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The Impact of Acceptance and Commitment Therapy and Cognitive-Behavioral Therapy on Enhancing Psychological Flexibility in Students with Phubbing

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A B S T R A C T

Purpose: The present study investigated the impact of two therapeutic approaches—Acceptance and Commitment Therapy (ACT) and Cognitive-Behavioral Therapy (CBT)—on enhancing psychological flexibility in students suffering from phubbing.

Methods and Materials: This study employed a quasi-experimental design with a pre-test, post-test, and a two-month follow-up phase. The study sample consisted of 45 students with phubbing behavior who were randomly assigned to three groups of 15: the ACT group, the CBT group, and the control group. The Psychological Flexibility Scale was used to collect data, and the results were analyzed using repeated measures analysis of covariance (ANCOVA) and Bonferroni post hoc tests.

Findings: The results indicated that both ACT and CBT had a significant effect on improving psychological flexibility compared to the control group ($F = 47.490$, $\eta = 0.698$). Notably, at the follow-up stage, ACT showed superior performance compared to CBT. In a more detailed analysis of subscales, ACT outperformed CBT, especially during the follow-up period. Regarding the psychological flexibility variable, post hoc test results revealed that the ACT group demonstrated significantly greater improvement in the follow-up phase compared to the CBT group.

Conclusion: Based on the findings of this study, it is recommended that ACT, as a long-term effective approach, be considered alongside CBT in university and educational center support and counseling programs to enhance psychological flexibility in students with phubbing behavior. These interventions may contribute to the enhancement of students' psychological capabilities and the reduction of harm associated with phubbing.

Keywords: *Psychological Flexibility, Cognitive-Behavioral Therapy, Acceptance and Commitment Therapy, Phubbing Behavior.*

1. Introduction

In recent decades, smartphones have become an inseparable part of life for individuals across different age groups. In addition to facilitating communication and access to information, these digital tools have created a basis for excessive dependence and the emergence of problematic behaviors (Ivanova et al., 2020; Safdar Bajwa et al., 2023). Recent research has shown that this type of dependence can have widespread negative effects on students' mental health, academic performance, and social interactions. Specifically, a study by Olsen et al. (2023) indicates that two-thirds of individuals experience varying levels of stress and anxiety when they are unable to access the internet, and are even willing to sacrifice many social activities to maintain their online connection (Olson et al., 2023). These findings suggest that excessive dependence on smartphones can lead to cognitive, emotional, and functional problems that impact individuals' quality of life.

Among the negative phenomena associated with excessive smartphone use is phubbing. Wolf (2014) defined phubbing as "the act of ignoring others in a social environment by looking at one's phone instead of paying attention to the people present." (Wolf, 2014). Such behaviors have negative consequences for interpersonal communication, harming relationship satisfaction and personal well-being (Roberts & David, 2016). The phubbing phenomenon can significantly affect individuals' attitudes and behaviors. Gao et al. (2023), in examining the role of phubbing and social exclusion in social media-related fear and depressive symptoms, stated that fear caused by social media is significantly and positively correlated with depressive symptoms among students (Gao et al., 2023). The study by Safdarbajwa et al. (2023) showed a significant positive relationship between smartphone addiction and phubbing behavior among students (Safdar Bajwa et al., 2023). According to Ivanova et al. (2020), greater smartphone addiction and higher phubbing are associated with increased levels of depressive mood, and phubbing mediates the relationship between smartphone addiction and depression (Ivanova et al., 2020). Moreover, phubbing is also linked to psychological disorders or distress, depressive states, loneliness, hopelessness, alexithymia, low self-concept, and more (Ruiz-Ruano et al., 2020).

Psychological flexibility is among the key concepts related to the misuse of modern technologies (Sadeghi & Karimi, 2018). Psychological flexibility is an approach to mental health and well-being that emphasizes the utility of behavior in a specific context, along with the ability to predict and influence that behavior (Biglan & Hayes, 2015). The core principle of psychological flexibility is that when individuals have low flexibility, they become overly entangled with their thoughts and thus excessively engage in avoidance or escape from negatively evaluated events. Individuals with high psychological flexibility manage their reactions and behaviors with active awareness of their thoughts and feelings in the present moment and guide themselves based on the situational demands. These individuals can reconfigure their mental resources, shift perspectives, and develop a balance between desires and needs in order to pursue identified goals and values (Kashdan & Rottenberg, 2010). In contrast, individuals with low psychological flexibility usually exhibit various psychopathological symptoms. They struggle to quickly return to baseline after a stressful event and are unable to plan or strive toward distant goals (Boulanger et al., 2010).

