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Contents

Information For Authors

1. ABOUT THE JOURNAL

Dusunen Adam Journal of Psychiatry and Neurological Sciences is a diamond open access, peer-reviewed scientific journal published quarterly and is the official academic publication of Bakirkoy Prof. Dr. Mazhar Osman Training and Research Hospital for Psychiatry, Neurology, and Neurosurgery.

The journal covers a broad range of topics spanning psychiatry, neurology, psychology, and neuroscience, integrating clinical, biological, and psychosocial perspectives to advance understanding of mental health and brain sciences.

No submission or publication charges are required from authors.

2. OPEN ACCESS, COPYRIGHT AND ARCHIVING POLICY

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3. EDITORIAL POLICIES AND WORKFLOW

3.1. General Principles

The editorial and publication processes of Dusunen Adam Journal of Psychiatry and Neurological Sciences are conducted in accordance with the highest standards of publication ethics and integrity, following the recommendations and guidelines of the Committee on Publication Ethics (COPE), the International Committee of Medical Journal Editors (ICMJE), the World Association of Medical Editors (WAME), the European Association of Science Editors (EASE), and the Council of Science Editors (CSE).

Manuscripts that have not been previously published or are not under consideration elsewhere are eligible for evaluation, provided that all listed authors approve the final version of the submission.

The Editor-in-Chief and Deputy Editors are responsible for maintaining the scientific quality and ethical standards of the journal. Manuscripts are evaluated solely on academic merit, without regard to the ethnic origin, gender, sexual orientation, citizenship, religion, or political beliefs of the authors.

All research involving human participants or animals must include an ethics committee approval statement and comply with the Declaration of Helsinki.

Any potential conflicts of interest must be declared by authors, editors, and reviewers.

3.2. Ethical Publishing

Dusunen Adam Journal of Psychiatry and Neurological Sciences upholds the highest ethical standards in scientific publishing, adhering to the aforementioned international guidelines, including those set forth by COPE. Authors, reviewers, and editors are expected to act in accordance with these principles and to maintain integrity, transparency, and accountability throughout the publication process.

All submissions must be original, unpublished, and not under consideration by any other journal simultaneously. Submitted manuscripts may be screened using plagiarism detection software, and the overall similarity index is expected to remain below 25%, excluding references.

Plagiarism, data fabrication, falsification or manipulation of research data, tables, or images, as well as unethical use of human or animal subjects, constitute serious breaches of publication ethics. Manuscripts found to violate these principles will be rejected or removed from publication. In cases where ethical misconduct is identified after publication, the Editorial Board reserves the right to retract the article in accordance with COPE Retraction Guidelines.

3.2.1. Conflict of Interest

Dusunen Adam Journal of Psychiatry and Neurological Sciences requires all authors to disclose any existing or potential conflicts of interest that may inappropriately influence, or be perceived to influence, their professional judgment or responsibilities.

Potential conflicts of interest include, but are not limited to, financial relationships (e.g., employment, consultancies, honoraria, stock ownership, paid expert testimony, or grants), academic or institutional affiliations, personal relationships, and intellectual property interests.

To ensure transparency, the corresponding author, on behalf of all authors, must declare any potential conflicts of interest at the time of submission. The corresponding author is responsible for verifying that all co-authors have disclosed any relevant financial or non-financial interests.

Authors must declare potential conflicts of interest in two ways:
i) by entering a declaration in the designated text box within the online submission system and completing the Declaration of Interest Form, which becomes part of the journal's permanent record; and
ii) by including a brief "Declaration of Interest" statement on the title page of the manuscript.

All sources of financial and material support for the reported research, as well as the role of the funder (if any), must be clearly stated at the time of submission. If no conflicts exist, authors must include the statement: "The authors declare no conflicts of interest."

If any potential conflict of interest involving the authors exists, the ICMJE Potential Conflict of Interest Disclosure Form must be duly completed and submitted by all contributing authors. These forms must be emailed to the Editorial Office at the time of submission.

The Editorial Board may reject or request revision of submissions that fail to meet these disclosure requirements.

3.2.2. Human and Animal Rights

Dusunen Adam Journal of Psychiatry and Neurological Sciences adheres to the ethical standards set out in the World Medical Association (WMA) Declaration of Helsinki – Ethical Principles For Medical Research Involving Human Subjects (revised 2003) and the WMA Statement on Animal Use in Biomedical Research (revised 2016).

For studies involving animals, authors must ensure that animal welfare is respected and must clearly describe the measures taken to prevent pain and suffering.

3.2.3. Ethics Committee Approval and Informed Consent

Approval from an institutional review board or a national/local ethics committee is mandatory for all studies involving human participants or animals. The approval number and date must be clearly stated in the Methods section of the manuscript, with the identity of the approving committee blinded where required. This information, along with the name of the approving committee, should also be entered in the Consent of Ethics / Ethical Approval field within the online submission system and included on the title page. Authors may be asked to submit the ethics committee approval letter or equivalent official documentation upon request.

For studies involving human participants, a statement confirming that informed consent was obtained prior to study inclusion must be provided. In studies involving minors, individuals under guardianship, or those lacking legal capacity, authors must indicate that consent was obtained from legal guardians or authorized representatives. For studies conducted in institutions requiring special permissions (e.g., correctional facilities), the relevant institutional approvals must also be stated in the manuscript.

For retrospective studies, it must be explicitly stated that the anonymity and confidentiality of human data were preserved. In all research articles and case presentations, information regarding informed consent must be included in the main document and indicated in the Consent of Patient field within the online submission system.

3.2.4. Use of Artificial Intelligence Tools

At submission, authors must declare any use of artificial intelligence (AI)–assisted technologies (e.g., Large Language Models, chatbots, image generators) in the preparation of their work. The type, name, version, and purpose of the AI tool should be briefly described on the Title Page and stated above the References section.

AI tools must not be listed or cited as authors, as they cannot take responsibility for the accuracy or integrity of the work. Human authors are fully accountable for all content, including AI-assisted text, data, or images, and must ensure correctness, originality, and proper attribution. This policy follows the EASE Recommendations on the Use of AI in Scholarly Communication and the ICMJE Recommendations.

3.2.5. Inclusion and Diversity in Research

Dusunen Adam Journal of Psychiatry and Neurological Sciences encourages authors to follow Sex and Gender Equity in Research – SAGER – guidelines developed by the EASE when drafting their manuscripts. These guidelines aim to promote the diversity and inclusion of sex and gender considerations in research.

