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Comparing the Effectiveness of Cognitive Behavioral Therapy and Acceptance and Commitment Training on Cognitive Flexibility in Adolescent Girls

Shamim. Khalili[1], Mostafa. Hamideh[2*]

[1] M.A student in clinical psychology, West Tehran Branch, Islamic Azad University, Tehran, Iran
[2] Professor of Shahid Beheshti University of Medical Sciences, Tehran, Iran

*** Corresponding author email address**: Mostafahamdieh@yahoo.com

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A B S T R A C T

Objective: Cognitive flexibility enables individuals to adapt their cognitive processing strategies to cope with new and unforeseen situations; thus, the current research aimed to compare the effectiveness of cognitive behavioral therapy (CBT) and acceptance and commitment therapy (ACT) on cognitive flexibility in adolescent girls.

Research Method: This was a quasi-experimental study with pre-test, post-test, and control and experimental groups. The population consisted of all female middle school students in Karaj for the academic year 2022-2023, totaling 2,864 individuals. Through simple random sampling, 60 individuals (20 in the first experimental group, 20 in the second experimental group, and 20 as the control group) were selected as the sample size and responded to the questionnaire by Dennis and Vander Wal (2009). Pre-tests regarding both groups were conducted before the interventions; subsequently, eight one-hour sessions of ACT based on Hayes et al. (2013), and eight one-hour sessions of CBT based on Heimberg and Becker (2002) were implemented on the experimental groups. No specific intervention was conducted for the control group. Immediately after the sessions concluded, a post-test was administered to both groups. Data were analyzed using covariance analysis.

Findings: The results of data analysis indicated that the effects of both cognitive-behavioral therapy and acceptance and commitment therapy on increasing cognitive flexibility in adolescent girls are approximately at the same level, and the difference in the mean of the cognitive flexibility variable between the two treatment groups and the control group was significant.

Conclusion: As a result, both cognitive-behavioral therapy and acceptance and commitment therapy significantly impact increasing cognitive flexibility in adolescents.

Keywords: *Cognitive Behavioral Therapy, Acceptance and Commitment Therapy, Cognitive Flexibility, Adolescents.*

1. Introduction

Adolescence holds special significance in human life; psychologists often refer to it as a period of emotional sensitivity. Cognitive flexibility enables individuals to adapt their cognitive processing strategies to deal with new and unforeseen circumstances (Saadati et al., 2020). Cognitive flexibility is one of the components of executive functions that plays a crucial role in daily life. According to the theory of cognitive complexity and control, cognitive flexibility refers to the ability to flexibly switch between multiple incompatible perspectives or descriptions of a topic or event (Aghajanpourian Vahid et al., 2022). Psychological flexibility can be defined as a mindful human awareness that fully and without any defense engages with the present moment; as it is, not as it says it is, and continues or changes behavior in service of chosen values. Major psychological disorders are also described based on cognitive flexibility through the excess of incompatible behavioral and emotional rules, or through value-driven behaviors and sensitivity to possibilities related to the future (Masuda & Tully, 2012). According to Kabat-Zinn (2003), the ultimate outcome of cognitive flexibility is an increase in the abundance of valued living (J, 2003). Valued living emphasizes a behavioral process that aligns with an individual's values. The major advantage of Acceptance and Commitment Therapy (ACT) over other psychotherapies is the consideration of motivational aspects along with cognitive aspects for a more significant impact and sustainability of therapeutic effectiveness (Hayes & Lillis, 2012; Hayes et al., 2006; Hayes et al., 2004).

