The Effectiveness of Cognitive Behavioral Therapy Using Cognitive Restructuring Techniques in Group Settings to Reduce Smoking Behavior in Adolescents

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Abstract
There are numerous factors that drive adolescents to smoke, one of which is the presence of negative or irrational thoughts related to smoking behavior itself. Such thoughts include beliefs that smoking makes them appear more masculine, more accepted within their social circles, among other irrational perceptions. This study aims to evaluate the effectiveness of cognitive behavioral therapy (CBT) using cognitive restructuring techniques in a group setting to reduce smoking frequency in adolescents by addressing their irrational thought patterns. A quantitative experimental method was employed, using a pretest-posttest control group design. A total of 8 students were randomly assigned to two groups. Data analysis was conducted using parametric statistical tests, specifically the independent sample t-test and the correlated/paired sample t-test. The results indicate that cognitive restructuring techniques applied in group setting significantly reduce smoking behavior among adolescents.

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1. Introduction

Smoking behavior is commonly observed in our surroundings. According to the Primary Health Research of 2013, an average smoker in Indonesia consumes 12 cigarettes per day (Kemkes, 2018). This behavior typically begins in adolescence, and currently, smoking is not only prevalent among adults but also among teenagers, some of whom are still in school. Data from the Basic Health Research (Riskesdas) indicate an increase in smoking prevalence among the population aged 10-18 years, from 7.2% in 2013 to 9.1% in 2018 (Kemkes, 2020). The Global Youth Tobacco Survey of 2014 ranked Indonesia as having the highest rate of teenage smokers globally (Pusdatin Kemkes, 2015).

The initiation of smoking in adolescence often continues into adulthood, making it imperative to prevent due to its association with severe health conditions such as cancer, cardiovascular, and respiratory diseases. Smoking adversely affects mental health, triggering stress, anxiety, and dependency (Taylor et al., 2014). Factors such as identity exploration, peer pressure to conform through smoking, and perceptions of smoking as a means of appearing cool frequently drive this habit (Lin et al., 2023; Sulastri et al., 2018). This identity conflict can lead to uncontrolled emotions, making adolescents more susceptible to emotional rather than rational decision-making (Huda & M, 2020). Furthermore, smoking is closely linked to the stress levels experienced by adolescents, particularly as a method to cope with academic pressure and life stressors (Safitri et al., 2019).

Additionally, the detrimental effects of smoking include cognitive decline, such as impaired concentration and academic performance, as well as the risk of dependency on substances like alcohol (Meckel & Rittenhouse, 2022; Tulenan et al., 2015). This correlation is supported by a school counselor at a vocational high school in Badung, who noted that students who smoke generally have lower academic performance indices.

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Although many teenagers are caught in the smoking habit, a majority have a strong desire to quit. Research by Sulastri et al. (2018) revealed that 107 (64.45%) out of 166 smoking students wanted to quit, 121 (72.89%) had attempted to quit in the past year, 125 (75.30%) believed they could stop if they desired, and 150 (90.36%) had received advice or assistance from programs and professionals to quit smoking. One of the challenges in cessation is the pervasive irrational beliefs among teenagers regarding smoking, such as it enhancing social status or alleviating stress. These dysfunctional beliefs include anticipatory beliefs (positive expectations about smoking), relief-oriented beliefs (smoking to reduce negative feelings), and permissive beliefs (viewing smoking as normal despite its dangers) (Del-Monte & Graziani, 2021).

Various studies on smoking interventions have been conducted, including stress management (Riyanto et al., 2023), Retrieval-extinction training (Germeroth et al., 2017), and educational interventions based on the Health Belief Model (Panahi et al., 2018). Findings suggest that cognitive distortions often complicate cessation efforts, and psychological interventions like cognitive-behavioral therapy (CBT) with cognitive restructuring techniques in group settings can be an effective solution. CBT aims to identify and correct irrational thoughts through rationalization, identifying cognitive distortions, and redirecting negative thoughts to positive ones (Rahmatillah & Setiawati, 2020). Given its goal-oriented nature and relatively short duration, this therapeutic approach focuses on rationalizing erroneous beliefs during cognitive restructuring, assigning homework, and teaching new skills that enhance understanding and rejection of smoking behaviors (Raji et al., 2019). Additionally, in group settings, cognitive restructuring can leverage group dynamics as a means of cognitive training to restore positive, objective, and rational thinking (Ireel et al., 2018).

