











ORIGINAL ARTICLE

# The effect of mandala colouring on anxiety in hospitalized COVID-19 patients: A randomized controlled clinical trial

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**ABSTRACT:** COVID-19 significantly affects patients' mental health, triggering a wide range of psychological disorders, including anxiety. The aim of this study was to investigate the effect of mandala colouring on the anxiety of hospitalized COVID-19 patients. In this randomized controlled clinical trial, 70 hospitalized patients with COVID-19 were randomly divided between the intervention and control groups. Standard care was provided for both groups. The intervention group spent 30 min/day for six consecutive days performing mandala colouring. Patient anxiety was measured prior and subsequent to the intervention in both groups using the Spielberger State-Trait Anxiety Inventory. Data were analysed using SPSS software version 25. The mean anxiety score was not significantly different between the two groups before the intervention ( $P = 0.08$ ). Subsequent to the intervention, the mean anxiety score in the intervention and control groups was  $44.05 \pm 4.67$  and  $67.85 \pm 6.25$ , respectively, indicating a statistically significant ( $P = 0.0001$ ) decrease in the anxiety measured among the intervention group as compared with that of the control group. The results of this study show that 30 min of mandala colouring daily is an effective strategy for reducing anxiety in hospitalized COVID-19 patients. Mandala colouring can complement routine treatment and provides a non-pharmaceutical option for decreasing patient anxiety.

**KEY WORDS:** anxiety, art therapy, colouring, COVID-19, mandala.

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## INTRODUCTION

As an emerging disease, coronavirus disease 2019 (COVID-19) has widespread effects on people's physical and mental health (Usher *et al.* 2020b). Commonly experienced negative emotions include helplessness, confusion, fear, anxiety, depression, and guilt (Usher *et al.* 2020a; Usher *et al.* 2020c). Anxiety disorders are a pressing mental health concern (Abbing *et al.* 2018). Feelings of anxiety are an expected response to stressful situations (Roy *et al.* 2020). They can be characterized by unpleasant feelings such as panic and fear (Gençdoğan *et al.* 2018). The experience of anxiety can lead to a series of physiological changes that can weaken the immune system (Liu *et al.* 2020) and ultimately threaten a patient's health (Curran *et al.* 2017). Anxiety has also been associated with depression, suicidality, and self-harming behaviour (Holmes *et al.* 2020). In a meta-analysis, Deng *et al.* reported a prevalence of anxiety in COVID-19 patients of 47% (Deng *et al.* 2020). For many patients diagnosed with COVID-19, a fear of the unknown nature of the disease and quarantine restrictions can lead to anxiety (Liu *et al.* 2020). Furthermore, the physical and social isolation of patients with COVID-19 has been shown to contribute to anxiety and sleep disorders (Rajeswari & SanjeevaReddy 2020). Many studies have highlighted the high prevalence of psychiatric disorders among COVID-19 survivors, demonstrating the importance of prevention, screening, and treatment for these diagnoses (Duan & Zhu 2020; Epstein *et al.* 2020; Paz *et al.* 2020).

Various pharmacologic and non-pharmacologic methods may be used to manage anxiety. Although symptoms of anxiety in patients with COVID-19 are typically mild in the early stages of the disease, they can suddenly worsen (Liu *et al.* 2020; Rajeswari & SanjeevaReddy 2020). The use of benzodiazepines or other pharmacologic agents to treat anxiety introduces an increased risk of respiratory depression and side effects causing clinical deterioration. As a result, non-pharmaceutical interventions, such as art therapy, may be safer alternatives (Liu *et al.* 2020). There is a close relationship between art, healing, and well-being which has been acknowledged around the world. Since the mid-twentieth century, art has been an important tool for the diagnosis and treatment of mental illnesses (Gençdoğan *et al.* 2018). According to art psychotherapists, mandala colouring is a psychotherapy technique which can provide psychological support and healing (Elkis-Abuhoff *et al.* 2009; Gençdoğan *et al.* 2018). In a study investigating the relationship between consciousness, the unconscious, and reality, it was noted