The foundational philosophy underlying the concept of psychological flexibility is based on a scientific orientation known as functional contextualism. The philosophical assumptions of functional contextualism are rooted in the interaction of the entire organism within a historical and situational context (Hayes et al., 2001; Hayes & Hofmann, 2021; Hayes et al., 2013). Functional contextualism offers an approach for observing all behaviors to derive principles, theories, and methodologies for successfully predicting and influencing behavior. Moreover, a comprehensive account of behavior is only complete when the historical and situational context is also considered. Context refers to the current and immediate circumstances and environment in which an event occurs, as well as an individual's learning history. Features of context include physical, social, biological, and/or cultural dimensions (Biglan & Hayes, 1996). Psychological flexibility consists of six core components: acceptance, cognitive defusion, present-moment awareness, self-as-context, values, and committed action, which can be examined across three key domains: openness to experience, behavioral awareness, and valued action (Rolffs et al., 2018).

Psychological flexibility is strongly associated with the ability to recognize and adapt to situational demands, modify attitudes and behaviors to align with personal and social functioning, maintain a balance among life demands, and identify and commit to behaviors that align with one's deeply held beliefs (Gloster et al., 2017). These capabilities are vital for healthy psychological functioning. Additionally, psychological flexibility plays a significant role in emotional

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regulation, especially in managing emotions under stressful conditions and enhancing the ability to reappraise situations to better align with emotional responses (Westphal et al., 2010).

Excessive dependence on mobile phones may reduce psychological flexibility, thereby impairing one's capacity to change behaviors and cope with environmental challenges. This concept encompasses a wide range of human capabilities, from recognizing and adapting to diverse environmental demands to shifting behavioral strategies when those strategies endanger one's personal and social functioning. Psychological flexibility helps maintain balance across various life domains and keeps individuals aware of their environments while committing to behaviors aligned with their personal values (Arslan & Allen, 2022). The findings of Lucas and Moore (2020) indicate that psychological flexibility is associated with general health and vulnerability to a wide range of psychological distress, including depression, anxiety, and general mental disorders (Lucas & Moore, 2020). Therefore, it can be inferred that intervention therapies such as Cognitive-Behavioral Therapy and Acceptance and Commitment Therapy can be effective in enhancing psychological flexibility.

Among the therapeutic approaches for reducing psychological problems in students affected by phubbing, CBT and ACT are noteworthy. CBT interventions teach assessment skills and a range of standardized cognitive-behavioral coping strategies, which provide guidance for choosing strategies suited to the context. The basic assumption of CBT is that distorted or biased thinking leads to psychological disorders, emphasizing the central role of dysfunctional beliefs and cognitive distortions (Hofmann & Hayes, 2019; Rasoulian et al., 2024). In contrast, ACT aims to shift the goal from avoiding unpleasant emotions to fully experiencing them in the service of personal value-oriented goals. Acceptance is a key feature of ACT, involving the active and conscious embracing of negative thoughts, emotions, and bodily sensations experienced throughout life—without unnecessary efforts to change their frequency or form, especially when such attempts could lead to psychological harm (Hayes et al., 2013).

In fact, since CBT is based on change and many individuals resist change, the emergence of third-wave behavioral therapy protocols (such as acceptance-based treatments) has raised hope for overcoming such resistance in individuals with personality disorders (Dela Cruz et al., 2023). According to Hayes and Hofmann (2021), many clinical problems can, in one way or another, be conceptualized as experiential avoidance (Hofmann & Hayes, 2019). Thus, comparing these two therapeutic approaches in any disorder essentially involves comparing the effectiveness of second-wave versus third-wave behavioral therapies in psychology (McCracken et al., 2022). Conducting studies in this field not only clarifies the effectiveness of these therapeutic protocols in improving individuals' cognitive and perceptual issues in different settings but also facilitates direct comparisons of their relative effectiveness.

Researchers studying ACT believe that psychological inflexibility is a core process in the development and maintenance of psychological pathology. Processes that contribute to psychological inflexibility include maladaptive responses to internal experiences. For instance, experiential avoidance involves rigid behavioral patterns focused on avoiding or altering internal experiences. On the other hand, cognitive fusion refers to interacting with the content of thoughts as though they were real and absolute, significantly influencing behavior. Additionally, attachment to the conceptualized self involves becoming overly entangled with a rigid and fused sense of self (Klimczak et al., 2023). Just as psychological flexibility is associated with mental health, its absence is linked to psychological distress. Depression is a common disorder characterized by inflexible behavioral patterns. Symptoms of depression strongly point to a lack of psychological flexibility (Bi & Li, 2021).