Given the high prevalence of smoking among teenagers, which can trigger numerous adverse effects on both physical and mental health, this research offers an innovative solution focusing not only on behavior but also on the underlying irrational thoughts. This intervention holds significant potential to reduce teenage smoking rates in the future. Thus, this study aims to measure the effectiveness of group-based cognitive-behavioral therapy with cognitive restructuring techniques in reducing smoking behaviors among teenagers at State Vocational High School Badung who harbor irrational thoughts related to smoking.

2. Method

2.1. Research Design

This study employed a quantitative methodology using a pretest-posttest control group design for its experimental setup. In this research design, two groups were established: an experimental group and a control group. Participants were allocated to these groups through a process of random assignment. Both groups underwent pretests, posttests, and follow-ups. However, the experimental group received an intervention involving cognitive-behavioral therapy with cognitive restructuring techniques in a group setting after the pretest, while the control group received no intervention.

2.2. Research Subjects

The subjects of this study were students identified as active smokers with moderate to high smoking intensity, who expressed a desire to quit smoking, and who harbored negative thoughts or beliefs regarding smoking behavior. Sample screening involved selecting a high school, specifically a vocational high school in the Badung area, where a considerable number of student smoking cases were suspected. This selection was based on interviews with a school counselor at this school, who indicated a significant prevalence of smoking compared to other schools surveyed by the researchers. Subjects were selected using purposive sampling techniques. Identification of smoking behavior was conducted using a smoking behavior scale and interviews with 15 second-year students, who were known to the school counselor as having tendencies toward smoking behavior. From this identification process, 8 active smoking students with negative thoughts or beliefs about smoking behavior were identified and subsequently divided into two groups (see Table 1): 4 in the experimental group receiving cognitive-behavioral therapy with cognitive restructuring techniques and 4 in the control group who did not receive any treatment.

Table 1. Research Subject Description

No	Subject's Initial	Age	Pre-test Score	Category	Group
1	PA	17	41	Moderate	Experimental
2	KA	18	46	Moderate	Experimental
3	AS	17	51	Moderate	Experimental
4	A	17	49	Moderate	Experimental
5	MAM	16	35	Moderate	Control
6	PK	17	47	Moderate	Control
7	RP	17	44	Moderate	Control
8	KAA	17	35	Moderate	Control

2.3. Research Instruments

The level of smoking behavior was assessed using a smoking behavior scale developed based on four types of smoking behaviors as identified by Aritonang in the study by Giyati et al. (2019): smoking intensity, smoking location, smoking situation, and the function of smoking in daily life. The smoking behavior scale utilizes a Likert model comprising 20 items with five response options each, scored on a gradient from 0-4. The scoring interpretation for the smoking behavior scale is as follows: X (scale score) < 27 = low, 27 – 53 = moderate, and > 53 = high. The scale demonstrated item discrimination values ranging from 0.318 to 0.691, and the reliability test yielded a Cronbach's Alpha coefficient of 0.896.

2.4. Data Collection Procedure

Data for the pretest, posttest, and follow-up concerning the intensity of smoking behavior were collected using the smoking behavior scale. Meanwhile, data regarding changes from irrational to more rational thoughts related to smoking behavior among the research subjects were gathered using interview techniques.

2.5. Data Analysis

To assess the effectiveness of cognitive restructuring techniques in reducing the level of smoking behavior among adolescents, two parametric statistical analysis techniques were employed: the independent sample t-test and the paired sample t-test. The independent sample t-test was used to examine differences between data obtained from the experimental and control groups. Conversely, the paired sample t-test was employed to assess differences between data before and after the intervention within each group.

3. Results and Discussion

3.1. Results

The data used to test the hypothesis were derived from pretests, posttests, and follow-ups from the smoking behavior scale, as well as interview results from both the experimental and control groups. The data obtained from the smoking behavior scale are presented in Table 2.