3.3 Preprint Policy Statement

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3.4. Authorship and Author's Responsibilities

Individuals listed as authors must meet all of the following criteria recommended by the ICMJE: (i) substantial contributions to the conception or design of the work, or to the acquisition, analysis, or interpretation of data; (ii) drafting the work or revising it critically for important intellectual content; (iii) final approval of the version to be published; and (iv) accountability for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Individuals who do not meet all authorship criteria but contribute in other ways (such as funding acquisition, data collection,

technical support, or supervision) should be acknowledged in the Acknowledgement section. Ghostwriting or honorary authorship is not acceptable. The Author Contribution Form indicating each author's role must accompany the submission. The order of authors should be determined jointly by all contributors.

Authorship changes after publication are not permitted. Authorship changes requested after submission but before publication, including the addition or removal of an author, are considered only under specific circumstances and handled in accordance with the COPE guidelines for authorship addition and authorship removal. The reason for the change must be stated, written consent from all authors obtained, and the Author Contribution Form updated. The Editor-in-Chief may suspend the editorial or review process until the issue is resolved.

Authors are responsible for ensuring that manuscripts comply with scientific and ethical standards and that the submitted work is original, unpublished, and not under consideration elsewhere.
Copyrighted material (such as tables, figures, or extended quotations) must be reproduced only with appropriate permission and acknowledgement. For quoted texts, tabulated data, or graphics from previously published works, authors are required to obtain permission from the copyright holder or the original author(s) of the source material and clearly indicate this permission within the manuscript.

All sources and contributions must be properly cited. All authors must disclose any financial relationships, conflicts of interest, or competing interests that could influence the research or its interpretation. Financial support, sponsorship, or project funding must be clearly stated.

Authors are expected to communicate with courtesy and professionalism in all correspondence related to their submission. All interactions with editors, reviewers, and journal staff must reflect respect, academic integrity, and adherence to the principles of scholarly communication.

3.5. Evaluation and Publication Process

The publication language of the journal is English and only manuscripts written in English will be considered for editorial and peer review.

Editors have the authority to conduct preliminary evaluations and may decide to reject submissions before peer review or request revisions when necessary. Manuscripts deemed suitable for peer review are evaluated in a double-blind process by at least two independent external experts, with the Editor-in-Chief and Deputy Editors holding the final decision authority.

The review process considers factors such as the relevance, methodological soundness, significance, novelty, originality, clarity, and quality of the language.

Dusunen Adam Journal of Psychiatry and Neurological Sciences does not accept formal appeals against editorial decisions. However, feedback from authors and reviewers is welcomed and considered in accordance with COPE guidelines. The journal does not allow any conflicts of interest between authors, reviewers, or editors.

The Editor-in-Chief holds the right to publish an erratum when required. When an author identifies a significant error or inaccuracy in their published work, they are obliged to cooperate promptly with the Editor-in-Chief to issue a corrigendum or retraction, as appropriate. If a substantial error, including serious ethical misconduct, is detected that cannot be remedied by an erratum or corrigendum, the Editor-in-Chief reserves the right to retract the article in accordance with the COPE Retraction Guidelines, with appropriate notification to the authors.

3.5.1. Peer Review Process

Double-blind peer review is employed in the journal, ensuring that both authors and reviewers remain anonymous throughout the evaluation process. All submissions undergo an initial assessment by the Editor-in-Chief or Deputy Editors to determine their suitability for the journal scope, originality, methodological rigor, and scientific quality. Manuscripts deemed appropriate are assigned to a Deputy or Associate Editor, who coordinates the peer review process.

Each manuscript is evaluated by at least two independent experts with relevant field expertise under the supervision of a handling editor. Reviewers are expected to provide objective and constructive feedback to support editorial decision-making and help authors improve their work. The handling editor reviews the reports and makes an editorial recommendation. When a revision is requested, reviewer comments and editorial feedback are shared with the authors, who are given a defined deadline to submit a revised version through the online system. After receiving the revised manuscript, the handling editor re-evaluates it and, when necessary, may initiate additional review rounds. A final recommendation is then submitted to the Editor-in-Chief or Deputy Editors, who make the final decision: acceptance, rejection, or further revision.

Authors are required to submit a detailed point-by-point rebuttal letter addressing each reviewer comment. Rebuttal letters must not include any author names or identifying information.

Manuscripts submitted by members of the editorial board are handled by an external and independent editor to ensure transparency and to avoid potential conflicts of interest.

Reviewers are required to maintain confidentiality, declare any potential conflicts of interest, and report suspected ethical misconduct such as plagiarism, data fabrication, or copyright infringement.

3.5.2. Editorial Decision and Post-Acceptance Process

After the peer-review process is completed, the Editor-in-Chief or Deputy Editors make the final publication decision based on the reviewers' recommendations and the overall scientific merit of the manuscript. Once accepted, manuscripts undergo professional copyediting, proofreading, and layout editing to ensure accuracy and clarity. Authors receive galley proofs to verify and approve the final version before publication. The journal publishes four issues per year and provides early online access to accepted articles.

4. MANUSCRIPT PREPARATION AND SUBMISSION

4.1. Before Submission

Dusunen Adam Journal of Psychiatry and Neurological Sciences complies with the editorial and publication guidelines of the EASE. Authors are encouraged to follow the EASE Guidelines for Authors and Translators, which are freely available in multiple languages.

Before preparing a submission, authors are strongly advised to read the aims and scope of the journal carefully to ensure that the submitted work is consistent with the thematic and methodological focus of the journal.

Manuscripts should be prepared in accordance with the ICMJE Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals. Authors are also expected to follow the appropriate international reporting guidelines, including CONSORT for randomized controlled trials, STROBE for observational studies, STARD for diagnostic accuracy studies, PRISMA for systematic reviews and meta-analyses, ARRIVE for animal experiments, and CARE for clinical case presentations submitted as letters to the editor. Authors are also encouraged to consult the EQUATOR Network for comprehensive guidance on reporting standards.

Manuscripts should be written in clear, concise, and grammatically correct English. Authors whose first language is not English are strongly encouraged to seek professional editing services.