Regarding the significance of ACT, Khorramnia et al. (2021) reported that this therapeutic method significantly reduced social anxiety, overall interpersonal sensitivity scores and subcomponents, and increased psychological flexibility in the post-test phase (Khormania et al., 2021). Nadaf et al. (2021), in their study on the effectiveness of group-based ACT on negative automatic thoughts and psychological flexibility in depressed clients at counseling centers, concluded that ACT significantly impacted both negative automatic thoughts and psychological flexibility (Nadaf et al., 2021). Furthermore, the study by Faghih and Manshaei (2024) showed that ACT significantly reduced health anxiety and emotional exhaustion while increasing psychological flexibility (Faghih & Manshaee, 2024). According to Tyndall et al. (2020), the ACT approach can positively impact the enhancement of psychological flexibility (Tyndall et al., 2020).

Regarding the effectiveness of CBT, Akerblom et al. (2021) stated that this therapeutic approach could be effective for chronic pain by focusing on psychological flexibility strategies (Åkerblom et al., 2021). In this regard,

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Rasoulian et al. (2023) reported that CBT significantly improved cognitive and emotional flexibility in individuals with psychological distress (Rasoulian et al., 2024). Similarly, the findings of Bakhtiari (2024) revealed that CBT was effective in improving psychological flexibility in women experiencing marital burnout, with the experimental group showing higher psychological flexibility than the control group (Bakhtiari, 2024). Likewise, Makvandi et al. (2024) noted that CBT training reduced psychological distress and improved cognitive flexibility in individuals with gender dysphoria (Makvandi et al., 2024). Despite numerous studies on the effectiveness of these two therapeutic methods, no study has yet directly compared ACT and CBT in improving psychological flexibility among students affected by phubbing, underscoring the importance of addressing this topic.

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a quasi-experimental design with pre-test, intervention, post-test, and two-month follow-up phases. The objective was to examine the effects of Acceptance and Commitment Therapy (ACT) and Cognitive-Behavioral Therapy (CBT) as independent variables on enhancing psychological flexibility in students with phubbing behavior, which served as the dependent variable. Following approval from the university's ethics committee (Ethics Code: IR.IAU.LIAU.REC.1403.131), the data collection process commenced.

The study population consisted of undergraduate students from the Islamic Azad University, Rasht Branch, during the 2024–2025 academic year. Using G*Power software, a sample size of 39 participants was determined; to increase statistical power and precision, 15 individuals were assigned to each group. Inclusion criteria included excessive dependence on mobile phones and absence of drug or sedative use. Exclusion criteria consisted of prior participation in therapeutic interventions and unwillingness to continue with the study.

To ensure group homogeneity, in addition to applying inclusion and exclusion criteria, influential variables such as academic level (undergraduate) and university location (Islamic Azad University, Rasht Branch) were controlled. Moreover, to minimize the impact of demographic variables and enhance the validity of the results, participants were matched based on characteristics such as age, gender, field of study, and daily mobile phone usage. For this purpose, the non-parametric Kruskal–Wallis test was utilized. This test, which is particularly suitable for comparing ordinal variables across groups, showed no significant differences between the groups on these demographic variables. Therefore, the matching process confirmed that the groups were demographically equivalent, ensuring that any observed differences in test results could be attributed to the therapeutic interventions rather than to demographic factors.

The study procedure was as follows: after selecting participants using purposive sampling, individuals were randomly assigned to one of three groups—ACT, CBT, and control (15 participants per group). At the beginning of the study, a psychological flexibility pre-test was administered to all groups. Subsequently, the ACT and CBT groups received therapeutic interventions, whereas the control group did not receive any intervention. After the intervention, a post-test was administered, followed by a two-month follow-up assessment.

2.2. Measure

The primary measurement tool used in this study was the Psychological Flexibility Questionnaire developed by Dennis and Vander Wal (2010). This self-report instrument consists of 19 items and is designed to assess the type of psychological flexibility required to confront and replace maladaptive thoughts with more effective ones. It is scored on a 5-point Likert scale, with total scores ranging from 19 to 95. Higher scores indicate greater perceived controllability and improved problem-solving processing when faced with external events. The two subscales include perceived controllability and problem-solving processing. This tool is commonly used to assess the degree of flexible thinking improvement during CBT for depression and other psychological disorders. The cut-off score is 57, representing the average of the possible minimum and maximum scores. Descriptive statistics from the study showed that only the ACT group, and only at the follow-up stage, obtained a score above the cut-off. The questionnaire's concurrent validity with the Beck Depression Inventory was −0.39, and its convergent validity with the Cognitive Flexibility Scale by Martin and Rubin was 0.75 (Dennis & Vander Wal, 2010). Domestically, Soltani et al. (2013) reported a test–retest reliability coefficient of 0.71 and a Cronbach's alpha of 0.90 (Soltani et al., 2013). In a more recent study, Aghababaei et al. (2022) found the Cronbach's alpha to be 0.75 (Aghababaei et al., 2022).