Table 2. Description of the Smoking Behavior Scale Data (N=8)

Measurement	Experimental Group			Control Group		
	Pre-test	Post-test	Follow Up	Pre-test	Post-test	Follow Up
Minimum	41	34	16	35	34	34
Maximum	51	43	35	47	46	47
Mean	46.75	37.50	25.25	40.25	40.50	40.50
Standard Deviation	4.349	4.041	8.421	6.185	5.916	6.952

Prior to conducting hypothesis testing using the data in the table above, tests for normality and homogeneity were performed. The normality test was conducted to determine whether the distribution of the research data followed a normal distribution. The normality of the data was assessed using the Kolmogorov-Smirnov (K-S) test.

According to the Kolmogorov-Smirnov (K-S) normality test, the significance value for the pretest variable was K-S Z = 0.170 with p = 0.200, indicating that the pretest variable data followed a normal distribution. For the posttest variable, a K-S Z = 0.205 with p = 0.200 was obtained, meaning

that the posttest variable data also followed a normal distribution. Similarly, the follow-up variable showed a K-S Z = 0.172 with p = 0.200, confirming that the follow-up variable data adhered to a normal distribution. Furthermore, the homogeneity of variances was evaluated using Levene's Test for Equality of Variances, which yielded an F = 2.526 with a significance value p = 0.163. Given that the obtained significance value was ≥ 0.050, it can be concluded that the data were homogeneous in variance.

Following the normality and homogeneity tests, hypothesis testing was conducted by analyzing the data in Table 2 using the independent sample t-test and the paired sample t-test. The results of the data analysis using the independent sample t-test are presented in Table 3.

Table 3. Analysis of Independent Sample t-Test Between Experimental Group and Control Group

	Pretest	Posttest	Follow Up
T	1.719	-0.837	-2.793
Sig. (2-tailed)	0.136	0.434	0.031

*. Correlation is significant at the 0.05 level (2-tailed)

The statistical analysis of the posttest measurements, after the intervention, revealed no significant difference in smoking behavior between the experimental group and the control group (t = -0.837, p > 0.05). However, the final measurement (follow-up) showed a significant difference in smoking behavior between the treated experimental group and the untreated control group (t = -2.793, p < 0.05). The smoking behavior in the experimental group was lower compared to the control group, as indicated by the mean smoking behavior score of 25.25 in the experimental group and 40.50 in the control group.

Additionally, statistical analysis using the paired/correlated sample t-test within the experimental group (Table 4), which received cognitive restructuring techniques, showed a significant reduction in smoking behavior from the pretest to the follow-up. The t-value from the pretest to the posttest was 4.045 with p < 0.05, while from the posttest to the follow-up, the t-value was 4.908 with p < 0.05. In the experimental group, after receiving the cognitive restructuring intervention in a group setting, participants recorded lower smoking behavior scores (mean: 37.5) compared to before the intervention (mean: 46.74).

Table 4. Analysis of Paired Sample t-Test in the Experimental Group

	Pretest - posttest	Posttest – follow up
t	4.045	4.908
Sig. (2-tailed)	0.027	0.016

*. Correlation is significant at the 0.05 level (2-tailed).

The results of the independent sample t-test and paired sample t-test indicate that cognitive restructuring techniques in a group setting are effective in reducing smoking behavior among adolescents.

3.2. Discussion

This study demonstrates that there are differences in the levels of smoking behavior among adolescents before and after the application of cognitive restructuring techniques. Subjects in the experimental group, after receiving treatment, exhibited lower smoking behavior scores compared to before the intervention and in comparison to the control group, which did not receive any treatment. This indicates that cognitive restructuring is effective in reducing adolescent smoking behaviors.

During the cognitive restructuring therapy sessions, subjects were taught to identify and evaluate their cognitions, understand the behavioral impacts of certain negative thoughts, and learn to replace these cognitions with more realistic, appropriate, positive, or rational ones (Corey, 2012). After receiving cognitive behavioral therapy with cognitive restructuring techniques, the smoking intensity of the subjects decreased, though not to the extent of complete cessation. The reduced smoking intensity was influenced by the subjects' increasingly positive and rational perspectives on

smoking, which motivated them to decrease their smoking intensity. This reduction in smoking behavior is evident from the posttest and follow-up results of the smoking behavior scale and interview outcomes.