All measurements must be presented using the International System of Units (SI) to ensure consistency and comparability across studies. Authors should use metric units throughout the text, tables, and figures, and adhere to standard scientific conventions for symbols and abbreviations. The spelled-out term should be followed by the abbreviation in parentheses upon first mention, unless the abbreviation represents a standard unit of measurement.

The use of brand names or commercial product names for drugs, devices, or materials is not permitted; only generic names should be used.

4.2. Manuscript Organization and Format

Manuscripts should be prepared as a single Microsoft Word document. The anonymized main document must be arranged in the following order, with each section starting on a new page:

(i) Title, abstract, and keywords,
(ii) Body text,
(iii) References, and
(iv) Tables, graphics, and/or figures.

All manuscript types except Letters to the Editor and Guest Editorials must include an abstract and keywords. Research Articles and Brief Reports should be structured under the following main headings: Introduction, Methods, Results, Discussion, and Conclusion. Systematic Reviews and Meta-Analyses should include the headings Introduction, Methods, Discussion, and Conclusion, with additional subheadings adapted to the content as appropriate.

Manuscripts must be prepared in 12-point Times New Roman, double-spaced, and left-justified throughout the entire text, including references, tables, and figure captions. All pages must be numbered consecutively in the lower right corner.

4.3. Manuscript Submission

Manuscripts must be submitted through the online submission and evaluation system available at eJManager. Submissions made via other means will not be considered for evaluation. Pre-submission inquiries are generally not required but may be accepted in specific cases at the discretion of the Editorial Office.

All submissions are initially checked by the Editorial Office for compliance with journal formatting and ethical standards. Manuscripts not meeting these requirements may be returned to the authors for technical revision before peer review, which may result in delays in the evaluation process.

During submission, authors must complete all mandatory fields in the eJManager system. Incomplete submissions will not proceed to the peer review process. The required information includes article type, full title, abstract, keywords, information for all authors (including ORCID ID and affiliation), patient consent and ethics committee approval details (if applicable), conflict of interest statement, funding information, and corresponding author details. The corresponding author is responsible for ensuring that all required information is entered accurately in the online submission system and that all necessary forms are completed and uploaded on behalf of all contributors.

Any supporting data or other required files, such as reporting checklists or additional tables and figures exceeding the stated limits, may be submitted as supplementary files.

The authors are required to suggest four potential peer reviewers during submission. The suggested reviewers must not be affiliated with the same institution as any of the authors and must have no conflict of interest.

The following documents must be prepared and uploaded at the time of submission:

- Cover letter
- Title page
- Main document (no author names or affiliations)
- Author Contribution Form
- Copyright Transfer Form
- Declaration of Interest Form

4.3.1. Cover Letter

A cover letter is required for all submissions. It should introduce the manuscript to the editorial team in a concise and professional manner, emphasizing its relevance, originality, and contribution to the journal readership. The letter should briefly explain why the study fits within the journal scope and how it advances knowledge in the field. Authors may also use this opportunity to confirm that the manuscript has not been published or submitted elsewhere and that all authors have approved the submission. The cover letter must be limited to one page and signed by the corresponding author.

4.3.2. Title Page

Essential title page information includes the full title, a short running head (maximum 50 characters), full names of all authors, their affiliations, ORCID identifiers, and complete contact details for the corresponding author (including postal address, phone number, and e-mail). It must also include declarations of interest, funding information, ethical committee approval details (if applicable), and acknowledgments.
Authors must state whether any AI–assisted technologies were used in preparing the manuscript. If applicable, the use of such tools should be described in detail in the Methods section.

The title should be non-declaratory, concise, and informative. Since titles are indexed in information retrieval systems, abbreviations and formulae should be avoided.

Please note that the title page is not shared with reviewers and must therefore be uploaded as a separate file through the online submission system.

4.3.3. Main Document

The main document must not contain any author names, institutional affiliations, or identifying information to maintain the integrity of the double-blind peer review process. It should begin with the first page containing the title, abstract, and keywords.

4.3.3.1. Abstract and Keywords

The abstract must not exceed 250 words and should be structured under the subheadings Objective, Method, Results, and Conclusion (excluding letters to the editor and guest editorials).

- Objective: State the main aim or purpose of the study.
- Method: Describe the study design, data sources, sample or subjects, assessments, and primary measures.
- Results: Summarize the key findings, emphasizing their relevance to clinical or scientific practice.
- Conclusion: Present the main outcomes and implications derived from the study. Three to five keywords should be listed directly below the abstract.

Keywords are recommended to align with the National Library of Medicine's Medical Subject Headings (MeSH) terminology. Since abstracts are indexed and searchable in electronic databases, authors must ensure that their abstract accurately reflects the content and significance of the article.

4.3.3.2. Body Text

The Introduction should briefly outline the study background and rationale, highlight the research question, and clearly state the objectives and hypotheses. It should be focused and purpose-driven rather than a broad literature review. The Method section should detail the study design, data sources, participants or subjects, instruments or scales, assessments, and primary measures. The research process and statistical methods should be described in sufficient detail to allow replication. The Results section should present the findings of the study clearly and objectively. Primary outcomes should be summarized in the text and supported by appropriately designed tables, figures, or graphs where applicable. The Discussion section should interpret and contextualize the findings in relation to previous studies, highlighting both supporting and conflicting evidence. Authors should discuss the implications of the findings, possible explanations for discrepancies, and the strengths and limitations of the study. The Conclusion section should provide a concise summary of the main results, their clinical or scientific relevance, and potential directions for future research. It should clearly state the key takeaway message derived from the study.

4.3.3.3. References

References should be numbered in parentheses and listed in the order in which they appear in the text, under the heading "References" at the end of the manuscript. The reference style must follow the Vancouver format.

There should be no inconsistency between the numbering and the reference order. Authors are solely responsible for ensuring the accuracy and completeness of all references. When there are seven or more authors, list the first six followed by "et al."

Abbreviations of journal names must comply with Medline/PubMed standards. Journals that are not indexed in Medline/PubMed should be written in full. Authors are encouraged to review previously published articles in the journal to ensure proper formatting and consistency when preparing the reference list.

4.3.3.4. Tables, Graphics, and Figures

Tables, graphics, and figures should be numbered consecutively in Arabic numerals (e.g., Table 1, Figure 1) according to the order in which they are cited in the text. Their approximate placement should be clearly indicated within the manuscript.