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2.3. *Intervention*

The ACT intervention protocol was based on the model developed by Eifert et al. (2006), which includes techniques related to acceptance, mindfulness, and commitment to values. For the CBT group, the protocol by Michael Free (2007) was implemented, targeting the modification of negative thoughts and maladaptive behaviors to reduce psychological distress. In addition to therapy sessions, participants were assigned homework exercises to apply the learned techniques in their daily lives. It is important to note that, under the supervision of an advisor and consultant, adjustments were made to the intervention sessions to enhance their effectiveness and tailor them to the specific variable under investigation.

The ACT intervention protocol included ten structured sessions designed to enhance psychological flexibility in students with problematic mobile phone use. The first session introduced the therapy protocol, emphasized the importance of psychological flexibility, and explored how mobile phone use often stems from a desire to avoid unpleasant experiences; participants were asked to record situations in which they used their phones to escape negative emotions. The second session focused on identifying dysfunctional thoughts related to phone use and learning to observe them non-judgmentally, with participants practicing mindful observation of such thoughts during phone cravings. In the third session, participants were taught to accept unpleasant emotions without trying to alter them via phone distraction, practicing simply sitting with difficult feelings without reaching for their devices. The fourth session addressed how to respond flexibly in situations where students typically use their phones to manage stress, encouraging alternative non-phone-based responses. In the fifth session, personal values were identified and aligned with daily behaviors to promote meaningful action, with students listing important life values and reflecting on how their phone use supports or hinders these. The sixth session discussed experiential avoidance and its role in phone dependence, guiding participants to observe and tolerate phone-related urges without acting on them. Session seven introduced mindfulness practices to strengthen psychological flexibility, including engaging in a focused activity without phone-related distractions. The eighth session trained cognitive and behavioral distancing techniques without attempting to suppress urges to use the phone, encouraging students to create mental space from dependency-related thoughts. In the ninth session, psychological flexibility skills were consolidated and applied to daily life, with participants designing a personal plan to balance phone use. The final session focused on long-term strategies for sustaining flexibility and preventing relapse, including a one-week trial implementation of the new plan and self-evaluation of its effectiveness.

The CBT intervention protocol also comprised ten sessions aimed at improving psychological flexibility by restructuring cognitive distortions and promoting adaptive behavior change. The first session introduced the protocol, emphasized the importance of psychological flexibility, and examined how mobile phone use reflects rigid thinking and behavior patterns; participants identified situations in which they avoided change or new experiences due to phone dependence. The second session explored irrational beliefs about phone use (e.g., “I can’t relax without my phone”) and replaced them with rational alternatives, with students analyzing and challenging these beliefs. In session three, participants increased their tolerance for ambiguity and practiced staying present in situations where they usually used phones to escape reality, consciously experiencing moments without their devices and recording related feelings. The fourth session focused on managing negative emotions such as anxiety, anger, or hopelessness without turning to the phone, encouraging emotion regulation strategies like deep breathing or mindfulness. The fifth session introduced cognitive flexibility techniques for coping with changes in phone use, involving challenges to reduce phone time in specific contexts and reflecting on emotional impacts. In session six, participants identified and modified automatic behavioral patterns, such as reflexively checking the phone when stressed, by designing alternative behaviors. Session seven emphasized accepting unpleasant emotions without using the phone as an avoidance tool, with students writing about their feelings when experiencing cravings without acting on them. The eighth session applied cognitive strategies to manage fear of missing out (FOMO), encouraging students to intentionally abstain from phone use in specific scenarios and analyze the emotional response. In the ninth session, students worked on consolidating cognitive and behavioral changes to manage phone dependence, documenting successes and challenges in increasing flexibility. The final session guided students in developing a practical strategy to maintain balanced phone use across various situations, supporting long-term behavioral regulation and self-management.

