

Original Article

The effectiveness of acceptance and commitment therapy (ACT) on intolerance of uncertainty and psychological inflexibility in individuals with generalized anxiety disorder (GAD)

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Abstract

This research aimed to investigate the effectiveness of acceptance and commitment therapy (ACT) on intolerance of uncertainty and psychological inflexibility in individuals with generalized anxiety disorder (GAD). The study utilized an experimental design with pre-test, post-test, and control groups. The population consisted of individuals diagnosed with GAD who were referred to four psychological health centers in Tehran, Iran, in 2018. The research sample comprised 30 individuals with GAD, selected through convenience sampling, and randomly assigned into two groups: experimental (n = 15) and control (n = 15). Data was collected using the Acceptance and Action Questionnaire—II (AAQ-II), the Intolerance of Uncertainty Scale, and clinical interviews. The results of the Multivariate Analysis of Covariance (MANCOVA) indicated that ACT significantly reduced both intolerance of uncertainty and psychological inflexibility among individuals with GAD ($P < 0.05$). The findings suggest that intolerance of uncertainty and psychological inflexibility are key factors contributing to the persistence of GAD, and ACT can be effective in reducing these cognitive patterns.

Keywords

Acceptance and commitment therapy
Intolerance of uncertainty
Psychological inflexibility
Generalized anxiety disorder

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Introduction

Generalized Anxiety Disorder (GAD) is characterized by excessive, uncontrollable worry about various activities (Baussay et al., 2024). With a lifetime prevalence of 4.4%, GAD is relatively common in the general population. It is associated with significant impairments in functioning and social life, with severity comparable to that of major depression (Zhou et al., 2024). Additionally, GAD is linked to increased healthcare utilization and higher medical costs. According to Nameni et al. (2024), the total lifetime medical cost for a person with any anxiety disorder is US\$6,475, with an additional US\$2,138 specifically for the diagnosis of GAD. As a chronic condition, GAD often manifests several years before the onset of depression. Patients with GAD may not always exhibit overt symptoms of the disorder. Furthermore, individuals with GAD frequently have comorbid diagnoses, leading to treatment that may focus on other conditions (Shah et al., 2023).

One of the key variables related to GAD is *intolerance of*

uncertainty, which encompasses cognitive, emotional, and behavioral reactions to uncertain situations. This intolerance leads to biased information processing, increased faulty evaluations, and reduced coping abilities (Qiu et al., 2024); Intolerance of uncertainty is also considered a personality trait characterized by negative beliefs about uncertainty. For example, individuals who are intolerant of uncertainty view uncertainty as distressing. They believe that doubt about the future is intolerable, unexpected events are inherently negative and must be avoided, and uncertainty impairs their ability to take action (Wang et al. 2024). Dugas et al. (2004) identified intolerance of uncertainty as the strongest predictor of worry in both clinical and non-clinical populations. While worry and depression are known to be interrelated, further research has demonstrated that intolerance of uncertainty is more strongly associated with worry (Schlager, 2023). Empirical evidence suggests that intolerance of uncertainty is a significant factor contributing to cognitive vulnerability to worry (Bird et al., 2024; Ercengiz et al., 2024), and is likely the primary factor underlying the persistence of GAD (Lin et al.,

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2024).

Among the factors observed in emotional disorders is *psychological inflexibility*. To define psychological inflexibility, it is useful to first define its opposite: *psychological flexibility*. Psychological flexibility refers to an individual's ability to focus on the present moment and pursue goals and internal values, even in the face of challenging or unwanted psychological experiences (such as thoughts, sensations, physiological feelings, subjective images, and memories) (Ong et al., 2024). In contrast, psychological inflexibility represents the inability to adapt in such situations. Numerous studies support the role of psychological inflexibility in various psychological problems (Hayes et al., 2006). For instance, research has shown positive correlations between experiential avoidance/psychological inflexibility and a range of psychological disorders, including depression (Shi et al., 2024), anxiety (Ådnøy et al., 2023), and worry (Aydn, 2023). In line with this research, Özdemir (2021) demonstrated a positive and significant relationship between psychological inflexibility and childhood trauma. In another study, Miron et al. (2015) found that psychological inflexibility moderated the relationship between fear of compassion and post-traumatic stress disorder (PTSD) such that a significant relationship existed between fear of compassion and PTSD symptoms among participants with high psychological inflexibility; however, this relationship was not observed in participants with lower psychological inflexibility. Evidence suggests that psychological inflexibility is associated with increased obsessive-compulsive symptoms (Xiong et al., 2021), aggression (Donahue et al., 2024), and anxiety (Cicek et al., 2021). Furthermore, research conducted by Chung et al. (2024) highlighted the significance of psychological inflexibility in relation to social distancing phobia. Additionally, Ruiz (2014) found that psychological inflexibility fully mediated the independent effects of general self-efficacy and anxiety sensitivity on pathological worry.