Tables should present information concisely and effectively, allowing data to be displayed with clarity and precision. Presenting data in tables rather than in the text often reduces the overall manuscript length. Each table must appear on a separate page with a descriptive title. Column or row headings should be short and specific, and any explanatory notes should be placed as footnotes—not within the heading. All nonstandard abbreviations and statistical measures of variation (e.g., standard deviation, standard error) should be defined in footnotes. Line spacing for tables should be double-spaced, and the maximum allowable size is 120 characters in width and 70 lines in length.

When materials such as tables, figures, or images are reproduced from another source, written permission from the copyright holder must be obtained, and the source must be appropriately cited in the text. Legends must be provided for all figures. Figure legends should be concise yet specific and must be listed together on a separate page at the end of the main manuscript text.

All figures should be submitted as separate high-quality digital files in JPEG format through the online submission system, in addition to being included at the end of the main document with their corresponding legends. Electronic images (e.g., photographs, radiographs, CT scans) must have a minimum resolution of 300 dpi to ensure print quality.

4.3.4. Author Contribution Form

This form must clearly specify the individual contributions of each author according to the ICMJE criteria. Each author should have participated in the conception, design, data acquisition, analysis, and/or interpretation, as well as in drafting or revising the manuscript and approving its final version. Authors who do not meet all authorship criteria should be listed in the acknowledgments section.

4.3.5. Copyright Transfer Form

This form confirms that the submitted manuscript is original, unpublished, and not under consideration elsewhere. It also verifies that all authors approve the submission and agree to transfer the copyright to Dusunen Adam Journal of Psychiatry and Neurological Sciences under the CC BY-NC 4.0 license. The form must be signed by all authors before publication.

4.3.6. Declaration of Interest Form

All authors must disclose any financial, institutional, or personal relationships that could be perceived as influencing the research. If no conflicts exist, this must be explicitly stated. The form also includes a section for declaring financial support or grants related to the study.

4.4. Manuscript Types

Dusunen Adam Journal of Psychiatry and Neurological Sciences accepts various types of submissions, including research articles, brief reports, systematic reviews and meta-analyses, and letters to the editor. Guest editorials are accepted by invitation only. Authors are encouraged to select the manuscript type that best represents the scope, design, and contribution of their study. The specific structure, length, and formatting requirements for each manuscript type are detailed below.

4.4.1. Research Articles

Research articles present substantial and original scientific findings within the scope of the journal. Each research article should contain an abstract, keywords, introduction, methods, results, discussion, conclusion, references, and tables or figures. The abstract and main text must follow the structured format described above. Ethics committee approval and informed consent information must be obtained and clearly stated in the manuscript.

4.4.2. Brief Reports

Brief reports follow the same general format and guidelines as research articles but focus on small-scale studies or research in early stages of development. They may include preliminary investigations with simple research designs or small sample sizes that provide initial findings and pilot data suggesting the need for further research. Ethics committee approval and informed consent information should also be obtained and clearly stated in the manuscript.

4.4.3. Systematic Reviews and Meta-Analyses

Systematic reviews and meta-analyses should address a clearly defined, relevant, and up-to-date research question within the scope of the journal. Only manuscripts that adhere to recognized methodological standards (such as PRISMA) or registered protocols (e.g., PROSPERO) and demonstrate a systematic approach will be considered for review. Narrative, scoping, or other non-systematic reviews are not accepted. Systematic reviews and meta-analyses should include an abstract, keywords, introduction, methods, discussion, and conclusion, with additional subheadings adapted to the content as appropriate, as well as references and tables or figures.

4.4.4. Letters to the Editor

Letters to the Editor are considered only if they do not exceed 750 words, include no subheadings, and contain a maximum of one table or figure (or up to two figures). All letters must begin with "Dear Editor" and, if commenting on previously published articles, be submitted within one month of publication. Letters may also present small-scale research or concise discussions of timely clinical topics.
Case reports are accepted only in the form of a Letter to the Editor and should present unique, informative, and clinically relevant original cases. They must describe novel clinical approaches or techniques, highlight rare comorbidities or uncommon adverse drug reactions, and provide concise, educational insights of clinical value. Written informed consent from the patient must be obtained and clearly stated in the manuscript.

4.4.5. Guest Editorials

Guest Editorials are invited opinion articles written by experts or researchers who have made significant contributions to a specific field. These articles aim to evaluate and discuss the current state of knowledge, recent developments, and emerging perspectives on topics relevant to clinical practice. Guest Editorials are accepted by invitation only and are not open to regular submission. Manuscripts should include an introduction and a conclusion, along with any additional subheadings considered appropriate by the author. Guest Editorials are not sent for external peer review; they are evaluated by the Editorial Board before publication.

Table: Manuscript types and corresponding word, abstract, reference, and table/figure

Type of manuscript	Word limit	Abstract word limit	Reference limit	Table/ figure limit (total)
Research article	3500	250 (*structured*)	50	6
Systematic reviews and meta-analyses	4000	250	No limit	10
Brief report	1500	250 (*structured*)	15	2
Letter to the editor	750	No abstract	10	1
Guest editorial	1200	No abstract	20	2

Information For Reviewers

1. GENERAL INFORMATION

Dusunen Adam Journal of Psychiatry and Neurological Sciences publishes high-quality research and scholarly work in psychiatry, neurology, clinical psychology, and neuroscience. The journal promotes interdisciplinary perspectives on mental health and brain sciences and prioritizes studies offering novel insights with clear relevance to clinical practice.

The journal accepts submissions in the following categories:

- Research articles
- Brief reports
- Systematic reviews and meta-analyses
- Letters to the editor
- Guest editorials (invited, not peer-reviewed)

The journal employs a double-blind peer review process in accordance with the Committee on Publication Ethics (COPE) and the European Association of Science Editors (EASE) guidelines.

All submissions are evaluated for originality, methodological rigor, and ethical standards before being sent for external review. Each submission is assessed according to its type, scope, and adherence to the journal's scientific and ethical principles.

2. PEER REVIEW SYSTEM

The journal follows a double-blind peer review process in which both authors and reviewers remain anonymous. All submissions are initially assessed by the Editor-in-Chief or Deputy Editors for scope, originality, methodological rigor, scientific quality, and ethical compliance before being sent for external review.