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2.4. Data Analysis

Data analysis was conducted using both descriptive and inferential statistics. In the descriptive section, the frequency distribution of participants' scores, as well as the means and standard deviations for each group, were calculated. For inferential analysis, repeated measures ANCOVA was used to examine significant differences across pre-test, post-test, and follow-up phases. Additionally, Bonferroni post hoc tests were used for more precise comparisons and to identify statistically significant differences between the groups. All statistical analyses were conducted using SPSS software, version 26.

3. Findings and Results

Analysis of demographic characteristics revealed that the majority of participants were female students. In terms of age, most students (60%) were between 20 and 25 years old, while 28.9% were under 20, and 11.1% were between 26 and 30 years old. Regarding academic major, the highest proportion of participants came from the psychology department (55.6%), likely due to the thematic alignment between the study topic and the discipline. Finally, with respect to daily mobile phone use, results showed that nearly half of the participants (46.7%) used their phones for more than 10 hours a day, and another 46.7% used them between 6 and 10 hours daily, indicating a significant dependence on mobile devices and online activity.

Descriptive statistical analysis of the psychological flexibility variable demonstrated that therapeutic interventions—particularly Acceptance and Commitment Therapy (ACT)—had a substantial impact on this variable. The mean psychological flexibility score in the ACT group increased from 48.00 at the pre-test to 58.53 at follow-up, indicating stable and significant improvement. Cognitive-Behavioral Therapy (CBT) also showed a meaningful improvement in this variable, with the mean increasing from 47.87 at pre-test to 54.87 at follow-up. In contrast, the control group showed minimal change, with the mean rising from 47.87 at pre-test to 49.27 at follow-up. Descriptive results for psychological flexibility across pre-test, post-test, and follow-up phases are shown in Table 1.

Table 1

Descriptive Statistics for Psychological Flexibility Scale Across the Three Groups

Variable	Group	Pre-test (M±SD)	Post-test (M±SD)	Follow-up (M±SD)
Perceived Controllability	ACT	32.07 ± 2.28	36.27 ± 1.22	37.13 ± 1.30
	CBT	31.87 ± 2.07	34.73 ± 1.67	36.20 ± 1.21
	Control	32.13 ± 2.00	32.67 ± 2.47	32.53 ± 2.53
Problem-Solving Processing	ACT	15.93 ± 1.44	19.40 ± 1.77	21.40 ± 1.99
	CBT	16.00 ± 1.36	18.20 ± 1.21	18.67 ± 1.29
	Control	15.73 ± 1.34	16.53 ± 1.41	16.73 ± 1.44
Psychological Flexibility	ACT	48.00 ± 3.12	55.67 ± 1.92	58.53 ± 2.59
	CBT	47.87 ± 2.83	52.93 ± 2.12	54.87 ± 1.69
	Control	47.87 ± 2.75	49.20 ± 2.88	49.27 ± 3.01

Results in Table 1 indicated similar trends across the subscales of perceived controllability and problem-solving processing. In the perceived controllability subscale, ACT showed the greatest improvement, with the mean increasing from 32.07 to 37.13. CBT also demonstrated a significant improvement, with scores rising from 31.87 to 36.20. Similarly, in the problem-solving processing subscale, the ACT group improved from 15.93 at pre-test to 21.40 at follow-up, while the CBT group increased from 16.00 to 18.67. Thus, both therapeutic interventions positively influenced psychological flexibility and its subscales, with ACT outperforming CBT overall.

In the first stage of inferential analysis, the necessary assumptions for conducting ANCOVA were evaluated. To assess the homogeneity of variances across groups, Levene's test was performed, confirming that the assumption was met. The normality of data distribution was examined using the Shapiro–Wilk test, which indicated that all variables, including psychological flexibility and its subscales, followed a normal distribution, as the significance levels exceeded 0.05. Additionally, the equality of covariance matrices for the dependent variables was tested, and the Box's M statistic was found to be non-significant, confirming that the assumption of homogeneity of covariance matrices was satisfied. Finally, the homogeneity

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of regression slopes was assessed, and the results showed that the relationship between the covariate and the dependent variable was consistent across all groups, with no significant interaction detected—thus verifying that this assumption was also met.

The first section of the ANCOVA analysis focused on within-group effects across the three phases. Initially, the effect of time on the dependent variable was examined to assess changes in psychological flexibility across pre-test, post-test, and follow-up for all groups. Subsequently, the interaction effect of time and treatment group was analyzed to determine how the combination of time and type of therapy influenced outcomes. Finally, the interaction effect between time and the dependent variable was evaluated. Since the control group received no intervention, the time effect on the dependent variable was expected to be nonsignificant, which would also influence the significance of the time–dependent variable interaction. Therefore, only the interaction effects of time and treatment group on psychological flexibility and its subscales were analyzed, with the results presented in Table 2.

