

The Implementation of Token Economy in Behavior Modification to Improve Sleep Quality of Drug Abuse Clients in the Recovery Process

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Abstract:

Substance abuse has a serious impact on the sleep quality of clients undergoing rehabilitation, often resulting in insomnia and other sleep disturbances that can hinder the recovery process. Poor sleep quality may exacerbate psychological conditions and increase the risk of relapse. This study aims to examine the effectiveness of implementing a token economy as a behavioral modification method to improve the sleep quality of clients with substance use disorders during their recovery process. This research employed a mixed-method approach using a sequential exploratory design. The results showed an improvement in sleep quality among all three subjects after the implementation of the token economy. These findings suggest that the token economy is effective as a positive reinforcement strategy in modifying sleep behavior in clients with substance use disorders and may serve as an alternative approach to support the success of recovery programs.

Keywords: *Token economy, behavior modification, sleep quality, substance abuse*

1. Introduction

Substance abuse, especially concerning narcotics, psychotropics, and other addictive substances (NAPZA), continues to be a major public health concern in Indonesia and worldwide (Puslitdatin, 2021). The detrimental effects of substance abuse on both physiological and psychological health are extensively documented, with sleep disturbances, including insomnia, commonly noted among individuals in rehabilitation (Mousavi et al., 2024). Sleep quality is a basic physiological need that is necessary for physical recovery, mental health stability, and emotional regulation (Widhiyanti et al., 2017). Nonetheless, substance abuse interferes with the central nervous system's regulation of sleep patterns, resulting in diminished sleep quality marked by challenges in initiating sleep, disrupted sleep continuity, and daytime impairment (Budyawati et al., 2019; Faoziyah & Suharjana, 2020). These sleep issues frequently intensify psychological distress and are associated with an increased risk of relapse during recovery (Rezky & Setiawan, 2025).

Behavioral interventions have surfaced as effective strategies for mitigating sleep disturbances in substance abuse rehabilitation programs. Token economy systems, grounded in B.F. Skinner's operant conditioning principles, employ systematic positive reinforcement to

promote favorable behavioral modification (Rohmaniar & Krisnani, 2019). Token economies give people tokens as rewards for specific behaviors right away. These tokens can then be traded in for more meaningful rewards, which encourages clients to make and stick to good sleep habits

(Dewi & Wayuni, 2023). Prior research demonstrates the efficacy of token economies in diverse contexts for altering maladaptive behaviors and enhancing adaptive ones; however, their specific implementation for the enhancement of sleep quality in substance abuse rehabilitation is yet to be thoroughly investigated (Khuzaimah, 2017; Ulyah & Noviekayatie, 2020). This gap indicates a necessity for research examining this intervention's efficacy in improving sleep quality among recovering clients.

The novelty of this study resides in the application of the token economy method to specifically regulate sleep behavior among clients engaged in community-based substance abuse rehabilitation, a demographic facing distinct challenges related to sleep disturbances associated with withdrawal and environmental stressors. By integrating qualitative understanding of behavioral antecedents and consequences with quantitative measurement of sleep changes via the Pittsburgh Sleep Quality Index (PSQI), this study aims to provide comprehensive evidence on the effectiveness of token economy in this context. The principal hypothesis asserts that the adoption of a token economy as a behavioral modification strategy will markedly enhance clients' sleep quality throughout the recovery process, evidenced by diminished sleep disturbances and improved overall sleep metrics.

The aim of this study is to investigate the impact of a token economy on the modification of sleep behavior and the enhancement of sleep quality among substance abuse clients in rehabilitation. This research aims to validate the efficacy of token economies in fostering healthier sleep habits while contributing to evidence-based rehabilitative practices that facilitate sustainable recovery outcomes.

2. Method

2.1 Research Procedure

This research utilized a mixed-methods approach, combining qualitative and quantitative techniques within a unified research framework to attain a thorough comprehension of the research issue. The amalgamation of narrative and quantitative data enabled the researcher to derive more profound insights and to corroborate findings through various forms of evidence (Nasution et al., 2024). This study employed a mixed-methods model characterized by a sequential exploratory design, initiating with the qualitative phase and subsequently proceeding to the quantitative phase. This design facilitated a comprehensive examination of participants' behavioral dynamics in the initial phase, subsequently validating these findings through quantifiable behavioral data (Azhari et al., 2023).