Considering the high medical costs associated with GAD and the related undesirable consequences, it is essential to utilize effective procedures and treatments in this regard (Carl et al., 2019). Acceptance and Commitment Therapy (ACT) is an evidence-based psychotherapy that targets the most significant and destructive symptoms of chronic disorders (Levin et al., 2024). This treatment emphasizes acceptance as a process that enhances psychological flexibility and serves as a buffer against experiential avoidance and ineffective coping (Gould et al., 2024). Unlike Cognitive Behavioral Therapy (CBT), the goal of ACT is not to decrease the frequency or severity of aversive internal experiences (e.g., thoughts, emotions, sensations, memories, and urges); rather, it focuses on reducing the efforts to control or eliminate these experiences and increasing engagement in meaningful life activities (Durepos et al., 2024). Moreover, research indicates that psychological flexibility is a stronger predictor of the disorder than its symptoms (Wicksell et al., 2010). Consistent with this finding, therapies

targeting psychological flexibility have shown promising results (Fang and Ding, 2023; Sanabria-Mazo et al., 2023). Since the aim of ACT is to enhance psychological flexibility, it is theoretically plausible that individuals with high psychological flexibility may show greater progress compared to those with low psychological flexibility, as they have more capacity to develop and improve that skill. In contrast, individuals with high psychological inflexibility may resist therapy (Lim et al., 2024). ACT has garnered significant attention and has been proven effective for various psychopathologies (Somaini et al., 2023), including anxiety disorders (Ara et al., 2023). Shortly after its development, ACT and acceptance-based therapies gained considerable attention and support for their efficacy in treating depression (Cojocararu et al., 2024) and chronic pain (Casey et al., 2024), and have recently demonstrated efficacy for enhancing psychological well-being in young adults (Mostafazadeh et al., 2024). Garner and Stuart (2023) found that the process of acceptance and commitment among patients with GAD is effective in facilitating acceptance of internal experiences and increasing engagement in valued activities. Furthermore, the effectiveness of this therapy has been shown to reduce public speaking anxiety (Gorinelli et al., 2023), enhance self-efficacy beliefs and academic vitality (Zarei et al., 2024), and decrease anger, irritability, and aggression (Byrne and Cullen, 2024).

Despite the growing interest in Acceptance and Commitment Therapy (ACT) for anxiety disorders, its effectiveness in addressing *intolerance of uncertainty (IU)* and *psychological inflexibility* among individuals with GAD is under-researched. While ACT has been widely applied to anxiety-related conditions, most studies focus on broad symptom reduction without specifically targeting the core cognitive features that drive GAD, such as IU. Additionally, the long-term efficacy of ACT in sustaining improvements in IU and psychological flexibility remains unclear, and there is limited research comparing ACT's effectiveness to other established therapies, such as Cognitive Behavioral Therapy (CBT), in managing these key cognitive dimensions in GAD. Thus, more targeted studies are needed to examine ACT's specific impact on IU and psychological inflexibility, as well as to assess the durability of these effects.