that mandala colouring could be used as an effective method for treating some diseases (Gençdoğan *et al.* 2018). The mandala is a product of creative imagination, in which deep religious, philosophical, psychological, and aesthetic concepts are mingled (Gençdoğan *et al.* 2018; Kim *et al.* 2018). Mandalas include art forms created using a circular framework. In Sanskrit, the word mandala means 'the whole world' or 'the circle of healing', reflecting the order and unity of the universe (Elkis-Abuhoff *et al.* 2009). This concept refers individuals to their essence and guides them to be honest with themselves to achieve a peaceful spirit (Kim *et al.* 2018). This circular art has been traditionally used for meditation in various Eastern cultures (Malchiodi 1993) and is a symbol of psychological integrity (Elkis-Abuhoff *et al.* 2009).

A systematic review by Abbing *et al.* showed that art therapy had a positive effect on reducing anxiety in patients (Abbing *et al.* 2018). The results of another study by Flett *et al.* also revealed that daily mandala colouring improved psychological symptoms (Flett *et al.* 2017). Other studies have demonstrated that mandala colouring can decrease anxiety (Carsley *et al.* 2015). Mandala colouring is a safe and accessible activity that does not require any special skills or training and can be used as a complementary strategy for anxiety reduction. To date, there are no published studies investigating the effects of mandala colouring on anxiety in patients with COVID-19. Considering the relatively high prevalence of anxiety in this patient population and its devastating effects on the patient's physical and mental health, this study aimed to investigate the effect of this mandala colouring on anxiety levels in hospitalized COVID-19 patients.

## METHODS

### Study design

This study was a randomized controlled clinical trial performed from May 20, 2020 to November 30, 2020 on 70 patients hospitalized with COVID-19 on the internal medicine and infectious disease wards of the Amir Al-Momenin Hospital of Arak, affiliated with Arak University of Medical Sciences.

### Participants

The eligible study population included all patients between 18 and 65 years of age diagnosed with COVID-19 who were admitted for greater than

24 hours during the dates of study. There could be no documented history of diagnosis or treatment for mental illnesses/anxiety disorder. The selected participants were clinically stable, without dyspnoea or hypoxia, and were not at the end-stage of the disease (Elkis-Abuhoff *et al.* 2009; Jodaki *et al.* 2021; Kim *et al.* 2018). Exclusion criteria were lack of capacity, deterioration of the patient's condition (decline in consciousness or haemodynamic instability), transfer to the ICU, or discharge (Curran *et al.* 2017; Elkis-Abuhoff *et al.* 2009; Jodaki *et al.* 2021).

### Sample Size

The sample size was determined based on Koo *et al.* (2020) using the following formula:

$$n = \frac{(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2 (s_1^2 + s_2^2)}{d^2}$$

Considering  $\alpha = 0.05$ ,  $\beta = 0.2$ ,  $S_1 = 6.8$ ,  $S_2 = 11.8$ , and the statistical power of 0.8, the sample size per each group was determined  $n = 35$  (Figure 1).

### Randomization

Patients were enrolled using a convenience sampling method. They were randomly divided between the intervention and control groups using a block randomization design. For this study, ten blocks were considered; half of which were coded 'C', and the other half were coded 'E', which were then assigned to the control and intervention groups, respectively. The codes were non-repeatedly placed in each block, and the blocks were randomly selected without any substitution.

