such as self-acceptance, positive relations with other, autonomy, environmental mastery, personal growth, and purpose in life.

Analysis

STAI and PWB were analyzed using paired sample t-test to see differences in pre-test and post-test scores. In addition, participant demographic data were analyzed using the chi-square test. Statistical analysis was performed using SPSS version 22.

Results

Demographic Characteristics

The participants in the two groups had similarities in sociodemographic characteristics as seen from p value $> .05$, thus there was no significant difference. Because the two groups have similar or equal characteristics, the two groups can be compared. The average female participant in this study was 17 people with a percentage of 65.4%. Then, most of the participants had first birth order as many as 11 people with a percentage of 42.3%. The age range of participants in this study ranged from 15-18 years and the average age of participants was 17 years old, amounting to 9 people with a percentage of 34.6%. The demographic characteristics is presented in Table 1.

Table 1

Demographic Characteristics

Variable	Rectangle (n = 12)		Mandala (n = 14)		Total (n=26)		p
	Frequency	%	Frequency	%	Frequency	%	
Gender							
Male	5	41.7	4	28.6	9	34.6	.484
Female	7	58.3	10	71.4	17	65.4	
Age							
15	1	8.3	5	35.7	6	23.1	.111
16	4	33.3	1	7.1	5	19.2	
17	3	25	6	42.9	9	34.6	
18	4	33.3	2	14.3	6	23.1	
Grade							
10	5	41.7	6	42.9	11	42.3	.951
12	7	58.3	8	57.1	15	57.7	
Order of Birth							
1	3	25	8	57.1	11	42.3	.245
2	2	16.7	3	21.4	5	19.2	
3	3	25	1	7.1	4	15.4	
4	1	8.3	2	14.3	3	11.5	
5	2	16.7	-	-	2	7.7	
6	1	8.3	-	-	1	3.8	

Normality Test Data

Normality test data using Shapiro-Wilk. The results of the normality test of the STAI measuring instrument on the state anxiety dimension show a significance value of the pre-test of .074 and the post-test of .092. Meanwhile, the trait anxiety dimension shows a significance value of pre-test of .973 and post-test of .238. The results of the PWB measuring instrument normality test showed a significance value of the pre-test of .968 and of the post-test of .062. Based on the results of the normality test, all variables have a p value $> .05$, so the data is normal. The normality test data is presented in Table 2.

Table2*Normality Test Data*

Measuring instrument	p (Shapiro-Wilk)	Distribution
STAI		
State anxiety dimation		
Pre-Test (T ₀)	.074	Normal
Post-Test (T ₁)	.092	Normal
Dimensi trait dimation		
Pre-Test (T ₀)	.973	Normal
Post-Test (T ₁)	.238	Normal
PWB		
Pre-Test (T ₀)	.968	Normal
Post-Test (T ₁)	.062	Normal

Findings

Table 3 shows the change scores in anxiety and PWB from T₀ to T₁ measured with the STAI and PWB questionnaire. A paired sample t-test was conducted to see differences in the pre and post-test results of STAI and PWB (T₀, T₁). The anxiety difference test is divided into two types, namely state anxiety and trait anxiety. The results of the state anxiety difference test using the paired sample t-test showed the value of $t = 3.765$, $p = .001 < .05$. This shows that there are significant differences between the two intervention groups. More specifically, there was a decrease in state anxiety before and after intervention in the other form groups and mandalas. Whereas on trait anxiety the results of the paired sample t-test showed the value of $t = 1.654$, $p = .111 > .05$, thus there was no significant difference in the two intervention groups. These results indicate that trait anxiety in both groups did not decrease. The conclusion from the STAI results states that coloring activities can reduce anxiety, but only temporarily, which is shown only in the state anxiety dimension.