Table 2

Within-Group Effects for Psychological Flexibility Variable

Variable	SS	df	MS	F	p	Effect Size (η^2)
Perceived Controllability	9.364	2	4.682	6.653	0.003	0.245
Problem-Solving Processing	14.002	2	7.001	3.944	0.027	0.161
Psychological Flexibility	30.572	2	15.286	7.325	0.002	0.263

The interaction effect analysis of time and group for psychological flexibility revealed both significant and nonsignificant changes across assessment phases. Changes in perceived controllability were significantly influenced by this interaction, with a medium effect size ($\eta^2 = 0.245$), indicating a notable impact of group differences over time. Problem-solving processing also showed significant change, although with a smaller effect size ($\eta^2 = 0.161$). Psychological flexibility exhibited a significant interaction effect with a large effect size ($\eta^2 = 0.263$), reflecting substantial variations across time and groups. Overall, these results suggest that both time and group type significantly influenced psychological flexibility, especially in the dimensions of perceived controllability and overall flexibility, whereas the impact on problem-solving processing was less pronounced. The next section evaluated the between-group effects for psychological flexibility, as shown in the following:

Table 3

Between-Group Effects for Psychological Flexibility Variable

Variable	SS	df	MS	F	p	Effect Size (η^2)
Perceived Controllability	265.998	2	132.999	22.007	< 0.001	0.518
Problem-Solving Processing	212.768	2	106.384	34.500	< 0.001	0.627
Psychological Flexibility	938.817	2	469.409	47.490	< 0.001	0.698

The results of between-group effect analysis for psychological flexibility and its subscales indicated significant differences across all scales. Specifically, for the perceived controllability subscale, the observed significant differences among groups were accompanied by a strong effect size ($\eta^2 = 0.518$), reflecting a substantial impact of group type. Similarly, in the problem-solving processing subscale, the differences were also statistically significant, with a large effect size ($\eta^2 = 0.627$), confirming the strong influence of the therapeutic groups on individuals' problem-solving skills. Finally, for overall psychological flexibility, significant differences were found in the post-test and follow-up stages, with a large effect size ($\eta^2 = 0.698$), indicating the strong impact of the interventions on improving psychological flexibility. In summary, the large effect sizes across all measures reflect the substantial and statistically meaningful effects of therapeutic interventions on these key psychological dimensions.

To conduct a more precise comparison between the therapeutic methods administered to the experimental groups, the Bonferroni post hoc test was used. This test is specifically designed to reduce the likelihood of Type I

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error—that is, the incorrect rejection of the null hypothesis—when multiple comparisons are performed simultaneously. A critical point in interpreting the results of this test is that when the interaction effects within groups for subscales or variables are significant, pairwise comparisons must be conducted based on the interaction of group and time. In other words, the combined effects of group and time should be considered as determining factors in pairwise analyses. Conversely, if the interaction effects are not significant and only the between-group effects are significant, then the pairwise comparisons should be based solely on group differences. The results of the post hoc analysis for psychological flexibility and its subscales are presented in the following tables.

Table 4

Bonferroni Post Hoc Test Results for the Perceived Controllability Subscale

Comparison	Mean Difference	Std. Deviation	t	p-value
ACT (Post-test) vs. CBT (Post-test)	1.511	0.682	2.215	0.486
ACT (Post-test) vs. Control (Post-test)	3.607	0.682	5.291	< 0.001
ACT (Post-test) vs. ACT (Follow-up)	-0.873	0.306	-2.849	0.102
ACT (Post-test) vs. CBT (Follow-up)	0.066	0.671	0.098	1.000
ACT (Post-test) vs. Control (Follow-up)	3.726	0.671	5.554	< 0.001
CBT (Post-test) vs. Control (Post-test)	2.096	0.683	3.071	0.057
CBT (Post-test) vs. ACT (Follow-up)	-2.384	0.671	-3.552	0.015
CBT (Post-test) vs. CBT (Follow-up)	-1.445	0.307	-4.714	< 0.001
CBT (Post-test) vs. Control (Follow-up)	2.214	0.672	3.298	0.030
Control (Post-test) vs. ACT (Follow-up)	-4.480	0.671	-6.679	< 0.001
Control (Post-test) vs. CBT (Follow-up)	-3.542	0.672	-5.274	< 0.001
Control (Post-test) vs. Control (Follow-up)	0.118	0.306	0.386	1.000
ACT (Follow-up) vs. CBT (Follow-up)	0.938	0.660	1.422	1.000
ACT (Follow-up) vs. Control (Follow-up)	4.598	0.660	6.972	< 0.001
CBT (Follow-up) vs. Control (Follow-up)	3.660	0.660	5.542	< 0.001

The Bonferroni post hoc test results for the perceived controllability subscale revealed that both ACT and CBT had significant effects on improving this subscale compared to the control group. Specifically, ACT had a significant impact during the post-test phase, although its effect diminished at follow-up. CBT also showed significant improvements compared to the control group at post-test, but no significant difference was observed at follow-up. Overall, both treatments enhanced perceived controllability, but CBT showed comparatively less impact than ACT at follow-up.