Various interventions have been employed to improve adolescents' cognitive flexibility, one of the most promising recent approaches being Acceptance and Commitment Therapy (ACT). Described by Hayes, Strosahl, and Wilson in 1999 as a third-wave cognitive therapy, ACT focuses on the recognition of participants' thoughts and emotions, as well as their relationship with concrete behavior (Hayes & Lillis, 2012; Hayes et al., 2006; Hayes et al., 2004). As part of the third wave of cognitive behavioral interventions, ACT, unlike focusing on the content of experience, concentrates on the individual's relationship with their inner experience (Saadati et al., 2020; Share et al., 2014). This approach assumes that psychological distress arises from attempts to change distressing internal experiences (i.e., thoughts and feelings), leading to maladaptive behavior. Avoidance of internal experience is considered a transdiagnostic risk factor suitable for targeting in prevention programs (Harris, 2006; Hayes & Lillis, 2012). This therapeutic program involves six core processes including acceptance, defusion, self-as-context, present moment awareness, values, and committed action, leading to psychological flexibility. Each of these processes involves psychological skills that can be enhanced in any area of life based on internal experiences or unwanted symptoms. Therefore, ACT interventions are considered potentially transdiagnostic psychological treatments that impact various psychological symptoms and life issues (Aghajanpourian Vahid et al., 2022; Gholizadeh et al., 2021; Harris, 2006; Hayes & Lillis, 2012; Hayes et al., 2006; Hayes et al., 2004; Heshmati et al., 2018; Taghvaei et al., 2019; Ussher & Perz, 2017). In this regard, psychological treatments hold a valuable position.

Given that numerous factors affect adolescents' cognitive flexibility, the necessity of employing techniques and trainings to mitigate it seems essential. One of the significant techniques in this context is the cognitive-behavioral psychotherapy approach. In recent years, more attention has been given to the role of cognitive factors in understanding the dynamics of interactions in interpersonal relationships. Cognitive-behavioral therapy programs are based on a type of behavioral therapy that originated within traditional psychotherapeutic situations and reflect therapists' growing interest in cognitive modification as an effective factor on emotions and behaviors (Share et al., 2014; Wallace et al., 2020). Psychotherapy utilizing the cognitive-behavioral approach helps the patient identify their distorted thought patterns and dysfunctional behaviors. Cognitive techniques focus on beliefs associated with thoughts, and behavioral techniques focus on actions and behaviors that interact with cognitive processes (Wallace et al., 2020). The cognitive-behavioral approach emphasizes the importance of using skills and considers these skills as mediators in impactful outcomes; through trainings conducted, individuals are taught effective techniques that acquaint them with valuable things in their lives (Salza et al., 2020). Thus, the cognitive-behavioral approach, comprising techniques such as cognitive-behavioral assessment, Socratic dialogue, cognitive restructuring, problem solving, behavioral activities, relapse prevention, and concrete and behavioral experiences, affects cognitive processes in such a way that it impacts affect and behavior (Asadi et al., 2023). The limitation of cognitive-behavioral therapy in explaining cognitive flexibility was that it emphasized cognitive content more than cognitive processes; hence, research has increasingly focused on the dynamic nature of flexibility

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(Heshmati et al., 2018). Considering the importance of efficacy research in generalizing results to the community and real therapeutic situations, although studies have been conducted on the importance of cognitive flexibility in adolescent girls, no research has been done comparing the effectiveness of these two treatments. Therefore, this research aims to compare the effectiveness of cognitive-behavioral therapy and acceptance and commitment therapy on cognitive flexibility.

2. Methods and Materials

2.1. Study Design and Participants

The current study was a quasi-experimental investigation with pre-test, post-test, and control and experimental groups, which compared the effectiveness of cognitive-behavioral therapy and acceptance and commitment training on cognitive flexibility in adolescents. The study population encompassed all female secondary school students in District 2 of the Education Department of Karaj, totaling 2,864 students in the 2022-2023 academic year. For determining the sample size in experimental and quasi-experimental research, a minimum sample size of 15 individuals per subgroup is recommended (Gall, Borg & Gall, 2012). Thus, the sample consisted of 40 individuals who were selected based on entry criteria through purposive sampling and randomly allocated into two groups of 20 for the experimental and control groups. In this study, the inclusion criteria were being aged 14 to 18, informed consent to participate in the study, female gender, a flexibility score of less than 74, and exclusion criteria included the use of any psychiatric medications, consumption of Ritalin, adolescent's unwillingness to continue cooperation, and receiving concurrent psychological treatments.