Authors must confirm that the manuscript has not been published or submitted elsewhere and that all listed authors have approved the submission. Manuscripts should be submitted exclusively through the journal online submission system (eJManager), while reviewers access assignments via the Reviewer Login section on the journal's website.

Each manuscript is evaluated by at least two independent experts under the supervision of a handling editor. Reviewers provide objective and constructive feedback to support editorial decisions and help authors improve their work. The handling editor reviews the reports and recommends acceptance, revision, or rejection. When revisions are requested, authors receive reviewer and editorial comments with a deadline for resubmission. Revised manuscripts are re-evaluated, and additional review rounds may be conducted if needed. The Editor-in-Chief or Deputy Editors make the final decision—acceptance, rejection, or further revision.

Reviewers are expected to provide detailed, objective, and constructive feedback that assists both the editor in making informed decisions and the authors in improving their work.

Reviewers are also responsible for identifying and reporting any potential research or publication misconduct, including plagiarism, data fabrication, falsification, duplication, or unethical study design. Any conflict of interest must be declared before agreeing to review a manuscript. When reviewers seek input from a trainee or colleague, these contributions must be acknowledged in the confidential comments to the editor.

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DUSUNEN ADAM

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GUEST EDITORIAL

A critical synthesis of treatment guidelines for schizophrenia

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Regularly updated guidelines are essential to translate rapidly evolving evidence into routine care. In schizophrenia, the therapeutic landscape shifts with new antipsychotics and formulations, refined dosing and trial-duration data for first-episode psychosis (FEP) and relapse prevention, and accumulating safety information across cardiometabolic, neurologic, and perinatal domains (1–3). Updated guidance integrates these developments, clarifies when to escalate to clozapine, and codifies best practices for psychosocial interventions, thereby reducing unwarranted practice variation and improving outcomes (1, 4).

Contemporary schizophrenia treatment guidelines help clarify areas of consensus, map disagreements, and support implementation in routine care. Convergent recommendations include antipsychotic monotherapy at cautious doses for acute treatment, continuation of the effective acute-phase agent for maintenance, and timely initiation of clozapine for treatment-resistant schizophrenia (2, 3, 5). Clozapine is also consistently endorsed for suicidality and chronic aggression (1, 3). Divergence persists regarding optimal maintenance dose and duration, indications and timing for long-acting injectables (LAIs), and management of negative symptoms and cognitive impairment. Most guidelines support early LAI use when adherence is at risk, with variable enthusiasm in FEP (3, 6, 7). Psychosocial interventions such as psychoeducation, family work, cognitive-behavioral and skills-based therapies, supported employment, and exercise, are recommended across phases (2, 8). Safety guidance is consistent. Clinicians are advised to avoid routine prophylactic anticholinergics, treat acute dystonia promptly with anticholinergics, prefer β-blockers or benzodiazepines for akathisia, consider vesicular monoamine transporter-2 (VMAT-2) inhibitors for tardive dyskinesia, implement cardiometabolic monitoring, and use first-line metformin for antipsychotic-associated weight gain (1, 3). Special-population advice addresses pregnancy and lactation, older adults, catatonia, substance use, and forensic settings. Standardized measurement of positive and negative symptoms, depression, cognition, and catatonia at baseline and follow-up is encouraged to support measurement-based care (4, 9). Translating these recommendations into concise algorithms and checklists can reduce polypharmacy, shorten time to clozapine, standardize LAI use, strengthen safety practices, and identify research priorities where evidence remains limited (1, 10).

In summary, schizophrenia treatment guidelines include convergent themes on antipsychotic monotherapy at cautious doses for acute treatment, continuation of the effective acute-phase agent during maintenance, and timely clozapine initiation for treatment-resistant schizophrenia (2, 3). Clozapine also remains the most consistently recommended option for suicidality and chronic aggression (1). Psychosocial interventions, including psychoeducation, family work, cognitive-behavioral and skills-based therapies, supported employment, and exercise, are endorsed across all phases of the disorder (2, 8).

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Moreover, timely guideline revisions enhance safety and equity. New safety signals, such as QTc prolongation, metabolic risk, drug-drug interactions, pregnancy and lactation data, and monitoring recommendations, require prompt incorporation to prevent harm. Guideline updates aim to embed implementation aids for dose-range optimization and trial-length consensus, switching algorithms, LAI initiation pathways, and shared decision-making tools that streamline care and support multidisciplinary teams (1, 4). Critically, refreshed guidelines address health-system changes that incorporate digital delivery, coordinated specialty care, early intervention services, and social determinants, promoting access and continuity for underserved groups (7). Up-to-date guidelines also strengthen quality improvement and research. By specifying measurable indicators such as metabolic screening rates, timely clozapine trials, and post-discharge follow-up, they enable audit and feedback. At the same time, transparent grading of evidence exposes gaps, such as those related to long-term functional outcomes or perinatal safety, guiding future studies (3, 9).

To conclude, maintaining and regularly updating current schizophrenia guidelines raises the floor of care, safeguards patients as evidence evolves, and aligns clinical practice with contemporary standards and resources. Translating consensus points into concise algorithms and checklists can reduce polypharmacy, shorten time to clozapine, standardize LAI use, strengthen safety practices, and highlight research priorities where guidance remains uncertain (1).

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RESEARCH ARTICLE

The mediator role of experiential avoidance in examining the relationship between weight self-stigma and emotional eating in overweight and obese individuals

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ABSTRACT

Objective: This study examines the mediating role of experiential avoidance in the relationship between weight-related self-stigma and emotional eating among overweight and obese individuals.

Method: The study included 200 overweight and obese individuals. Participants completed a questionnaire consisting of a sociodemographic information form, Emotional Eater Questionnaire (EEQ), the Weight Self-Stigma Questionnaire (WSSQ), and the Multidimensional Experiential Avoidance Questionnaire (MEAQ). The data obtained were analyzed using IBM SPSS and AMOS software packages.

Results: The results indicated that higher levels of weight-related self-stigma were significantly associated with increased emotional eating. The procrastination, distraction/suppression, and repression/denial subdimensions of multidimensional experiential avoidance had a significant mediating effect in this relationship. However, no significant mediation effect was observed for the behavioral avoidance, distress aversion, and distress endurance subdimensions.