Table 5

Bonferroni Post Hoc Test Results for the Problem-Solving Processing Subscale

Comparison	Mean Difference	Std. Deviation	t	p-value
ACT (Post-test) vs. CBT (Post-test)	1.195	0.545	2.193	0.511
ACT (Post-test) vs. Control (Post-test)	2.880	0.546	5.274	< 0.001
ACT (Post-test) vs. ACT (Follow-up)	-1.996	0.487	-4.103	0.003
ACT (Post-test) vs. CBT (Follow-up)	0.738	0.569	1.296	1.000
ACT (Post-test) vs. Control (Follow-up)	2.667	0.570	4.679	< 0.001
CBT (Post-test) vs. Control (Post-test)	1.685	0.547	3.081	0.055
CBT (Post-test) vs. ACT (Follow-up)	-3.192	0.569	-5.605	< 0.001
CBT (Post-test) vs. CBT (Follow-up)	-0.457	0.487	-0.939	1.000
CBT (Post-test) vs. Control (Follow-up)	1.472	0.570	2.580	0.203
Control (Post-test) vs. ACT (Follow-up)	-4.877	0.570	-8.557	< 0.001
Control (Post-test) vs. CBT (Follow-up)	-2.142	0.570	-3.756	0.008
Control (Post-test) vs. Control (Follow-up)	-0.213	0.488	-0.437	1.000
ACT (Follow-up) vs. CBT (Follow-up)	2.734	0.592	4.616	< 0.001
ACT (Follow-up) vs. Control (Follow-up)	4.663	0.593	7.860	< 0.001
CBT (Follow-up) vs. Control (Follow-up)	1.929	0.594	3.246	0.035

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The post hoc test results for the problem-solving processing subscale indicated that both ACT and CBT significantly improved this subscale compared to the control group. ACT showed superior performance at post-test compared to the control group, though the difference became non-significant at follow-up. Similarly, CBT showed significant improvement at post-test, but this did not persist at follow-up. When comparing the two treatments, ACT demonstrated stronger effects at follow-up than CBT. In general, both therapies had positive and significant impacts on problem-solving processing relative to the control group, but ACT showed better performance, especially in the follow-up phase.

Table 6

Bonferroni Post Hoc Test Results for the Psychological Flexibility Variable

Comparison	Mean Difference	Std. Deviation	t	p-value
ACT (Post-test) vs. CBT (Post-test)	2.731	0.866	3.154	0.045
ACT (Post-test) vs. Control (Post-test)	6.465	0.866	7.464	< 0.001
ACT (Post-test) vs. ACT (Follow-up)	-2.870	0.528	-5.440	< 0.001
ACT (Post-test) vs. CBT (Follow-up)	0.800	0.893	0.895	1.000
ACT (Post-test) vs. Control (Follow-up)	6.400	0.893	7.163	< 0.001
CBT (Post-test) vs. Control (Post-test)	3.733	0.866	4.311	0.001
CBT (Post-test) vs. ACT (Follow-up)	-5.601	0.893	-6.269	< 0.001
CBT (Post-test) vs. CBT (Follow-up)	-1.932	0.528	-3.662	0.011
CBT (Post-test) vs. Control (Follow-up)	3.668	0.893	4.106	0.003
Control (Post-test) vs. ACT (Follow-up)	-9.335	0.893	-10.447	< 0.001
Control (Post-test) vs. CBT (Follow-up)	-5.665	0.893	-6.341	< 0.001
Control (Post-test) vs. Control (Follow-up)	-0.065	0.528	-0.123	1.000
ACT (Follow-up) vs. CBT (Follow-up)	3.670	0.920	3.988	0.004
ACT (Follow-up) vs. Control (Follow-up)	9.270	0.920	10.074	< 0.001
CBT (Follow-up) vs. Control (Follow-up)	5.600	0.920	6.087	< 0.001

The post hoc test results for the overall psychological flexibility variable showed that both ACT and CBT produced significant improvements. At post-test, ACT led to a significant improvement compared to the control group, and CBT also had a meaningful positive effect. At follow-up, the ACT group outperformed the CBT group and showed a significant improvement compared to the control group. Although CBT continued to show improvements at follow-up compared to the control group, its effects were weaker than those of ACT. Overall, both therapeutic approaches had significant and positive effects on psychological flexibility when compared to the control group, but ACT demonstrated stronger sustained outcomes, particularly at the follow-up stage.