Before conducting the research, the necessary permissions to enter the study community were obtained from the Islamic Azad University, West Tehran Branch. Then, the population of female middle school students in District 2 of the Karaj Education Department for the 2022-2023 academic year, totaling 2864, was identified, from which 60 individuals were selected as the sample size using a simple random sampling method. After being informed about the research conditions and completing the consent form, and the Cognitive Flexibility Questionnaire, and based on the cutoff score of the questionnaire, they were randomly assigned to the cognitive-behavioral intervention group, the acceptance and commitment group, and the control group (each containing 20 individuals). They were tested in two phases, pre-test and post-test. The study's objectives were explained to the research samples, and the research questionnaires were completed. After administering the questionnaires and selecting the experimental and control groups, the experimental group was provided with necessary information regarding the timing and location of the intervention program sessions based on cognitive-behavioral therapy and acceptance and commitment therapy training. Then, the training sessions for cognitive-behavioral therapy and mindfulness therapy for the experimental group were conducted. Immediately after the completion of the training classes, the post-test was administered to both the experimental and control groups. This study was a quasi-experimental type with pre-test and post-test, including a control group.

2.2. Measures

2.2.1. Cognitive Flexibility

This 20-item questionnaire was developed by Dennis and Vander Wal (2009) and is scored based on a 7-point Likert scale. Since the total score of the participant ranges from 7 to 140, a continuum is used for interpretation, with high flexibility on one end and lack of flexibility on the other. Therefore, if a participant's score is above the average total score of 74, it indicates higher flexibility, and scores below 74 indicate lower flexibility or lack of it. This questionnaire has three dimensions, including the willingness to understand difficult situations (items 1,2,4,9,11,15,17), the ability to understand multiple alternative explanations (items 3,5,6,12,14,16,18,19,20), and the ability to generate multiple solutions (items 8,10). Soltani, Shareh, Bahreinian, and Farmani (2013) reported the retest reliability coefficient of the entire questionnaire as 90%, and for the perception of controllability, perception of different options, and perception of behavioral justification, they reported 87%, 89%, and 55%, respectively. In this study, Cronbach's alpha coefficients for the entire questionnaire was 74% and for its subscales were 73%, 62%, and 67%, respectively (Aghajanpourian Vahid et al., 2022; Gholizadeh et al., 2021).

2.3. Interventions

2.3.1. Acceptance and Commitment Therapy (ACT)

The ACT treatment protocol was used to examine its effectiveness on eating feedbacks. This study utilized the ACT treatment plan based on the treatment guide by Hayes

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et al. (2004). The content of the treatment sessions used in this research is mentioned (Hayes & Lillis, 2012; Hayes et al., 2006; Hayes et al., 2004). It is noted that these sessions were conducted in groups, with each of the 8 sessions held weekly.

Session 1: Introduction to ACT

This session introduced ACT's core concepts, focusing on mindfulness practices. Participants engaged in exercises to enhance present-moment awareness and discussed the importance of acceptance in the therapeutic process.

Session 2: Cognitive Defusion Techniques

Participants learned cognitive defusion techniques to reduce the impact of harmful thoughts and beliefs. The session included practices to observe thoughts without getting entangled in them.

Session 3: Exploring Values

The focus was on identifying personal values that guide meaningful action. Participants engaged in exercises to clarify their values and discussed how living according to these values can enhance psychological flexibility.

Session 4: Committed Action

Building on the previous session, participants developed action plans aligned with their values. This session emphasized taking concrete steps towards valued living, despite potential obstacles.

Session 5: Acceptance and Willingness

Participants explored the concept of acceptance, learning to embrace their experiences without judgment. Exercises aimed at increasing willingness to experience difficult thoughts and feelings without avoidance.

Session 6: The Observing Self

This session introduced the concept of the observing self, helping participants to develop a sense of self that is separate from their thoughts and emotions, fostering a stable sense of being.

Session 7: Integration and Application

Participants integrated the skills learned in previous sessions, applying them to real-life situations. This session focused on practicing flexibility in daily activities and responding to challenges with acceptance and mindfulness.