2.2 Research Subjects

There were three clients who were getting Community-Based Intervention (CBI) rehabilitation for substance (NAPZA) abuse. They were chosen through purposive sampling according to the following criteria for inclusion: (1). Actively participating in a rehabilitation program; (2). Willing to undergo a two-week token economy intervention, and (3). Having observable and measurable target behaviors to be modified. These participants were deemed appropriate for

the behavioral modification program employing the token economy method, as their behavioral issues were distinctly recognizable and receptive to systematic reinforcement.

2.2 Finding Behaviors That Are a Problem

We used unstructured interviews with each participant to find the target behaviors. The goal of this process was to find negative behaviors that were getting in the way of their daily lives and that they wanted to change with help. The analysis utilized the ABC Theory (Antecedent–Behavior–Consequence) framework to comprehend the contextual relationship among: (1) Antecedents, or things that happen before the behavior that cause it; (2) Behaviors, or specific actions that the client takes, and (3) Consequences, or things that happen after the behavior happens. The researcher created a unique behavior modification plan for each participant based on their behavior and the setting in which they lived.

2.3 Research Procedure

The study took place over a two-week intervention period. In the initial phase, qualitative data were collected via unstructured interviews to ascertain problematic behaviors, their antecedents, and their consequences. The researcher and participants subsequently worked together to identify specific target behaviors for alteration. After this, the token economy system was put into place. Tokens, which were small chips, were used as "positive reinforcement" when participants did the right thing. The tokens were given out right after the behavior happened to make the connection between the behavior and the reward stronger.

The reward system and reinforcement schedule were set up like this: (1). The first reward went to participants who got at least five tokens in the first week; (2) The second reward went to people who got at least six more tokens in the second week, bringing their total to 11 tokens; (3) Participants who didn't reach the first-week goal could still get the second reward if they got to 11 tokens by the end of the second week.

Every day, we kept track of how many tokens each participant had collected. A reflection session was held at the end of the intervention to talk about changes in behavior and personal experiences.

2.4 Data Collection

We gathered Quantitative and Qualitative data approach. Quantitative data, sourced from the token collection records during the intervention, indicating measurable behavioral enhancements. while qualitative data, obtained from interviews, elucidating the participants' behavioral patterns and their reflections on the change process; and The Pittsburgh Sleep Quality Index (PSQI) was also used to look at changes in sleep quality as an indirect effect of the intervention.

The qualitative data underwent analysis via thematic analysis, concentrating on patterns of behavioral modification, emotional reactions, and contextual stimuli discerned through the ABC framework. Descriptive analysis was used to look at the quantitative data and summarize the number of tokens collected and the level of behavioral improvement. Combining both data sources made it possible to triangulate, which made the study's results more valid and complete.

Table 1.

Identification of behavior using the ABC theory in subject 1 (WW)

Antecedent (A)	Behavior (B)	Consequence (C)
<ul style="list-style-type: none"> The subject goes to bed late, past 12 midnight. When not sleeping, the subject goes out to hang out until early morning. There is a habit or urge to go out if the subject does not sleep on time 	The subject hangs out until dawn with friends (not from the neighborhood where they live).	Negative physical effects: the subject feels weak, sleepy while selling, and gets tired more easily

Table 2.

Identification of behavior using the ABC theory in subject 2 (SY)

Antecedent (A)	Behavior (B)	Consequence (C)
<ul style="list-style-type: none"> The subject goes to bed late, past 2 a.m. When not sleeping, the subject plays games or hangs out. 	The subject hangs out until dawn with friends or plays games until late at night	Negative effect when sleeping late: the subject feels less

Table 3.

Identification of behavior using the ABC theory in subject 3 (FLQ)

Antecedent (A)	Behavior (B)	Consequence (C)
<ul style="list-style-type: none"> The subject goes to bed late, past 12 midnight. 	The subject has difficulty sleeping earlier due to a long-established habit of staying up late, formed when the subject often spent time hanging out at night	The negative effect experienced by the subject is difficulty waking up in the morning, which leads to decreased productivity.

3. Result

3.1 Behavioral Modification Outcomes

The behavioral modification intervention using the token economy method was implemented over a two-week period. The intervention aimed to reinforce positive behaviors related to sleep hygiene and routine adherence among clients in substance abuse recovery. The weekly token collection data demonstrated varying progress across the three participants.

Table 4.