In testing the group that was most effective in reducing anxiety, the researcher tested the differences between the two groups one by one using the paired sample t-test. The results of the state anxiety dimension difference test in the other form groups showed the value of $t = 2.186$, $p = .051 > .05$, thus there was no significant difference. On the trait anxiety dimension, it shows the value of $t = .454$, $p = .659 > .05$, thus there is no significant difference. The results of the STAI analysis in the other form groups indicated that there was no decrease in state and trait anxiety before and after the intervention was given.

Whereas in the Mandala group the results of the state anxiety test showed the value of $t = 3.074$, $p = .009 < .05$. This shows that there are significant differences in the mandala group. More specifically, there was a decrease in state anxiety before and after the intervention in the mandala group. On trait anxiety, it shows the value of $t = 1.654$, $p = .122 > .05$, thus there is no significant difference. These results indicate that trait anxiety in the mandala group did not decrease. However, the significance value of the trait in the mandala group was closer to .05 than the other form groups, which means that the mandala group was much better at reducing anxiety. The conclusion from the results of this effectiveness test states that the mandala group tends to be more effective at reducing anxiety than the other form groups.

Furthermore, the results of the PWB analysis using the paired sample t-test showed the value of $t = -1.164$, $p = .265 > .05$, which means that there was no significant difference in the

Mandala group. The results of this PWB show that there is no increase in the PWB before and after being given the mandala coloring activity. Therefore, the mandala coloring activity has not been proven to improve PWB for the participants.

Table 3

Scores on State-Trait Anxiety Inventory (STAI) and Psychological Well-Being (PWB) before (baseline, T₀) and after (T₁) the coloring activity

Variable	Rectangle (n=12)		Mandala (n=14)		Total (n=26)	
	Mean	SD	Mean	SD	Mean	SD
STAI						
State anxiety dimension						
Pre-test (T ₀)	48.08	6.19	50.93	7.84	49.62	7.13
Post-test (T ₁)	42.50	12.40	41.07	7.42	41.73	9.84
t	2.186		3.074		3.765	
p	.051		.009		.001	
Trait anxiety dimension						
Pre-test (T ₀)	49.33	7.02	53.64	9.35	51.65	8.49
Post-test (T ₁)	48.25	11.51	47.64	8.95	47.92	9.99
t	.454		1.654		1.654	
p	.659		.122		.111	
PWB						
Pre-test (T ₀)	3.33	.40	3.24	.59	3.28	.50
Post-test (T ₁)	3.46	.46	3.33	.51	3.39	.49
t	-1.679		-1.164		-2.006	
p	.121		.265		.056	

Discussion

The purpose of this study was to determine the effectiveness of coloring activities in reducing anxiety and improving psychological well-being in adolescents. The results of the data analysis showed that the participants' anxiety experienced a temporary decrease (state anxiety) in the two groups. These results answer hypothesis 1 that coloring activities can reduce anxiety. This findings in this study are in line with research conducted by Curry and Kasser (2005) that participants who colored the plaid design and mandala for 20 minutes were effective in reducing state anxiety. In addition, research conducted by Eaton and Tieber (2017) also shows that coloring activities are effective in reducing state anxiety. Both studies explain that other form groups and mandala groups each have a structure and direction (Curry & Kasser, 2005; Eaton & Tieber, 2017). Grossman (as cited in Lee, 2018) explains that if anxiety is an inner chaos, then the existence of a structure in both groups helps participants manage the chaos. Individuals who do coloring activities have awareness and attention to the present moment, so that individuals experience lower levels of anxiety (Brown & Ryan, 2003). Conversely, the absence of patterns and directions made participants experience confusion so that participants did not color continuously for 20 minutes. Therefore, coloring activities are not optimal. Csikszentmihalyi (1997) describes a state like in flow that occurs during the art-making process. He found that the process of making an art work was considered more important than the final result of an art work. Flow refers to a situation in which the individual is very involved in an activity so that the individual does not focus on the anxiety they experience

(Csikszentmihalyi as cited in Ko & Donaldson, 2011). During coloring, there are tactile, visual, and repetitive muscle activities that are part of the coloring process. Research conducted by Benson (as cited in Sandmire et al., 2012), discusses the mind body relationship and the results of this study indicate a relationship between repetitive activity and a state of relaxation.