Conclusion: The findings indicate that emotional eating behavior increases as levels of weight-related self-stigma rise among individuals with overweight and obesity. In this relationship, cognitive dimensions of experiential avoidance play a more prominent role than behavioral components. Furthermore, no significant mediating effects were found for dimensions associated with long-term regulatory processes, such as distress aversion and distress tolerance, which may be more closely linked to broader aspects of psychological functioning. A multidimensional assessment of experiential avoidance may therefore support the development of more targeted and personalized interventions for individuals with overweight and obesity.

Keywords: Emotional eating, obesity, stigma, weight self-stigma, experiential avoidance

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INTRODUCTION

Obesity is a disease characterized by excessive fat accumulation due to an impaired energy balance in the body (1). It has a high prevalence across all societies and is gradually becoming a global epidemic. According to the World Health Organization's (WHO) 2022 report, more than 2.5 billion (43%) adults aged 18 years and older worldwide are overweight, and more than 890 million (16%) of them are obese. Such a large-scale public health problem has serious negative consequences both individually and socially (2). This disease not only reduces the quality of life and functionality of individuals but also causes economic problems (3). Therefore, studies aimed at determining the factors that influence obesity will make a significant contribution to the field.

Stigmatization is one of the main negative experiences faced by overweight and obese individuals (4). Weight self-stigma (WSS) affects people across all weight ranges. However, the rates of overweight and obese individuals who internalize the messages they are exposed to and stigmatize themselves based on their weight are considerably higher compared to other groups (5). Contrary to common assumptions, stigmatization has been shown to undermine obesity treatment efforts and contribute to significant declines in both psychological and physical well-being (6). Studies involving overweight and obese individuals have reported that those who internalize weight-related stigma are less likely to diet and exercise and are more prone to binge eating behavior (7). Similarly, findings indicate reduced emotional awareness, disrupted emotion regulation (ER) strategies (e.g., lower cognitive reappraisal and acceptance, higher suppression), and increased emotional eating tendencies among individuals with obesity (8). These patterns emphasize the need to address emotional eating (EE), a factor widely recognized as a major obstacle to effective treatment.

Emotional eating is one of the most frequently used concepts to describe the psychological mechanisms underlying obesity (9). Escape theory defines emotional eating as the tendency to engage in binge eating behavior to reduce awareness, distract attention, or avoid negative stimuli. In other words, eating is considered a coping mechanism to escape from negative life experiences (10). Individuals with emotional eating tendencies often attribute greater psychological significance to food than its actual nutritional value. For them, food may function as a source of comfort, a reward, or a tool to control their emotions (11). Therefore, emotional eaters tend to consume large amounts of high-calorie food in a short time, in parallel with emotional changes, negative affect, and lifestyle factors. Studies have reported that emotional eating behavior is observed in more than 40% of obese individuals (9).

In recent years, there has been increasing evidence that experiential avoidance (EA) plays a mediating role in the relationship between weight-related self-stigma and emotional eating. EA refers to an individual's effort to avoid or control negative internal experiences (emotions, thoughts, bodily sensations) (12). However, there is no consensus in the literature regarding the nature of this construct. While some studies adopt a unidimensional approach, others focus on a multidimensional structure. These studies define six subdimensions of the concept (behavioral avoidance, distress aversion, procrastination, distraction/suppression, repression/denial, and distress endurance) and emphasize that the subcomponents of experiential avoidance may have unique clinical outcomes. Similarly, it has been suggested that a unidimensional approach to the construct may be insufficient for clinical interpretation, and that evaluating the subdimensions separately offers important contributions to both theoretical explanations and the determination of intervention goals (12). On the other hand, experiential avoidance is an important application area within different therapeutic approaches. Psychodynamic therapy focuses on the defensive relegation of painful or threatening material to the unconscious, whereas cognitive-behavioral approaches target emotional and experiential avoidance through structured interventions. Current approaches such as acceptance- and mindfulness-based Cognitive Behavioral Therapies (CBTs) (13), Dialectical Behavior Therapy, (14) and Acceptance and Commitment Therapy (ACT) (15) also underline the critical importance of this transdiagnostic concept. Therefore, a multidimensional assessment is important to identify specific areas of EA related to EE behavior in overweight and obese individuals and to design clinical interventions in a targeted and individualized manner.

The aim of this study was to examine the mediating role of EA in the relationship between WSS and EE among overweight and obese individuals. First, it was hypothesized that higher levels of WSS would be positively associated with increased EE.

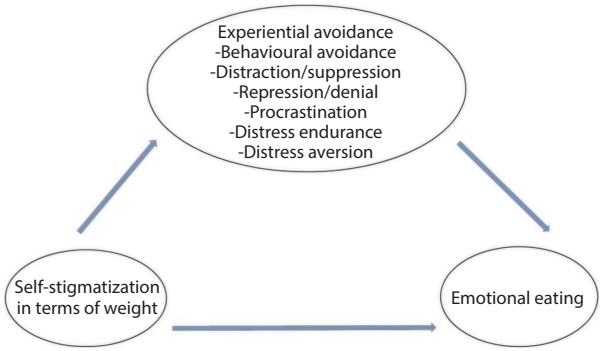

Figure 1. Mediating Role of Experiential Avoidance in the relationship between Weight-Related Self-Stigmatization and Emotional Eating Model.

Second, specific dimensions of EA were hypothesized to mediate this relationship. Figure 1 shows the mediation relationship between the variables.

METHODS

The study was conducted in accordance with the Declaration of Helsinki and received approval from the Istanbul Gelisim University Ethics Committee (24.12.2021, protocol no. 2021-40). Data collection was carried out through face-to-face administration, with informed consent obtained and voluntary participation ensured.

Participants

The inclusion criteria for the current study were: (1) participants were 18 years of age or older, and (2) had a Body Mass Index (BMI) of 25 kg/m^2 or higher (classified as overweight or obese). Exclusion criteria were: (1) pregnancy, (2) current or past psychiatric diagnosis or psychological/psychiatric treatment, and (3) incomplete or inconsistent responses. Individuals were screened via self-report and clinical interview to exclude psychiatric diagnoses. Participants were recruited from the outpatient clinics of Inönü University Turgut Ozal Medical Center and voluntarily participated in the study. Data were collected through self-report questionnaires administered in a face-to-face format. Power analysis was performed using G*Power software to determine the sample size. Based on the effect size estimates reported in Palmeira et al. (16) (2018), a minimum of 182 participants was required to achieve 95% statistical power with a 5% Type I error rate. The final sample was set at 200 participants to reduce the risk of data loss and to ensure sufficient power for the analyses (16).