Token Accumulation and Behavioral Progress Across Participants During the Intervention Period

Participant	Week 1 Tokens	Week 2 Tokens	Total Tokens (2 Weeks)	Rewards Earned	Behavioral Trend
WW	6	6	12	2	Stable and consistent
SY	7	5	12	1	Decline in Week 2
FLQ	6	7	13	2	Improved consistency

In line with these results, daily token accumulation data showed that people were becoming more compliant and motivated. Two participants (WW and SY) met the reward criteria for over 85% of the intervention period, whereas FLQ exhibited moderate enhancement in consistency. Here is the bar chart for Figure 1. Token Accumulation Trend During Intervention, showing the total tokens collected by each participant (WW, SY, FLQ) across the 14-day program

Figure 1.

Token Accumulation Trend During Intervention

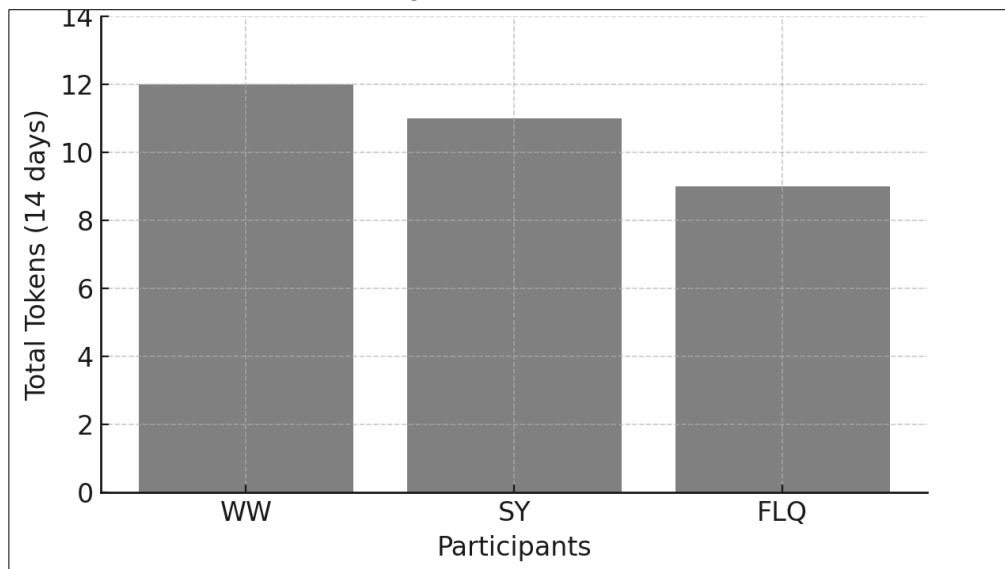


Figure 1 showed the progression of token accumulation over the 14-day intervention period showed a consistent upward trend for all participants. WW achieved the highest consistency, reaching 12 tokens by the end of the program, followed by SY with 11 tokens and FLQ with 9 tokens. The visualized pattern reflects gradual adaptation during the first week and sustained reinforcement during the second week, supporting the quantitative improvement in sleep quality scores.

3.2 Narrative Analysis of Behavioral Advancement

The token accumulation pattern over two weeks shows how each of the three participants' behaviors changed over time (see Figure 2). Every participant exhibited a distinct reaction to the reinforcement system, highlighting both motivational dynamics and the impact of situational factors during the intervention.

WW showed a steady pattern of improvement at the start of the program. In both the first and second weeks, WW always got six tokens, which was enough to get the reward. This steady performance showed that the person had strong self-control, stuck to their sleep schedule, and stayed motivated. WW's consistent success indicates that the reinforcement schedule successfully reinforced the desired behavior, resulting in the internalization of beneficial sleep-related habits.

SY, on the other hand, showed a quick increase in motivation during the first week. They collected seven tokens and got the first reward. But this momentum slowed down in the second week, and they only got five tokens. The decline may be due to outside factors, like changing moods or environmental factors that made behavior less consistent. This pattern is a common occurrence in behavioral modification: people get excited at first, but their sensitivity to rewards slowly fades as the novelty wears off.

During the intervention period, FLQ, on the other hand, showed a positive and upward trend. At first, FLQ got six tokens and one reward in the first week. FLQ got another reward after reaching seven tokens in the second week, which made them want to do better. This progression shows that reinforced behaviors are becoming more ingrained over time and that the token economy system worked to boost both motivation and self-regulatory skills.

Overall, the weekly trends show that everyone who took part in the token economy intervention had a positive response, but the level and consistency of improvement were different for each person. WW demonstrated consistency, SY exhibited variable motivation, and FLQ illustrated incremental growth. These results highlight the variability in reinforcement responsiveness among individuals and stress the significance of tailored behavioral monitoring within addiction recovery programs.