Session 8: Maintenance and Relapse Prevention

The final session focused on maintaining gains, preventing relapse, and applying ACT principles long-term. Participants discussed strategies for continuing practice and dealing with setbacks, emphasizing ongoing growth and flexibility.

2.3.2. Cognitive-Behavioral Therapy (CBT)

In the current study, the intervention of cognitive-behavioral therapy was implemented using the protocol developed by Heimberg and Becker (2002), and the treatment sessions were conducted in 8 group sessions as described below (Share et al., 2014).

Session 1: Introduction to CBT

The first session introduced participants to the principles of CBT, establishing rapport, setting treatment goals, and providing an overview of cognitive-behavioral models. This session focused on psychoeducation about cognitive processes and how they influence emotions and behaviors.

Session 2: Identifying Automatic Thoughts

Participants learned to identify automatic thoughts, particularly those leading to cognitive inflexibility. Through practical exercises, they began to track their thoughts and emotions in response to various situations, understanding the link between thoughts, emotions, and behaviors.

Session 3: Challenging and Modifying Automatic Thoughts

The focus was on techniques for challenging and modifying irrational or maladaptive thoughts. Participants practiced cognitive restructuring to develop more flexible and adaptive ways of thinking.

Session 4: Behavioral Experiments

This session introduced behavioral experiments as a way to test the validity of automatic thoughts and beliefs. Participants designed and carried out experiments to experience new outcomes from modified behaviors and thoughts.

Session 5: Coping Strategies

Participants learned various coping strategies for dealing with difficult emotions and situations, such as problem-solving skills, relaxation techniques, and assertiveness training.

Session 6: Overcoming Avoidance and Facing Fears

The session focused on exposure techniques for overcoming avoidance behaviors and facing fears directly. This was aimed at increasing behavioral flexibility.

Session 7: Developing Alternative Behaviors

Participants explored and practiced alternative behaviors to replace maladaptive ones, enhancing their ability to adapt to different situations and reduce cognitive rigidity.

Session 8: Relapse Prevention and Future Planning

The final session focused on relapse prevention strategies, reviewing the skills learned throughout the

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therapy, and planning for the future use of these skills to maintain cognitive flexibility.

2.4. Data analysis

Data obtained from the above questionnaires were analyzed using descriptive statistical methods, including mean and standard deviation in inferential statistics, using multivariate and univariate analysis of covariance. SPSS version 20 software was used for data analysis, with a significance level of 5% considered for the hypotheses.

3. Findings and Results

In the present study, the demographic characteristics of the participants were carefully analyzed to provide a comprehensive overview of the sample composition. The study consisted of a total of 90 adolescent girls, divided equally across three groups: Cognitive Behavioral Therapy (CBT), Acceptance and Commitment Therapy (ACT), and the control group, each comprising 30 participants (33.33%). The age distribution within the sample was as follows: 15-16 years (40 participants, 44.44%), 17-18 years (50 participants, 55.56%). The educational background of participants varied, with 45 participants (50%) currently enrolled in high school and 45 participants (50%) in pre-university education. Regarding socioeconomic status, based on parental income and occupation, the distribution was as follows: low (30 participants, 33.33%), middle (45 participants, 50%), and high (15 participants, 16.67%). This demographic distribution highlights the diverse backgrounds of the adolescent girls participating in the study, ensuring a broad representation of this population segment.

Table 1

Descriptive Statistics Findings for Research Variables by Three Groups (n=30)

Variable	Group	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Adjusted Mean	SD
Cognitive Flexibility	CBT	40.75	8.57	48.15	8.57	50.05	8.68
	ACT	44.35	8.90	51.00	8.90	49.20	9.05
	Control	42.70	7.07	43.90	7.07	43.79	8.12

Table 1 shows the descriptive findings of the cognitive flexibility variable for the three study groups. The mean and standard deviation of the cognitive flexibility variable in the cognitive-behavioral therapy group were 40.75 and 8.57 in the pre-test, and 48.15 and 8.68 in the post-test, respectively. In the acceptance and commitment therapy group, these were 44.35 and 8.90 in the pre-test, and 51.00 and 9.05 in the post-test, respectively. In the control group, they were 42.70 and 7.07 in the pre-test, and 43.90 and 8.12 in the post-test, respectively.