Clinical Questionnaires

Weight Self-Stigma Questionnaire (WSSQ)

The WSSQ is used to assess self-stigmatization levels related to weight among overweight and obese individuals (17). Higher total scores indicate greater levels of self-stigmatization related to weight. The scale has two subdimensions: self-evaluation and fear of stigmatization. The scale has a minimum score of 12 and a maximum score of 60. The Cronbach's α value was 0.83 in the Turkish validation study (18) and 0.91 in the current research.

Emotional Eater Questionnaire (EEQ)

The EEQ is used to assess unhealthy eating attitudes associated with the emotions of overweight and obese individuals (19). It has three subdimensions: inability to curb food cravings, food types, and guilt. An increase in the total score indicates an increase in emotional eating behavior. The scale has a minimum score of 0 and a maximum score of 30. The Turkish validity and reliability study of the scale was conducted by Arslantas et al. (20). The Cronbach's α value of the Turkish form was found to be 0.81 for the inability to prevent food cravings subdimension, 0.57 for the type of food subdimension, 0.64 for the guilt subdimension, and 0.84 for the whole scale (20), while the total scale showed α=0.89 in the present study.

Multidimensional Experiential Avoidance Questionnaire (MEAQ)

The MEAQ is used to determine the extent of attempts to control or change negative emotions, thoughts, and internal experiences (12). It has six dimensions: behavioral avoidance, distress aversion, procrastination, distraction/suppression, repression/denial, and distress endurance. Over time, to facilitate its use in clinical practice, a 30-item short form was developed in parallel with the subdimensions of the original scale. In the Turkish version, subscale reliabilities ranged from 0.76 to 0.87. In the present study, Cronbach's α values were 0.89 for behavioral avoidance, 0.88 for distress aversion, 0.78 for procrastination, 0.91 for distraction/suppression, 0.86 for repression/denial, and 0.93 for distress endurance.

Statistical Analysis

IBM SPSS Statistics 25.0 (SPSS Inc., Chicago, IL) and AMOS v21 programs were used for the evaluation of the research data. Reliability analyses were conducted for the scales used in the study, and Cronbach's alpha coefficients were taken into account. In the analysis of the data, descriptive categorical variables were

Table 1: Assumption testing for the structural model: Autocorrelation and multicollinearity results

Model	Variable	Durbin-Watson	Tolerance	VIF
	WSSQ		0.44	2.29
	BA		0.46	2.17
	DA		0.38	2.63
EE	PR	1.95	0.51	1.98
	DS		0.59	1.70
	RD		0.81	1.24
	DE		0.72	1.39

WSSQ: Weight Self-Stigma Questionnaire; BA: Behavioral avoidance; EE: Emotional eating; DS: Distraction/suppression; RD: Repression/denial; PR: Procrastination; DE: Distress endurance; DA: Distress aversion.

expressed as number (n) and percentage (%), while quantitative variables were expressed as mean, standard deviation, skewness, and kurtosis values. Before conducting Structural Equation Modeling (SEM), assumptions regarding autocorrelation and multicollinearity were assessed. The Durbin-Watson statistic was examined to evaluate autocorrelation between residuals, and multicollinearity was assessed using Tolerance and Variance Inflation Factor (VIF) values. These results are reported in Table 1.

RESULTS

The dataset obtained from 200 participants was analyzed, and no missing values or univariate outliers were detected. Skewness and kurtosis statistics were calculated to evaluate the normality assumption of the total and subscale scores of the EEQ, WSSQ, and MEAQ. The fact that the skewness and kurtosis values of all variables were within the acceptable range of -1.5 to +1.5 indicates that the data were approximately normally distributed. In line with these findings, parametric statistical tests were used in the subsequent analyses. Descriptive statistics and correlation coefficients between variables are reported in Table 2.

Additionally, prior to conducting the Structural Equation Modeling, Durbin-Watson, tolerance, and VIF values were examined to assess potential violations of model assumptions. The results indicated no issues of autocorrelation or multicollinearity among the variables. These values are presented in Table 1.

Sample Characteristics

According to the collected data, 65.5% of the participants were female (n=131) and 34.5% were male (n=69); 38% (n=76) experienced obesity in childhood, and 51% (n=102) had a family history of obesity. The mean age was 28.52±7.83 years, with a minimum of 18 and a maximum of 54 years. The mean height was 169.54±10.05 (range: 150–203 cm), and the mean weight was 88.75±17.5 (range: 58–134).

Mediation Analysis

In the study, to analyze the mediating effect of multidimensional experiential avoidance on the relationship between weight self-stigma and emotional eating, the relationship between the external latent variable weight self-stigma (WSSQ total) and the internal latent variable emotional eating (EEQ total) was first evaluated. Then, the mediating variable (MEAQ subdimensions) was added to the model. The significance of the mediation effect for the models was evaluated based on the 95% confidence interval obtained using the bootstrap method. An indirect effect whose confidence interval does not include "0" was considered statistically significant. The coefficients and significance (p) values of direct, indirect, and total effects in the models are shown in Table 3.

Table 2: Descriptive statistics and correlation analysis among weight self-stigma, emotional eating, and dimensions of experiential avoidance

Variable	Mean±SD	Skewness	Kurtosis	1	2	3	4	5	6	7	8
1. WSSQ	35.9±11.2	-0.39	-0.95	—							
2. EE	28.3±6.7	-0.70	-0.40	0.76**	—						
3. BA	25.8±7.3	-1.12	0.50	0.55**	0.42**	—					
4. DA	24.7±7.9	-0.99	0.05	0.62**	0.54**	0.70**	—				
5. PR	23.5±6.6	-0.80	-0.18	0.55**	0.59**	0.57**	0.55**	—			
6. DS	25.3±7.3	-1.20	0.87	0.43**	0.45**	0.57**	0.57**	0.45**	—		
7. RD	16.1±7.1	0.49	-0.44	0.21	0.30*	0.26*	0.24	0.43**	0.27	—	
8. DE	19.6±7.7	0.34	-0.95	-0.39**	-0.33**	-0.08	-0.22	-0.05	-0.01	-0.20	—

Pearson's Correlation was used. **p<0.01; *p<0.05; SD: Standard deviation; WSSQ: Weight Self-Stigma Questionnaire; BA: Behavioral avoidance; EE: Emotional eating; DS: Distraction/suppression; RD: Repression/denial; PR: Procrastination; DE: Distress endurance; DA: Distress aversion.