4. Discussion and Conclusion

This study was conducted to examine the effects of Acceptance and Commitment Therapy (ACT) and Cognitive-Behavioral Therapy (CBT) on enhancing psychological flexibility among students experiencing phubbing behavior. The results of the repeated measures analysis of variance indicated that both ACT and CBT had significant effects on improving psychological flexibility in students with mobile phone dependence. However, at the follow-up stage, ACT demonstrated greater effectiveness compared to CBT. This finding suggests that ACT has more enduring effects in enhancing psychological flexibility.

This result can be interpreted through the lens of psychological flexibility, which refers to an individual's ability to accept negative experiences and adapt to difficult situations without avoiding unpleasant emotions. ACT emphasizes acceptance of negative thoughts and emotions rather than fighting against them, thereby fostering more lasting changes in individuals' attitudes and behaviors. Skills such as mindfulness, cognitive defusion, and committed action toward personal values are taught in ACT, leading to greater acceptance of negative emotions and a reduction in experiential avoidance. As a result, the effects of this intervention are more sustainable over time and may continue to influence individuals' daily lives even after therapy ends.

On the other hand, CBT, although effective in restructuring maladaptive thoughts and enhancing coping skills, does not explicitly emphasize acceptance of negative experiences. In CBT, individuals learn to identify and modify their negative thoughts and regulate their emotions through techniques such as cognitive restructuring, problem-

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solving, and exposure. These methods are effective in the short term and help individuals function better in challenging situations. However, due to their reliance on changing the content of thoughts, the long-term stability of CBT's effects may be less than that of ACT.

Previous studies support the findings of the present research. For example, Klimczak et al. (2023) reported that ACT was more effective than CBT in improving psychological flexibility and reducing experiential avoidance (Klimczak et al., 2023). Similarly, Bi and Li (2021) emphasized that psychological flexibility increases through the acceptance of negative emotions and a focus on personal values—core principles in ACT (Bi & Li, 2021). In contrast, Rasoulian et al. (2023) found that while CBT positively affected emotional and cognitive flexibility, it was less enduring compared to ACT in the long term (Rasoulian et al., 2024). Overall, these findings indicate that while both treatments are effective in enhancing psychological flexibility in students with mobile phone dependence, ACT yields more sustainable effects over time. Therefore, ACT can be recommended as a suitable approach for long-term interventions aimed at increasing psychological flexibility, while CBT may serve as a complementary approach for short-term improvements in cognitive and emotional flexibility.

Given the positive and lasting effects of ACT in enhancing psychological flexibility, it is recommended that this approach be integrated into counseling programs and life skills workshops. One effective method in this regard is the practice of cognitive defusion. In this exercise, students are taught to view their negative thoughts as mental events—temporary and subjective—rather than objective truths. For instance, students may write down intrusive thoughts on paper and imagine them as leaves floating on a stream, allowing the thoughts to pass without engagement. This technique can help reduce experiential avoidance and improve students' focus and mental clarity. These exercises can also be incorporated regularly into counseling sessions and group programs to provide students with practical tools for managing everyday psychological challenges.

In managing mobile phone use—one of the major issues in academic environments—it is advisable to use technological tools such as app blockers. These applications can help students manage their time and limit access to non-essential apps during study periods. Additionally, creating dedicated study environments such as libraries or distraction-free study rooms can enhance focus and reduce the temptation to use mobile phones. Another recommendation is to designate specific times of day for phone use and commit to these limits. This strategy transforms phone use into a controlled and conscious behavior rather than an unconscious, compulsive habit, thereby improving students' self-regulation and time management abilities.

Furthermore, universities and educational institutions should play an active role in promoting students' psychological well-being and self-management skills. Organizing educational workshops on topics such as time management, self-discipline, and reducing smartphone dependence can help students become familiar with practical techniques for increasing psychological flexibility. Creating study spaces where phone use is restricted may also encourage effective and healthy study habits. In addition, through individual and group counseling services, universities can guide students in strengthening their mental and psychological capabilities and equip them to better cope with daily challenges.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

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In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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