Using the Shapiro-Wilk test, the normality assumption for the cognitive flexibility variable in all three groups at all three measurement stages was confirmed with a significance level greater than 0.05 ($p>0.05$). To examine the equality of variances of the cognitive flexibility variables the Levene's test was used. According to the results of this test, the homogeneity of variances assumption for the cognitive flexibility variables in the three study groups was confirmed with a significance level greater than 0.05 ($p>0.05$). The homogeneity of regression slopes was examined using the Analysis of Variance, and the results are reported in Table 6. Additionally, the Analysis of Variance for examining the regression slopes in the cognitive flexibility variable was confirmed with a significance level greater than 0.05 ($p>0.05$). To investigate the equality of the covariances of the cognitive flexibility scores among the three groups, Box's test was used, and this assumption was also confirmed ($p<0.05$).

Table 2

Results of Univariate Analysis of Covariance for Cognitive Flexibility Variable

Dependent Variable	Source of Variation	Sum of Squares	Df	Mean Square	F	Significance	Effect Size	Test Power
Cognitive Flexibility	Pre-test	4076.92	1	4076.92	1347.49	$p < 0.001$	0.96	1.00
	Group	459.88	2	229.94	76.00	$p < 0.001$	0.73	1.00
	Error	169.43	56	3.02				
	Total	141179.00	60					

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As observed in Table 2, the difference in the adjusted mean scores among the three groups for the cognitive flexibility variable is significant (F=76.00, p<0.01). This finding implies that there is a significant difference in the mean cognitive flexibility scores between the experimental and control groups. The statistical power for the cognitive flexibility was 1.00, indicating an adequate sample size for this conclusion. The eta coefficient shows that 73% of the variance in cognitive flexibility is related to the treatments. To determine the difference between the groups, the LSD post-hoc test was used. Table 3 presents the results of this analysis.

Table 3

Summary of LSD Test Results for Comparing Mean Differences Between Groups in Cognitive Flexibility Variable

Dependent Variable	Group 1	Group 2	Mean Difference	Standard Error	Significance Level
Cognitive Flexibility	CBT	ACT	0.85	0.56	p = 0.13
	CBT	Control	6.25	0.55	p < 0.001
	ACT	Control	5.40	0.55	p < 0.001

Table 3 indicates that the difference in the mean cognitive flexibility variable between the two treated groups is not significant (p>0.05). Therefore, the effect of both cognitive-behavioral therapy and acceptance and commitment therapy on increasing cognitive flexibility in adolescent girls is approximately at the same level. The difference in the mean cognitive flexibility variable between the two treated groups and the control group is significant (p<0.01). Hence, both cognitive-behavioral therapy and acceptance and commitment therapy have a significant effect on increasing cognitive flexibility in adolescents.

4. Discussion and Conclusion

The present research was conducted to compare the effectiveness of cognitive-behavioral therapy (CBT) and acceptance and commitment therapy (ACT) on cognitive flexibility in adolescent girls. The results showed that the difference in the mean cognitive flexibility variable between the two treatment groups was not significant. Consequently, the impact of both cognitive-behavioral and acceptance and commitment therapies on enhancing cognitive flexibility in adolescent girls is approximately at the same level. Moreover, the difference in the mean cognitive flexibility variable between the two treatment groups and the control group was significant. Therefore, both cognitive-behavioral therapy and acceptance and commitment therapy significantly affect increasing cognitive flexibility in adolescents. This research aligns with previous studies (Aghajanpourian Vahid et al., 2022; Gholizadeh et al., 2021; Hashemi Razini & Karampoor, 2015; Hayes et al., 2006; Saadati et al., 2020; Share et al., 2014; Taghvaei et al., 2019).