The current body of research on ACT has established its efficacy in reducing overall anxiety and enhancing psychological flexibility, particularly by encouraging individuals to accept distressing thoughts and emotions while committing to value-driven behaviors. However, the literature often overlooks the role of *intolerance of uncertainty*, a central cognitive feature of GAD, which is characterized by an individual's inability to tolerate the unknown, leading to excessive worry. Most studies treat psychological inflexibility as a broad construct without explicitly addressing how it intersects with IU in GAD patients. Furthermore, existing research often fails to differentiate GAD from other anxiety disorders, leading to a generalized understanding of ACT's effectiveness

rather than a disorder-specific approach. This leaves a significant gap in understanding how ACT can be optimized to target the specific mechanisms underlying GAD, particularly in relation to IU and psychological flexibility. This research seeks to innovate by focusing on the nuanced application of ACT in addressing *intolerance of uncertainty* and *psychological inflexibility* specifically within a GAD population. It aims to go beyond symptom reduction to explore how ACT can directly alter the cognitive processes that fuel chronic worry and anxiety in GAD, particularly by improving tolerance of uncertainty. Therefore, This research was conducted with the aim of the effectiveness of acceptance and commitment therapy on intolerance of uncertainty and psychological inflexibility in individuals with GAD.

Method

Participants

This study employed an experimental method with a pre-and post-test design involving control groups, where Acceptance and Commitment Therapy (ACT) and the absence of therapy served as the independent variables, while intolerance of uncertainty and psychological inflexibility were the dependent variables.

The population of this study comprised individuals with GAD who were referred to four psychological health centers in Tehran, Iran, in 2018. They were diagnosed with GAD according to the short-term GAD scale and clinical interviews. From this population, 30 individuals with GAD were selected through convenience sampling and assigned to either the experimental group (n = 15) or the control group (n = 15). The inclusion criteria for selection were: signing the written consent form, currently being diagnosed with GAD or having had a diagnosis within the previous 12 months, and not using specific medications. The exclusion criteria included: lack of cooperation with the therapist and failure to complete assigned tasks, being absent from more than three therapy sessions, lack of motivation to continue therapy, experiencing catastrophic events such as the death of a family member or divorce, drug abuse, and the presence of physical illnesses.

Instrument

Generalized Anxiety Disorder Scale (GADS-7):

This scale, which was developed by Spitzer et al (2006) is used to measure the degree and intensity of symptoms related to GAD during two previous weeks. The scale consists of 7 questions graded in 4 different degrees (not at all=0, a few days=1, more than half the period=2, and almost all days=3), and the scale scores range from 0 to 21. The reliability of the scale has been reported as 0.92 using Cronbach's alpha (Spitzer et al., 2006). The cut point, sensitivity, and exclusiveness of the test were 10, 0.89, and 0.82, respectively. The results of research by Naeimian et al (2011) indicated that the validity and reliability of this tool were 0.87 and 0.76, respectively.

Intolerance of uncertainty scale (IUS):

The Intolerance of Uncertainty Scale (IUS) is designed to assess individuals' tolerance for ambiguous and uncertain situations. Developed by Buhr and Dugas (2002), this questionnaire consists of 27 items and is answered based on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). The reported Cronbach's alpha coefficient for the scale and its test-retest reliability after a 5-week interval were 0.94 and 0.74, respectively (Buhr and Duga, 2002). The Cronbach's alpha reported by Akbari et al (2010) and the test-retest reliability (after a 3-week interval) were 0.88 and 0.76, respectively.

Acceptance and Action Questionnaire—II (AAQ-II):

This questionnaire was developed by Bond et al (2011). It is a 10-item version of the original questionnaire (i.e., AAQ-I) developed by Hayes (2000). It assesses the construct related to variety, acceptance, experiential avoidance, and psychological flexibility. The higher scores show high psychological flexibility. The psychometric characteristics of the original version: the results of 2816 participants in 6 different samples showed that the reliability, validity, and construct validity of the scale are satisfactory. The mean of the alpha coefficient was 0.84 (0.88 – 0.78) and the reliability of its retest after the intervals of 3 and 12 months were 0.81 and 0.79, respectively. The results indicate that AAQ-II scores concurrently, longitudinally, and incrementally predict a range of outcomes, from mental health to work absence rates that are consistent with its underlying theory. This tool is also of suitable face validity. It seems that AAQ-II measures the concept similar to AAQ-I but with better psychometric consistency (Bond et al., 2011). The reported internal consistency of this scale in Iran was between 0.71 and 0.89 (Abasi et al., 2012).