3.2 Sleep Quality Assessment Using the Pittsburgh Sleep Quality Index (PSQI)

Based on the assessment of sleep quality using the Pittsburgh Sleep Quality Index (PSQI), further behavioral monitoring was conducted through token recording. Table 5 below details the accumulation of tokens and behavioral progress among participants during the intervention period.

Table 5.

Token Accumulation and Behavioral Progress Across Participants During the Intervention Period

PSQI Component	WW	SY	FLQ
Subjective Sleep Quality	0	1	1
Sleep Latency	1	1	1
Sleep Duration	1	0	0
Sleep Efficiency	0	0	0
Sleep Disturbances	1	1	1
Use of Sleep Medication	0	0	0
Daytime Dysfunction	1	2	2
Total PSQI Score	4	5	5
Sleep Quality Category	<i>Good</i>	<i>Good</i>	<i>Good</i>

Sleep quality improvements were evaluated using the Pittsburgh Sleep Quality Index (PSQI) after the intervention. Each participant's component scores and total scores are presented in Table 2.

3.3 Integrated Analysis

The quantitative data were obtained from the Pittsburgh Sleep Quality Index (PSQI), administered prior to and following a two-week token economy intervention. The results showed that all three participants (WW, SY, and FLQ) slept better.

Table 6.

Summary of PSQI score improvements after token economy intervention.

Participant	Pre-test PSQI Score	Post-test PSQI Score	Sleep Quality Category	Notable Improvement Area
WW	9	4	Good Sleep Quality	Sleep latency, fewer disturbances
SY	10	5	Good Sleep Quality	Reduced daytime dysfunction
FLQ	11	5	Good Sleep Quality	Regularity in sleep onset

The qualitative component utilized unstructured interviews to contextualize quantitative variations. Thematic analysis (Braun & Clarke, 2019) discerned three principal themes: ((1) Increased self-awareness, (2) Motivation through reinforcement, and (3) Behavioral regulation.

"The tokens made me see how hard I had to work to keep my bedtime." It was like a game, and I wanted to win. *(WW, Interview, Day 14)

Participants recognized that tangible rewards enhanced their dedication to maintaining consistent bedtime routines. SY and FLQ said it was hard to keep up with the new patterns at first, but they slowly made the structure a part of their recovery discipline. People thought the reinforcement schedule was fair and helpful, not punishing, which helped them feel more confident in their ability to manage their sleep behavior.

Combining both data sets showed that the token economy was an effective behavioral reinforcement mechanism that connected external rewards with intrinsic motivation (Bandura, 1986). Quantitative results validated significant enhancements in sleep quality, whereas qualitative narratives elucidated the psychological mechanisms driving behavioral change, notably self-regulation and reinforcement learning.

The convergence of both strands supports the hypothesis that structured reinforcement can promote behavioral and emotional stability among individuals in rehabilitation, leading to improved physiological outcomes such as better sleep as shown in Table 2.

Table 7.
Integration of quantitative and qualitative findings.

Day	WW (tokens)	SY (tokens)	FLQ (tokens)	Remarks
1–3	6	5	4	Initial adaptation period
4–6	8	7	6	Increased compliance to bedtime routine
7–9	10	9	8	Stable reinforcement pattern observed
10–12	11	10	8	High consistency maintained by WW & SY
13–14	12	11	9	Stable behavioral maintenance

The convergence of both strands substantiates the hypothesis that structured reinforcement can enhance behavioral and emotional stability in individuals undergoing rehabilitation, resulting in improved physiological outcomes, including enhanced sleep quality.

Overall, the results show that the token economy successfully changed behaviors related to sleep, leading to improvements in sleep quality that could be measured and seen. The mixed-methods approach provided an extensive comprehension of the functioning of reinforcement systems in rehabilitation, emphasizing the fluid interplay among behavior, cognition, and emotion (Creswell & Plano Clark, 2018; Nacke, 2023).

4. Discussion

Based on the two-week intervention using the token economy method and measurements with the Pittsburgh Sleep Quality Index (PSQI), it was found that the three subjects showed varying positive responses to the behavioral modification program. Subject WW demonstrated good consistency throughout the two-week intervention. The subject maintained the same number of tokens each week and successfully obtained both rewards. This reflects relatively stable internal motivation as well as WW's ability to understand and respond effectively to the token economy system. The consistency in maintaining positive behavior was also in line with the sleep quality measurement results, which were categorized as good with

a PSQI score of 4. This indicates that WW was in a relatively stable physical and psychological condition, supporting his success in following the intervention.