### Outcome assessment

The tools used in this study included two questionnaires. The first one was a demographic questionnaire to collect information such as age, gender, marital status, education level, employment status, and length of hospitalization. These data were collected through either medical record review or direct patient interview. The second questionnaire was the Spielberger State-Trait Anxiety Inventory (STAI). This instrument, developed by Spielberger in 1983, includes independent self-assessment scales for measuring overt (state) and covert anxiety (trait) (Jodaki *et al.* 2021). This study focussed on the overt anxiety scale, which consists of

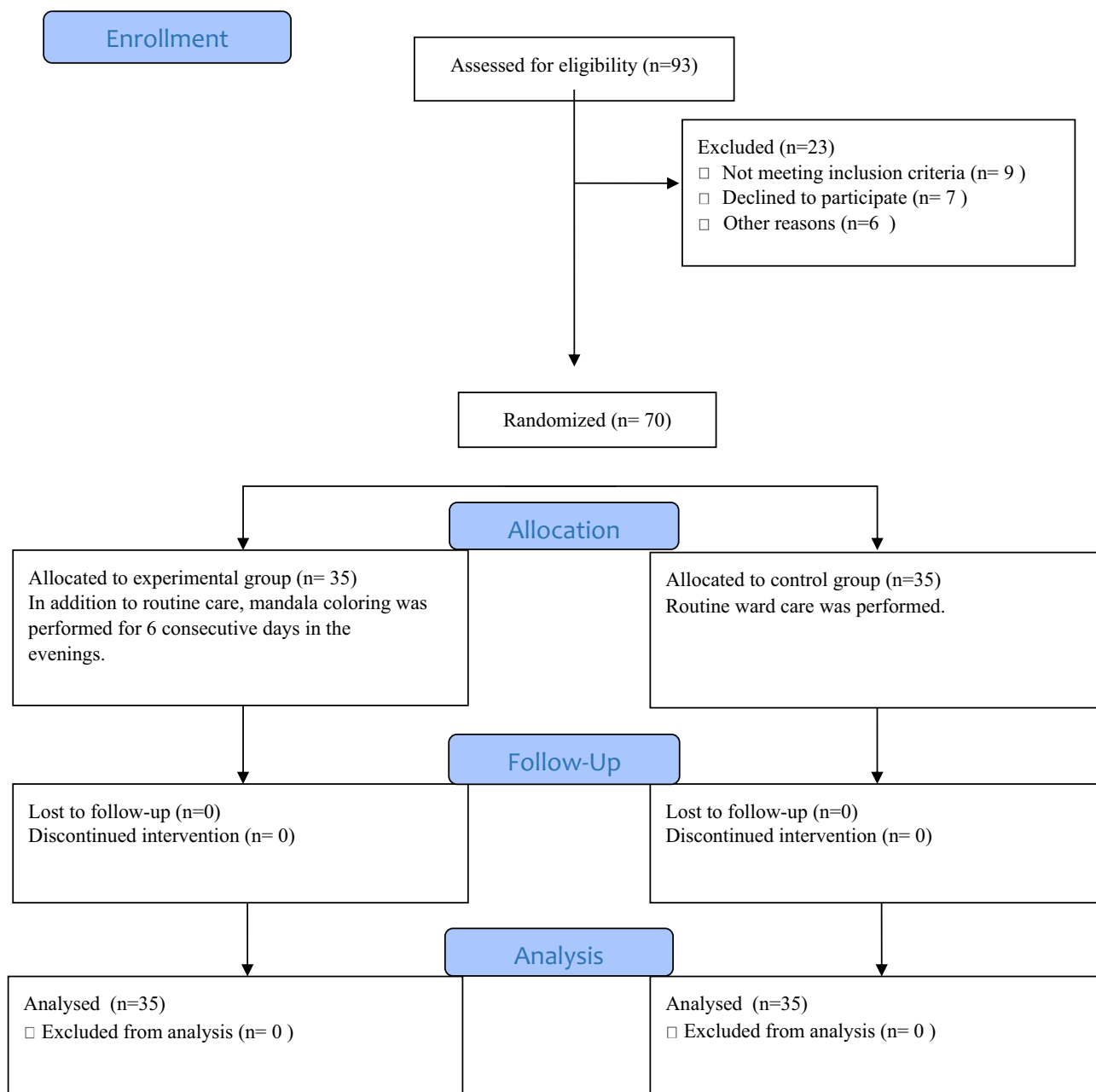
20 items that assess a person's feelings based on a 4-point Likert scale (very low, low, high, and very high). The total score of the STAI can range from 20 to 80. In the overt anxiety scale, scores are interpreted using the following categories: 20–31 (mild); 32–42 (mild/moderate); 43–53 (moderate/severe); 54–64 (relatively severe); 65–75 (severe); and  $\geq 76$  (very severe) (Jodaki *et al.* 2021). Standardization and intercultural matching of the STAI questionnaire in Iran were performed by Roohy *et al.* (2005), reporting a reliability of 0.90 (Roohy *et al.* 2005). The reliability of this tool was confirmed, delivering a Cronbach's alpha coefficient of 92%.