Procedure

After obtaining the necessary permissions and explaining the research objectives to the participants, they were asked (with their consent) to participate in the therapeutic sessions. Prior to the start of the training sessions, both groups were pretested, during which participants completed the questionnaire. The therapeutic sessions consisted of eight group sessions, each lasting one and a half hours, held twice a week. Following the final session, both groups were post-tested, and the results were analyzed using SPSS through Multivariate Analysis of Covariance (MANCOVA). The defined significance level for the research was set at 0.05. Protecting respondents' confidentiality and ensuring their complete freedom to participate were among the ethical considerations observed in this study.

Table 1. Summary of acceptance and commitment therapy intervention

Session	Focus/Topic	Key Components	Session Objectives
1	Introduction to ACT & Overview	- Psychoeducation on ACT principles - Initial exploration of problem areas	Introduce the ACT model, establish rapport, and identify areas of psychological inflexibility.
2	Acceptance & Emotional Avoidance	- Acceptance exercises - Discussion on avoidance strategies	Encourage clients to accept uncomfortable thoughts/feelings rather than avoiding them.
3	Cognitive Defusion	- Cognitive defusion techniques (e.g., thought labeling) - Mindfulness practice	Help clients recognize thoughts as separate from reality and reduce their emotional impact.
4	Present Moment Awareness (Mindfulness)	- Mindfulness exercises (e.g., breathing, body scan) - Present moment focus	Cultivate awareness of present experiences and reduce worry about past/future events.
5	Self-as-Context	- Exercises on self-observation - Differentiating between the self and experiences	Develop a flexible sense of self, encouraging clients to see themselves as distinct from their thoughts/emotions.
6	Values Clarification	- Values identification exercises - Exploration of personal values	Help clients identify core values that guide their behavior and give meaning to life.
7	Committed Action	- Goal-setting based on values - Action planning despite discomfort	Encourage clients to take action aligned with their values, even in the presence of distress.
8	Review & Consolidation	- Review progress - Relapse prevention strategies - Future goals	Consolidate learning, discuss ongoing application of ACT principles, and plan for continued growth.

Results

In our study, demographic data was collected to better understand the participants' characteristics and contextualize the findings. The following demographic information was gathered: The participants' ages ranged from 20 to 38 years, with a mean age of 30.65 years.

The educational backgrounds of the participants were different, including 59% were undergraduate students, 38% were postgraduate students, and 3% were doctoral students. The sample included 51% female students and 49% male students.

Table 2. Pre-test/post-test mean±SD of psychological flexibility and intolerance of uncertainty among groups under study

Variable	Experiment				Control			
	Pre-test		Post-test		Pre-test		Post-test	
	M	SD	M	SD	M	SD	M	SD
psychological flexibility	25.46	4.58	57.80	9.32	24.46	3.83	26.73	3.36
intolerance of uncertainty	105.73	12.92	64.53	7.11	104.86	5.87	108.73	5.29

As indicated in Table 2, the pre-test mean ± SD of psychological flexibility among the experimental group was 25.46 ± 4.58, while the post-test mean ± SD was 57.80 ± 9.32. The pre-test mean ± SD of intolerance of uncertainty among the experimental group was 105.73 ± 12.92, and the post-test mean ± SD was 64.53 ± 7.11.

Moreover, the pre-test mean ± SD of psychological flexibility among the control group was 24.46 ± 3.83, while the post-test mean ± SD was 26.73 ± 3.36. Additionally, the pre-test mean ± SD of intolerance of uncertainty among the control group was 104.86 ± 5.87, and the post-test mean ± SD was 108.73 ± 5.29.