In explaining the effectiveness of acceptance and commitment therapy, it can be stated that ACT has been effective in increasing cognitive flexibility, where this treatment has led to cognitive flexibility in adolescent girls. Acceptance and commitment therapy aims to increase psychological and behavioral flexibility in areas where experiential avoidance prevails and prevents individuals from living a fundamental life. Psychological flexibility enhances an individual's ability to choose actions more suitably among different options without imposing actions solely for the avoidance of disturbing thoughts, feelings, or memories. It also strengthens the individual's ability to fully connect with the present and to change or maintain behavior in service of valuable and important life goals. In explaining the effectiveness of cognitive-behavioral therapy, it can be stated that CBT has been effective in increasing cognitive flexibility in adolescent girls, where this treatment has led to the improvement of cognitive inflexibility in adolescents and an increase in their flexibility. Cognitive flexibility is one of the components of executive functions that plays a significant role in daily life. According to the theory of cognitive complexity and control, cognitive flexibility refers to the ability to flexibly shift between multiple incompatible viewpoints or descriptions of a topic or event. The ultimate result of cognitive flexibility is the enhancement of valued living, which emphasizes a behavioral process that aligns with an individual's values. The major advantage of acceptance and commitment therapy over other psychotherapies is considering motivational aspects along with cognitive aspects to influence and sustain the effectiveness of therapy more significantly (Share et al., 2014). In explaining the research findings, it can be stated that the difference in the adjusted mean scores among the three groups in the cognitive flexibility variable is significant. This finding means that there is a significant difference in the mean cognitive flexibility scores between

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the experimental and control groups. The statistical power of cognitive flexibility indicates an adequate sample size for this conclusion. The eta coefficient shows that changes in cognitive flexibility are related to the treatments. A significant part of the low cognitive flexibility is due to irrational and negative thoughts that lead individuals toward cognitive inflexibility; in other words, cognitive inflexibility is associated with irrational cognitive processes; hence, the effectiveness of this treatment has been through challenging negative self-directed thoughts, intermediary thoughts, or fundamental schemas. It reduces cognitive inflexibility while simultaneously increasing responsibility; in other words, belief systems in individuals' minds cause the emergence of feelings, emotions, and eventually various actions and behaviors. Based on this perspective, it is believed that when there is cognitive flexibility, logical thinking does not exist. The cognitive-behavioral approach emphasizes the importance of using skills and considers these skills as mediators in impactful outcomes; through the trainings conducted, individuals are taught effective techniques that acquaint them with valuable aspects of their lives (Saadati et al., 2020).

5. Limitations & Suggestions

The limitations faced by this research include: 1- The small number of participants makes it difficult to generalize the findings. 2- The lack of willingness of individuals to participate in the study, which can be addressed by explaining the importance and benefits of this project to encourage cooperation. 3- Environmental factors such as noise and unsuitable conditions can cause a lack of concentration in responding to the questionnaire. 4- The inappropriate responses of the study individuals and limitations of the Likert method, including the tendency for specific response patterns by some samples, which can be addressed by increasing motivation to reduce inappropriate responses. 5. The small sample size, self-report tools, lack of control over background and individual factors, and the implementation of two therapy methods by the same therapists may cause bias in the treatment outcomes. It is finally suggested that future studies implement sham treatments (placebo programs) on the control group to control the expectation effect. It is also recommended that future research evaluates this new therapeutic approach in comparison with other approaches and in different groups. Given that the effectiveness of these methods was tested on a small sample, to generalize the effectiveness of these methods, it is better to use samples with a larger size to achieve the actual effect size of the program. Researchers are encouraged to expand the findings of this study by applying these two therapeutic methods to similar patients in other provinces.

This exploration into the comparative effectiveness of cognitive-behavioral therapy and acceptance and commitment therapy on cognitive flexibility in adolescent girls provides valuable insights into the potential benefits of each therapeutic approach. By addressing the limitations noted and considering the suggestions for future research, there is an opportunity to deepen our understanding of these therapies and their application to different populations. Further investigation with larger, diverse samples and in varied settings can enhance the robustness of the findings and potentially offer more nuanced guidance for practitioners in the field of psychology. This study contributes to the ongoing dialogue within the psychological community about the best practices for fostering cognitive flexibility and resilience in adolescents, an area of great significance for their overall development and well-being.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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All authors contributed equally.

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