### Intervention

On the second hospital day or later, patients were eligible for recruitment and assignment to the control and intervention groups. Demographic information was collected through medical record review and patient interviews for patients in both groups. Subsequently, the STAI questionnaire was administered. In the control group, patients received routine care. In the intervention group, patients received routine care and performed mandala colouring for 30 min/day in the evenings for six consecutive days. On the evening of the 6<sup>th</sup> day of the intervention, the STAI questionnaire was again administered to patients in both groups. (Gençdoğan *et al.* 2018; Noor *et al.* 2017; Yakar *et al.* 2021). The evening time was chosen for performing the intervention to avoid interference with clinical nursing tasks (medication administration and other therapeutic interventions). Six preselected mandala drawings were separately printed on A4 (21.0 cm × 29.7 cm) sheets. A new drawing was given to each patient daily. Various designs were used for the six days of the intervention. At the beginning of the study, a pack of six coloured pencils (yellow, blue, green, red, purple, and brown) was provided. Each patient was advised to colour in relative silence (Angellim *et al.* 2020.; Gençdoğan *et al.* 2018; Yakar *et al.* 2021). For illiterate patients, the researcher read the questions to the patient and then recorded their responses.

### Data analysis

In this study, the data were analysed using SPSS (version 25) software. Quantitative variables were described using mean and standard deviation, and qualitative variables were presented by frequency and percentage. For inferential analysis of qualitative



**FIGURE 1** The CONSORT follows diagram of the patients' recruitment.

variables, the Chi-square and Fisher's exact tests were applied. The distribution of quantitative variables was assessed by the Kolmogorov–Smirnov test. The independent (or paired) samples Student's *t* test or its non-parametric equivalents (the Mann–Whitney or Wilcoxon tests) were used accordingly. To control the confounding effects of baseline parameters, the covariance test was used. A *P*-value of  $<0.05$  was considered statistically significant.

### Ethical considerations

This study was approved by the Corona Research Center of the Research Committee of Arak University of Medical Sciences (registration code: 3634) and the Ethics Committee of the university (ethics code: IR.ARAKMU.REC.1399.089). After obtaining the required permissions from the Vice Chancellor for Research, the study was performed at the Amir Al-

Momenin Hospital of Arak. The study's protocol was registered at the Iranian Registry for Clinical Trials (trial code: IRCT20180519039711N6) and is available online. Before starting the study, the patients were advised regarding the method and purpose of the study and informed consent acquired.

## RESULTS

Thirty-two (45.7%) of the participants were female, and 38 (54.3%) were male. The mean age was  $39 \pm 7.9$  years, and the mean duration of hospitalization due to COVID-19 at the onset of study participation was  $8.4 \pm 5.2$  days. Other demographic and clinical data are presented in Table 1, indicating no statistically significant differences between the intervention and control groups.

Our findings demonstrate that the mean anxiety score was not significantly different between the two

groups prior to the intervention. However, this score significantly increased in the control group while decreasing in the intervention group at the end of the study period (Table 2).

To control for the confounding effect of the baseline anxiety score, analysis of covariance (ANCOVA) was performed, resulting in the adjusted mean baseline scores of  $56.94 \pm 0.56$  and  $55.96 \pm 0.56$  in the control and intervention groups, respectively ( $P > 0.05$ , Table 3).

