KMANPUB | AI and Tech in Behavioral and Social Sciences Vol. 4 No. 2 (2026)

Article history:
Received 17 January 2026
Revised 19 March 2026
Accepted 24 March 2026
Published online 01 April 2026

Effectiveness of ACT Therapy Using a Digital Workbook on Intensity of Pain and Pain Acceptance in Patients with Chronic Pain Disorder

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1. Round 1

1.1 Reviewer 1

Reviewer:

The Introduction provides a comprehensive overview of chronic pain and ACT; however, the literature review remains overly descriptive and lacks a critical synthesis of prior digital ACT studies. For example, in the paragraph beginning “Recent studies have begun to explore the effectiveness of digital ACT interventions for chronic pain,” the authors summarize previous findings but do not critically evaluate methodological weaknesses, inconsistencies in outcomes, or differences in intervention formats. A more analytical discussion would better justify the current study’s novelty.

The paragraph stating “This randomized controlled trial seeks to evaluate the impact of a structured digital ACT workbook intervention on key outcome measures, including pain intensity, pain interference, psychological flexibility, and quality of life” introduces variables such as pain interference, psychological flexibility, and quality of life; however, these constructs are neither measured nor analyzed in the Methods or Results sections. This discrepancy creates conceptual inconsistency and suggests either incomplete reporting or inaccurate statement of objectives. The aims and outcome variables must be aligned throughout the manuscript.

The description of the sampling and assignment process in the Methods section is internally contradictory. The sentence “participants were assigned to either the experimental or control group based on availability and willingness, followed by

random assignment within those clusters" does not reflect true randomization and introduces substantial selection bias. If allocation was not fully randomized at the individual level, the study cannot legitimately claim randomized controlled trial status. The authors should clearly explain the allocation process and discuss the resulting threats to internal validity.

The sample size estimation requires further clarification. The manuscript states that G*Power indicated "a minimum of 34 participants per group," yet the final analyzed sample included only 30 participants in the experimental group and 32 in the control group. This indicates that the final study was underpowered relative to the original calculation. The authors should provide a post-hoc power analysis or discuss the implications of reduced statistical power on interpretation of the findings.

The attrition reporting is problematic. The manuscript reports that 10 participants dropped out of the experimental group and 8 from the control group, but there is no CONSORT-style participant flow diagram, no analysis of attrition bias, and no comparison between completers and dropouts. Because dropout causes included technical difficulties and lack of interest, differential attrition may have influenced treatment effects. A detailed attrition analysis is necessary.

There is a major inconsistency in the handling of missing data. In the Participants section, the manuscript states that "Data from the remaining participants were analyzed using the per-protocol approach," while in the Data Analysis section the authors report that "Missing data were handled using multiple imputation." Multiple imputation is generally associated with intention-to-treat analyses rather than per-protocol analyses. The statistical strategy must be clarified because the current description is methodologically contradictory.

The description of therapist involvement is insufficiently detailed. The manuscript states that "A clinical psychologist provided brief feedback via email twice a week," but the qualifications of the therapist, duration of contact, adherence monitoring procedures, and fidelity assessment methods are not reported. Since therapist support can significantly influence digital intervention outcomes, the authors should provide a more rigorous account of therapist involvement and treatment fidelity.

The Results section lacks transparency regarding post-hoc analyses. The authors repeatedly state that Bonferroni comparisons were significant, but no dedicated post-hoc comparison table is provided, no confidence intervals are reported, and no exact adjusted p-values are included. Comprehensive reporting of pairwise comparisons is necessary to support the interpretation of treatment effects.

The manuscript does not sufficiently address potential expectancy effects and placebo influences. Participants in the experimental group received an active digital intervention with therapist contact, while the control group received only routine care. This imbalance may have inflated observed treatment effects due to attention, engagement, or expectancy factors rather than ACT-specific mechanisms. The lack of an active control group should be discussed as a major limitation.

Author revised the manuscript and uploaded the updated document.

1.2 Reviewer 2

Reviewer:

The Intervention Protocol section is well structured; however, the digital workbook itself is inadequately operationalized. Important information is missing regarding platform usability, accessibility standards, interface design, adherence metrics, completion rates for weekly modules, and user engagement analytics. Without such information, the intervention cannot be replicated accurately by future researchers.

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AI and Tech in Behavioral and Social Sciences
E-ISSN: 3041-9433

The Instruments section lacks sufficient psychometric detail for the CPAQ. Although Cronbach's alpha is reported, no information is provided regarding factor structure, convergent validity, or sensitivity to change in chronic pain populations. Additionally, the authors should clarify whether the Persian validation study was conducted in a sample comparable to the present population.

The study claims adherence to CONSORT guidelines in the Introduction; however, several core CONSORT elements are absent. Specifically, there is no trial registration number, no allocation concealment procedure, no blinding information, no participant flowchart, and no description of protocol deviations. The manuscript therefore does not currently meet CONSORT reporting standards and should be revised accordingly.

The Results section reports that "No significant differences were found between the two groups regarding demographic variables at baseline, indicating successful randomization." Statistical non-significance alone does not confirm successful randomization, particularly in small samples. Moreover, the study's earlier description of assignment procedures suggests quasi-random rather than true random allocation. The interpretation should therefore be tempered and methodologically corrected.

Several tables contain formatting and statistical reporting inaccuracies. For example, in Table 1, continuous variables such as age and pain duration are presented as "41.80 7.95" rather than "41.80 ± 7.95." Similarly, chi-square statistics appear without proper symbols in some rows ("= 0.02"). These presentation issues reduce the professionalism and readability of the manuscript and should be corrected according to APA statistical formatting guidelines.

The manuscript reports Greenhouse-Geisser corrections due to violation of sphericity assumptions; however, Mauchly's W values, chi-square statistics, epsilon values, and exact p-values are not provided. Without these statistics, readers cannot independently evaluate the appropriateness of the correction procedure. Full assumption-testing statistics should be reported.

The effect sizes reported in Table 3 are large (e.g., $\eta^2 = 0.449$ for pain acceptance interaction effects), yet the Discussion section does not adequately interpret their practical or clinical significance. Statistical significance alone is insufficient in chronic pain research. The authors should discuss whether the observed reductions in pain intensity meet clinically meaningful thresholds and how these changes compare with established minimally clinically important differences (MCIDs).

Author revised the manuscript and uploaded the updated document.

2. Revised

Editor's decision after revisions: Accepted.

Editor in Chief's decision: Accepted.

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E-ISSN: 3041-9433