On trait anxiety scores before (pre-test) and after (post-test) showed a decrease from the mean value of 51.65 to 47.92. However, this score did not show a significant decrease in the two groups. According to Sandmire et al. (2012) the trait anxiety score is relatively stable over a long period of time, while the state anxiety score will fluctuate based on the individual's current environmental conditions. In reducing trait anxiety, additional intervention is needed besides coloring. In a study by Bergen-Cico and Cheon (2014), it is explained that mindfulness has the strongest effect in reducing trait anxiety for eight weeks. The mindfulness given can be in the form of yoga, meditation so that individuals do not judge the current event and respond to the situation reflectively (Anderson, 2017). In this study, researchers only provided coloring activity for three days while it took a longer time to reduce trait anxiety.

Hypothesis 2 is that mandala coloring activities are more effective in reducing anxiety than rectangle coloring activities in adolescents. The results of data analysis showed that the decrease in participant anxiety in the mandala group was much greater than in the rectangle groups, so that hypothesis 2 was answered. According to Jung (as cited in van der Venet and Serice, 2012) and Buchalter (2013), the mandala shows a centering effect because of its circular shape and no angles so that individuals can easily focus on the center. Rectangle indicates a sharp angle. Bolander and Lundholm (as cited in Slegelis, 1987) describe the angular lines as giving feelings of unpleasantness, aggression, expressions of hostility, fear and control while the curved shape of the circle indicates a state of calm. This condition is due to the fact that a circle is the most symmetrical two-dimensional shape ever (Buchalter, 2013). The symmetrical shape and the presence of repetitive patterns in the mandala help draw the individual into a state of calm and relaxation. Individuals become deeply involved in an activity that removes them from the flow of negative thoughts and emotions that can sometimes dominate their lives (Curry & Kasser, 2005). When individuals are in a calm and relaxed condition, they indirectly balance their physical, mental, and spiritual states so that individuals can increase awareness and regulate negative emotions so that they can be managed adaptively (Greenson as cited in Napitupulu, 2018).

Then hypothesis 3 is that coloring mandalas can improve psychological well-being in adolescents. The results of data analysis show that coloring mandalas for three days has not been proven to improve psychological well-being in adolescents. Therefore, hypothesis 3 is not answered. This can be caused because the participants in the study experienced psychological problems such as anxiety, stress in the low and moderate categories. The higher the level of psychological problems experienced by a person, the higher the benefits obtained so that the increase in PWB is more visible. Most of the participants in this study were also in the moderate category so this could be one of the causes. In addition, Brown and Ryan (2003) explained that no increase in PWB can occur when the individual has a neurotic personality type. Neurotic personality type is closely related to negative emotions (negative affect) so that it affects a person's psychological well-being (Diener et al. cited in Brown & Ryan, 2003). Another cause is the difference in the age of the participants. The range of participants involved in the study conducted by Duong et al. (2018) are 22-56 years old. This shows that the participants in the study were in the early adult category, while in this study the participants were in the adolescent category, so there were differences in cognitive and psychosocial development.

Recommendations

The limitation of this study is the lack of time to collect data. Due to the condition of the large-scale social distancing which made students study at home, researchers were unable to continue collecting data. However, within a limited period of time and the number of participants, a small picture of the effectiveness of mandala coloring has been obtained. Meanwhile, PWB cannot be better described. Future studies need to consider the number of participants being enlarged and the provision of multiple intervention sessions because this cannot be done so that it can be considered in the future.

Conclusions

The conclusion of this study is that mandala coloring activity is more effective in reducing anxiety but has not been proven to improve psychological well-being. The decrease in anxiety that occurs in adolescents is temporary (state anxiety), namely anxiety that can change from time to time where in response to situations that threaten adolescents, it is not influenced by personality.

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