This demonstrates no statistically significant difference in the distribution of various anxiety severities between the intervention and control groups at the baseline ( $P = 0.08$ ), with all patients scoring within the mild and moderate anxiety ranges. After the intervention, there was a statistically significant difference in the distribution of anxiety severity between the two groups ( $P < 0.0001$ ). According to the Wilcoxon test, anxiety levels increased in a statistically significant

**TABLE 1** Comparison of demographic and clinical characteristics of patients in the control and intervention groups

	Control group		Intervention group		Significance
	Frequency	Percent	Frequency	Percent	
Gender					
Female	13	37.1	19	54.3	X <sup>2</sup> =2.072 <i>P</i> = 0.230
Male	22	62.9	16	45.7	
Marital status					
Single	8	22.9	6	17.1	Fisher exact=2.826 <i>P</i> = 0.460
Married	23	65.7	28	80	
Divorced	2	5.7	1	2.9	
Widowed	2	5.7	0	0	
Educational level					
Illiterate	5	14.3	5	14.3	Fisher exact=1.865 <i>P</i> = 0.117
High school	10	28.6	9	25.7	
Diploma	11	31.3	10	28.6	
Superior diploma	1	2.9	2	5.7	
Undergraduate	7	20	8	22.8	
Master	1	2.9	1	2.9	
Occupation					
Employee	12	34.2	9	25.8	Fisher exact=4.638 <i>P</i> = 0.467
Self-employed	13	37.1	11	31.3	
Unemployed	1	2.9	0	0	
Retired	1	2.9	1	2.9	
Homemaker	8	22.9	14	40	
		Mean (SD)		Mean (SD)	
Age (years)		40.42 (8.59)		37.65 (6.92)	T = 1.468 <i>P</i> = 0.142
Duration of hospitalization (days)		8.37 (4.26)		9.42 (5.94)	Mann-Whitney u = 492.5 <i>P</i> = 0.157

SD, Standard deviation.

**TABLE 2** Comparison of the mean anxiety scores of COVID-19 patients before and after the intervention in the two studied groups

	Group	Before		After		P-Value
		Mean	SD	Mean	SD	
Anxiety Score on STAI	Intervention	58.68	2.97	44.05	4.67	0.0001
	Control	57.43	4.44	67.85	6.25	0.0001
	P-value	0.08		0.0001*		

SD, Standard deviation; \*ANCOVA.

**TABLE 3** Estimated marginal means of baseline anxiety after ANCOVA

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Control	56.949 <sup>a</sup>	.564	49.824	61.074
Intervention	55.965 <sup>a</sup>	.564	46.840	57.091

Abbreviation: Std. Error, standard error.

fashion in the control group ( $P < 0.0001$ ). Four patients in the control group, who had mild anxiety at the baseline, progressed to the moderate level, and one patient who had moderate anxiety entered into the severe range. Conversely, patients in the intervention group recorded a statistically significant decrease in anxiety ( $P = 0.008$ ). In this group, three patients who had severe anxiety fell into a lower category. Out of 26 patients who had moderate anxiety, seven entered the mild range, indicating an improvement in their anxiety. According to the Wilcoxon test, changes in anxiety levels in both groups were statistically significant after the intervention ( $P < 0.003$ ) (Table 4).

## DISCUSSION

The present study shows that patients hospitalized with COVID-19 had mild to moderate levels of anxiety at baseline. Other studies have demonstrated anxiety among this population, especially when receiving

treatment in isolation (Liu *et al.* 2020). The results of one study by Zandifar *et al.* showed severe and very severe anxiety levels in all patients hospitalized with COVID-19 (Zandifar *et al.* 2020). In one study examining the prevalence and risk of depression/anxiety among patients hospitalized with COVID-19, a high level of anxiety was most notably documented in patients who had lost relatives due to the disease (Nie *et al.* 2021). In another study, 36% of 44 patients hospitalized with COVID-19 exhibited symptoms of severe anxiety (Parker *et al.* 2020).