Subject SY showed different results. Although SY managed to obtain the reward in the first week, his token collection decreased in the second week. This decline may have been influenced by reduced motivation or the emergence of certain barriers in maintaining positive behavior. Nevertheless, the PSQI results indicated that SY's sleep quality was still in the good category, with a total score of 5. However, the highest score was in the daytime dysfunction component (score of 2), which may have contributed to the decline in SY's performance in maintaining positive behaviors during the second week.

Subject FLQ showed significant progress during the intervention. The subject not only managed to obtain rewards in both weeks but also increased the number of tokens collected from the first to the second week. This indicates improved motivation, better understanding of the token economy system, and enhanced ability to maintain and strengthen positive behavior. The PSQI results also showed good sleep quality with a total score of 5. Similar to SY, FLQ's highest score was also in the daytime dysfunction component, but it was not significant enough to hinder performance in completing the program.

Overall, the results demonstrate that the token economy method was effective in modifying the behavior of NAPZA-abusing clients in community-based rehabilitation settings. All three subjects showed either improvement or consistency in positive behaviors during the intervention period, as indicated by the tokens collected and rewards obtained. These behavioral improvements were further supported by the PSQI results, which showed that all subjects' sleep quality fell within the good category. This confirms that tokens, as secondary reinforcers, were able to motivate subjects to consistently maintain positive behaviors.

This success is consistent with Skinner's operant conditioning theory, which states that behaviors followed by positive consequences are more likely to be repeated. In this intervention, the token economy served as a form of positive reinforcement that increased motivation, making the desired behaviors easier to maintain (Rohmaniar & Krisnani, 2019). The findings of this study are also in line with Prabaningsih (2019), who emphasized that token economy is a behavioral modification technique designed to reduce maladaptive behaviors while increasing adaptive ones. The technique works by providing reinforcement in the form of tokens that can be collected and exchanged for rewards, thereby enhancing motivation and compliance in performing the expected behaviors.

Various studies have also shown that behavioral modification using the token economy method is highly effective in increasing adaptive behaviors while reducing maladaptive behaviors in different populations requiring behavioral interventions. This method utilizes tokens as reinforcement, which can be accumulated and exchanged for meaningful rewards, thereby significantly enhancing motivation and compliance in maintaining positive behaviors. With consistent and systematic implementation, the token economy not only facilitates the development of new constructive habits but also reduces and suppresses negative behaviors in a sustainable manner (Khuzaimah, 2017; Ulyah & Noviekayatie, 2020; Widhiarso,

2024).

5. Conclusion

Based on the research findings, the implementation of token economy proved effective in modifying the sleep behavior of drug abuse clients undergoing the recovery process. Through a consistently applied system of positive reinforcement, clients demonstrated significant behavioral changes, particularly in terms of sleep habits. Clients who previously had irregular sleep patterns such as staying up late into the night, hanging out until the early hours, or playing games until morning gradually began to show improvements in maintaining a more regular sleep schedule. The tokens awarded as recognition for appropriate sleep behavior served as external motivation that encouraged clients to sustain healthier sleeping habits. The provision of tokens also fostered a sense of responsibility and achievement, as these tokens could be exchanged for rewards that held value for them.

This improvement in sleep quality not only impacted clients' physical condition but also their psychological and emotional well-being. Adequate and quality sleep plays a vital role in stabilizing emotions, enhancing focus and concentration, as well as improving mood. In the context of drug abuse rehabilitation, poor sleep quality is often one of the major obstacles in the recovery process. Clients' sleep disturbances frequently trigger stress, fatigue, and even cravings to return to substance use. Therefore, behavior modification that focuses on improving sleep quality becomes an essential step that cannot be overlooked.

The implementation of token economy in this context provides a structured and systematic alternative approach to help clients develop more adaptive habits. Behavior modification also encourages social learning, discipline, and reinforcement of positive behaviors carried out consciously and responsibly. The results of this study highlight that positive reinforcement-based interventions, such as token economy, are not only relevant for use in educational settings or with children but are also highly applicable and beneficial within rehabilitation contexts, including for drug abuse clients.

In conclusion, it can be stated that token economy is an effective method in supporting the success of recovery programs, particularly in improving sleep quality, which serves as a crucial foundation for long-term recovery.

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