Table 3. The obtained data related to the reliability of the multivariate analysis of covariance (MANCOVA)

Variable	Effect	Value	Hypothesis df	Error df	F	Sig	Partial Eta Squared
Group	Pillai's Trace	0.955	2	25	265.587	P ≤ 0.001	0.955
	Wilks' Lambda	0.045	2	25	265.587	P ≤ 0.001	0.955
	Hotelling's Trace	21.247	2	25	265.587	P ≤ 0.001	0.955
	Roy's Largest Root	21.247	2	25	265.587	P ≤ 0.001	0.955

As indicated in Table 3, the results of Wilks' Lambda showed that the effect of the group is significant on the combination of research variables [$P \leq 0.001$, $F(25, 2) = 265.587$, Wilks' Lambda = 0.045]. The use of

Multivariate Analysis of Covariance (MANCOVA) was supported by this test. The results indicated that there is a significant difference between at least one of the variables related to the groups under study.

Table 4. The results of Box's Test of Equality of Covariance Matrices and Levene's Test of Equality of Error Variances among groups under study

Box's M Test	df1	df2	F	Sig
12.483	3	141120	3.454	0.07
Levene's Test	df1	df2	F	Sig
psychological flexibility	1	28	1.705	0.202
intolerance of uncertainty	1	28	1.550	0.223

Based on Table 4, before using the parametric test of Multivariate Analysis of Covariance (MANCOVA), we applied Box's test and Levene's test to assess their assumptions. Box's test was not significant for any of the research variables, indicating that the condition of

equality for variance/covariance matrices was satisfied ($p = 0.07$, $F = 3.454$, Box's $M = 12.483$). Similarly, Levene's test was not significant for any of the variables, confirming that the condition of equality for intergroup variances was also satisfied.

Table 5. The results of Multivariate Analysis of Covariance (MANCOVA) of psychological flexibility and intolerance of uncertainty in experimental and control groups

Variable	Source	Ss	df	MS	F	Sig
psychological flexibility	Pre-test	69.593	1	69.593	1.389	0.249
	Group	6827.350	1	6827.350	135.939	0.001
intolerance of uncertainty	Pre-test	2.919	1	2.919	0.076	0.785
	Group	14026.687	1	14026.687	366.303	0.001

Based on Table 5, and after adjusting for pre-test scores, the results of the post-test indicate that Acceptance and Commitment Therapy (ACT) has a significant impact on psychological flexibility ($P < 0.001$, $F = 135.939$) and intolerance of uncertainty ($P < 0.001$, $F = 366.303$). Therefore, it can be concluded that, compared to the control group, ACT improved psychological flexibility and reduced intolerance of uncertainty among individuals with GAD.

Discussion

This research aimed to study the effectiveness of Acceptance and Commitment Therapy (ACT) on intolerance of uncertainty and psychological inflexibility in individuals with GAD. The results indicated that ACT was effective in reducing intolerance of uncertainty among individuals with GAD. These findings align with those of [Ara et al. \(2023\)](#), [Cojocaru et al. \(2024\)](#), [Casey et al. \(2024\)](#), and [Mostafazadeh et al. \(2024\)](#), which demonstrate the effectiveness of this therapy in alleviating symptoms of various psychological problems, including GAD and its negative consequences, such as intolerance of uncertainty. Moreover, the findings are consistent with [Wetherell et al. \(2011\)](#), which showed that ACT was effective in improving anxiety and depression symptoms in patients with GAD. The findings from this study highlight the effectiveness of ACT in addressing intolerance of uncertainty (IU) among individuals with GAD. Given that IU is a central cognitive feature driving GAD, characterized by excessive worry and difficulty coping with uncertain situations, the results of this study suggest that ACT is a promising therapeutic approach for directly targeting and reducing IU. ACT's emphasis on encouraging individuals to accept their distressing thoughts and emotions, rather than attempting to control or eliminate them, may explain its impact on IU. By fostering psychological flexibility, ACT allows individuals to develop a healthier relationship with uncertainty, which is essential for managing GAD ([Casey et al., 2024](#)).