The results of our study show an increase in measured anxiety among the control group consistent with previously documented results (Mazza *et al.* 2020; Nie *et al.* 2021; Parker *et al.* 2020; Sun *et al.* 2021). Fear, denial, and stigma usually occur during the early stages of disease (Sun *et al.* 2021; Zhou 2020). Numerous factors, including fear of permanent disability or death, uncertainty about the diagnosis and treatment, isolation from family and friends, guilt regarding the possibility of infecting family members, changes in diet, sleep disturbances, and physical symptoms have been noted to contribute to the development and persistence of anxiety (Sun *et al.* 2021; Zandifar *et al.* 2020).

Given the increased prevalence and risk of anxiety among patients hospitalized with COVID-19, psychological counselling and art therapy are useful non-pharmacologic interventions to alleviate these feelings (Sun *et al.* 2021; Zandifar *et al.* 2020). A review by Abbing *et al.* showed that various types of art therapy methods could reduce anxiety in adults (Abbing *et al.* 2018). In another study by Yakar *et al.*, mandala colouring significantly reduced distress and anxiety in cancer patients (Yakar *et al.* 2021). In the present study, hospitalized COVID-19 patients with mild to moderate anxiety who performed 30 min daily of mandala colouring showed a significant reduction in these symptoms. Artistic and structural efforts that are based on Yogi's theory, such as mandala colouring, have been shown to be effective in reducing anxiety and stress, as

**TABLE 4** Distribution of anxiety scores before and after intervention

Variable	Group	Before intervention N (%)				After intervention N (%)				P-value
		No	Mild	Moderate	Severe	No	Mild	Moderate	Severe	
Anxiety Score	Intervention	0	6 (17.1)	26 (74.3)	3 (8.6)	0	16 (45.8)	19 (54.2)	0	0.008
	Control	0	6 (17.1)	27 (77.2)	2 (5.7)	0	2 (5.7)	30 (85.7)	3(8.6)	0.003
		X <sup>2</sup> =15.96				Fisher exact=0.699				
		P-value <0.08				P-Value <0.003				

N = Number.

well as in processing complex personal, negative emotions, and promoting general well-being (Duong *et al.* 2018). McMahon declared that mandala colouring was not only one of the most effective methods in counselling groups, but also a calming tool for reducing anxiety, developing relationships, and nurturing a creative space for expressing one's feelings (McMahon *et al.* 2007). Previous studies have shown that mandala colouring has a significant impact on reducing anxiety (Amelia *et al.* 2020; Koo *et al.* 2020; Lee 2018; Salazar 2019). A study by Curry & Kasser showed significantly lower levels of anxiety in a group of students who painted mandalas (Curry & Kasser 2005). The anxiety-reducing effects of mandala colouring appear to be stronger than that of painting (Lee 2018) (37). Mandal colouring may be an effective intervention for other populations, including those with long-term anxiety (Curry & Kasser 2005).

## LIMITATIONS

Many factors, including economic, cultural, and social differences, contribute to the development of anxiety and vary between different sample populations. These were not examined or controlled for in this study. Furthermore, the lack of accurate information about the origin of anxiety, as well as an unclear relationship between COVID-19 disease and the development of anxiety, makes the results less generalizable. Some of these limitations may be overcome by performing future studies with higher sample sizes.

## CONCLUSION

Mandala colouring was effective in reducing measured anxiety in patients hospitalized due to COVID-19. Based on the findings of this study, physicians and nurses may consider offering mandala colouring as a complementary treatment option along with routine therapies. It is a safe, cheap, and accessible alternative therapeutic strategy to reduce anxiety among patients hospitalized with COVID-19. Future research may focus on comparing the effects of mandala colouring with pharmacologic therapy for anxiety in patients hospitalized with COVID-19.

## RELEVANCE TO CLINICAL PRACTICE

Mandala colouring can complement routine treatment and provides a non-pharmaceutical option for decreasing patient anxiety. Physicians and nurses may consider

offering mandala colouring as a complementary treatment option along with routine therapies. It is a safe, cheap, and accessible alternative therapeutic strategy to reduce anxiety among patients hospitalized with COVID-19.

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