Although no difference in smoking behavior levels was observed during the posttest between the treated experimental group and the untreated control group, the posttest scores of the experimental group were lower compared to the control group that did not receive cognitive restructuring techniques. A significant difference in smoking behavior levels between the experimental and control groups was only observed during the follow-up, related to independence and self-efficacy. Bandura states that individuals need to strengthen their confidence in effecting behavioral change by applying the skills acquired during therapy. When a change is successfully implemented, it enhances the motivation to make further behavioral changes (King, 2016). Therapy participants are taught many useful skills they previously lacked, and upon completing the therapy process, they are encouraged to apply these skills independently with little or no dependence on therapists. This may explain why changes in therapy participants tend to be maintained or even improve after the therapy process is completed, as participants require more time to hone and strengthen the skills learned during therapy. Cognitive restructuring itself takes longer to learn and is more likely to demonstrate its effectiveness in longitudinal studies (Hessler-Kaufmann et al., 2020).

In this study, the cognitive restructuring technique in a group setting was conducted in six stages over three meetings, each consisting of two sessions: (1) rationale, (2) identification of negative thoughts, (3) introduction and practice of coping thoughts, (4) transition from negative thoughts to coping thoughts, (5) introduction and practice of positive reinforcement, (6) homework (Cormier et al., 2008). Each stage contributes to reducing smoking behavior, as in the first stage, therapy participants realize that their thoughts related to smoking behavior are negative rather than positive; the second stage enables clients to identify the sources of their negative thoughts and evaluate whether these thoughts are based on reality or mistaken perceptions; the third stage helps them shift focus from fear of failure to managing situations effectively, thus focusing more on handling situations rather than fearing failure; the fourth stage enables them to transition from negative to more positive thoughts by using negative thoughts as cues to immediately switch to coping thoughts, thus preventing negative thoughts from taking control; the fifth stage enables them to appreciate each progress made in overcoming negative thoughts, thus reinforcing the skills achieved without relying on external encouragement; and the sixth stage helps therapy participants understand how to apply the taught methods to real-life stressful situations, so they can apply them to various other stressful situations in the future, especially those related to smoking behavior (Cormier et al., 2008).

According to the stages followed by therapy participants, it is evident that cognitive restructuring techniques can help subjects change their thought patterns from negative or irrational to more positive or rational, especially regarding smoking behavior. This aligns with findings from Noviandari and Kawakib (2016), which state that cognitive restructuring techniques are effective in helping adolescents learn to think differently, correct erroneous thoughts, and replace them with more rational, realistic, and positive thinking. Moreover, cognitive restructuring also provides adolescents with the understanding that their emotions and behaviors can be controlled by recognizing and changing their irrational thoughts to more rational ones (Steigerwald & Stone, 1999).

The implications of this study suggest that adolescents need guidance not only on the dangers of smoking but also on how to think more rationally, realistically, and positively when facing issues related to smoking behavior. Training adolescents to think more healthily is expected to help them develop effective coping strategies, thereby enabling them to make correct decisions in handling various problems. Research by Aminullah et al. (2019) found that group-based cognitive restructuring techniques are more effective than problem-based coping in reducing academic stress by changing negative thoughts about subjects to positive ones. Research by Utami (2017) also shows that cognitive restructuring is effective in reducing learning burnout by creating positive emotions and strong beliefs.

However, this study has limitations, such as the lack of specific measurements of daily smoking intensity, the small number of subjects, and the inclusion of only male adolescents. Research by Giyati et al. (2019) used a behavior checklist to measure daily smoking intensity, providing more detailed

results regarding the reduction in cigarette consumption. Further research is recommended to address these limitations.

4. Conclusion

Cognitive-behavioral therapy with cognitive restructuring techniques is effective in reducing smoking behavior among adolescents by helping them transform negative or irrational thought patterns into more positive and rational ones. Through this therapy, adolescents learn to recognize erroneous thoughts and replace them with healthier, more realistic, and optimistic thinking, which can motivate them to reduce their smoking intensity. This approach enables adolescents to develop better coping strategies for dealing with stress or pressure, thus leading to more prudent decisions regarding smoking behavior. Research results show a significant decrease in smoking behavior among adolescents who undergo this therapy.

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