Previous research on ACT has shown its efficacy on improving psychological flexibility across various anxiety disorders, but this study adds specificity to the literature by focusing on its role in reducing IU in GAD populations ([Dehghani Bidgoli et al., 2022](#)). ACT encourages patients to accept uncertainty as part of life,

which contrasts with traditional cognitive-behavioral approaches that focus on changing thought patterns related to uncertainty. This acceptance-based strategy is particularly relevant for individuals with GAD, who tend to engage in maladaptive behaviors such as excessive worry or avoidance as a response to uncertain situations. The reduction in IU observed in this study could be attributed to ACT's emphasis on accepting uncertainty without avoidance or suppression ([Cojocaru et al., 2024](#)). Furthermore, a small open trial ([Ruiz et al., 2020](#)) as well as a Larger RCT (randomized clinical trial) ([Roy et al., 2021](#)) concluded that ACT was effective on GAD. On the other hand, after post-testing the results showed that 77 % of the subjects who received acceptance and commitment therapy didn't meet the criteria for diagnosing GAD.

The results indicated that Acceptance and Commitment Therapy (ACT) was effective in reducing psychological inflexibility among individuals with GAD. These findings align with those of [Garner and Stuart \(2023\)](#), [Gorinelli et al. \(2023\)](#), [Zarei et al. \(2024\)](#) and [Byrne and Cullen \(2024\)](#). According to the ACT model, the attempt to suppress worry can paradoxically lead to an increase in it ([Hayes et al., 2006](#)); therefore, while ACT aims to enhance psychological flexibility, it can also lead to a reduction in various other psychological issues ([Hayes et al., 2010](#)). Psychological flexibility originates from six core processes: acceptance, defusion, self-as-context, present-moment awareness, values, and committed action ([Hayes et al., 2010](#)). Through these processes, clients learn that their thoughts are merely thoughts and not reflections of reality; these are internal events, not external truths. By distancing themselves from their thoughts and defusing worrying thoughts, clients can engage with the present moment and perceive it as it truly is. They learn to be mindful of the present and to enjoy it, rather than becoming absorbed in unrealistic thoughts and imaginations. The ACT model emphasizes engagement in meaningful activities regardless of the presence of worry. This movement toward participating in valuable activities further facilitates acceptance of internal experiences ([Cojocaru et al., 2024](#)).

The findings indicate that the progress achieved through Acceptance and Commitment Therapy (ACT) among individuals suffering from anxiety and worry is due to their increased willingness to experience a wide range

of psychological phenomena, including unwanted emotional experiences, memories, thoughts, urges, and physical symptoms. This suggests that the distress and impairment in individuals with chronic worry are not solely due to their concerns about future events or attempts to avoid them, but also due to generalized patterns of inflexibility and experiential avoidance (Ara et al., 2023; Nikonejad et al., 2024). Inflexible responses and avoidance behaviors toward worry are likely part of larger behavioral patterns, influenced by cognitive fusion and attempts to control personal experiences such as anger, depression, fatigue, fear, disappointment, guilt, and shame—experiences typically evaluated negatively, which lead to intolerance of uncertainty. By focusing on behavioral patterns aligned with personal values and meaningful activities, a flexible pattern can emerge that enhances psychological flexibility and breaks the cycle of worrying thoughts (Pourabdol et al., 2016; Nariman et al. 2016; Roy et al., 2021;). Mindfulness exercises play a crucial role in this process, as mindfulness is a key component of the ACT model. Various studies have demonstrated that mindfulness-based exercises and interventions effectively reduce anxiety disorders. For instance, in an open trial of ACT for social anxiety disorder, Morina et al. (2023) found a significant relationship between improvements in mindfulness and reductions in social anxiety symptoms.

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Conclusion

The findings of the present research demonstrated that Acceptance and Commitment Therapy (ACT) is effective in reducing intolerance of uncertainty and psychological inflexibility among individuals with GAD. This suggests that ACT, as an evidence-based treatment, can be a valuable approach in addressing emotional disorders, particularly GAD. However, the study faced several limitations. First, the use of a convenience sampling method may limit the generalizability of the results. Second, the study was confined to Tehran, Iran, which poses challenges in extending the findings to other regions or populations. Additionally, the lack of a follow-up phase is another significant limitation. Future research should address these gaps by conducting similar studies in other provinces of Iran and incorporating more robust sampling techniques, such as multi-stage cluster sampling, alongside follow-up assessments. Lastly, it is recommended that training programs for psychologists and counselors be implemented to facilitate the application of ACT interventions in clinical practice.

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