Table 3: Direct, indirect and total effects in models evaluating the dimensions of experiential avoidance: Bootstrap confidence intervals (confidence interval (CI) (Bias 95%)

	B	Lower	Upper
Direct effects			
WSSQ → BA	0.50*	0.42	0.59
BA → EE	0.04	-0.76	0.14
WSSQ → DS	0.43*	0.31	0.51
DS → EE	0.14*	0.04	0.22
WSSQ → RD	0.21*	0.09	0.32
RD → EE	0.14*	0.05	0.23
WSSQ → PR	0.64*	0.53	0.69
PR → EE	0.24*	0.16	0.35
WSSQ → DE	-0.39*	-0.52	-0.24
DE → EE	-0.04*	-0.13	0.07
WSSQ → DA	0.63*	0.55	0.70
DA → EE	0.11	-0.02	0.23
Indirect effects			
WSSQ → BA → EE	0.04	-0.01	0.09
WSSQ → DS → EE	0.05*	0.02	0.12
WSSQ → RD → EE	0.03*	0.01	0.06
WSSQ → PR → EE	0.15*	0.10	0.25
WSSQ → DE → EE	0.01	-0.04	0.04
WSSQ → DA → EE	0.06	-0.01	0.16
Total effects	0.76*	0.66	0.82

For direct effects, *p<0.05 bootstrap confidence intervals not including zero indicate statistical significance. For indirect effects, *p<0.05 bootstrap confidence intervals not including zero indicate significant mediation. WSSQ: Weight Self-Stigma Questionnaire; BA: Behavioral avoidance; EE: Emotional eating; DS: Distraction/suppression; RD: Repression/denial; PR: Procrastination; DE: Distress endurance; DA: Distress aversion.

The results of the analyses showed a statistically significant positive relationship between WSSQ and EE (β=0.76, 95% confidence interval [CI]=[0.66, 0.82]), (Appendix 1). Distraction/suppression mediated this relationship, while the direct effect remained significant (β=0.70), (Appendix 2). According to the model, distraction/suppression had a positive effect on EE, and this subdimension explained 19% of EE. When the fit indices of the model were examined, it was found to have good fit values [χ^2/df=1.89; Tucker-Lewis Index (TLI)=0.89; Normed Fit Index (NFI)=0.92; Comparative Fit Index (CFI)=0.96; Root Mean Square Error of Approximation (RMSEA)=0.062].

Similarly, when the mediating role of procrastination was examined, a significant relationship was observed. The relationship between WSSQ and EE remained significant when procrastination was included in the model, but the direct effect decreased (β=0.61). According to the model, this subdimension explained 41% of emotional eating [χ^2/df=2.02; TLI=0.91; NFI=0.90; CFI=0.96; RMSEA=0.061], (Appendix 3). In the model including repression/denial, the relationship between WSSQ and EE was also found to be statistically significant, with a decrease in the direct effect (β=0.73), and the rate of explained emotional eating was found to be 60%. When the fit indices of the model were examined, they were within the recommended value ranges [χ^2/df=1.72; TLI=0.94; NFI=0.92; CFI=0.97; RMSEA=0.059], (Appendix 4). However, behavioral avoidance (β=0.04, 95% CI=[-0.01, 0.09]); distress endurance (p>0.05; β=0.01; 95% CI=[-0.04, -0.04]), and distress aversion (p>0.05; β=0.06; 95% CI=[-0.01, 0.16]) were not found to mediate the relationship between WSSQ and EE.

Thus, the hypothesis that higher levels of WSS would be associated with increased EE was confirmed. On the other hand, three of the hypotheses suggesting that the six subdimensions of EA would mediate this relationship were confirmed. It was concluded that the procrastination, distraction/suppression, and repression/denial subdimensions of EA had a significant mediating effect on this relationship. However, no significant mediation effect was observed for the behavioral avoidance, distress aversion, and distress endurance subdimensions.

DISCUSSION

The findings of this study indicate a positive, significant, and strong relationship between WSS and EE (β=0.76, 95% CI=[0.66, 0.82]). Therefore, it can be said that the findings are consistent with our first hypothesis. Similarly, previous studies have reported that internalized weight stigma is significantly associated with unhealthy eating behaviors, particularly uncontrolled and emotional eating (16). Research highlights that this relationship is multidimensional and that variables such as emotional stress, self-criticism, self-confidence, and BMI play important roles (16, 21–23). The effect of high levels of WSS on disordered eating behaviors has been partially explained by individuals' adoption of a harsh and self-aggressive attitude, along with a reduced capacity for self-reassurance (23, 24).

The fact that internalized stigma, which is one of the difficulties frequently experienced by overweight and obese individuals, shows a strong relationship with EE necessitates a more comprehensive evaluation of the psychological mechanisms underlying this relationship. Accordingly, the second hypothesis of the study tested whether the subdimensions of EA play a mediating role in this relationship. It was concluded that the procrastination, distraction/suppression, and repression/denial subdimensions of multidimensional experiential avoidance had a significant mediating effect on this relationship.

Although studies providing a comprehensive assessment of experiential avoidance are quite limited, the present findings are consistent with the relevant literature. Procrastination, which involves temporarily delaying impending distress, has been identified as a significant risk factor in the development of binge-eating behavior (25, 26). Prior research has reported that procrastination may represent a characteristic decision-making and coping style among individuals with binge-eating disorder (BED) (25). Similarly, individuals with overweight and obesity may cope with weight stigma by employing avoidance and psychological disengagement strategies, such as ignoring it without responding or viewing the situation as the other person's problem (27). Studies have generally shown that distraction strategies, defined as ignoring distress or redirecting attention toward an alternative stimulus or activity, are strongly associated with emotional eating (28). Within the framework of escape theory (10), distraction is considered an important coping mechanism for escaping negative emotions and distressing self-awareness. A significant mediating relationship was also observed for the repression/denial dimension—characterized by unawareness of or disengagement from distress. Deaux and Ethier's (29) (1998) negotiating social identity theory explains how individuals may adopt strategies to reject or reinforce their social identities depending on perceived threats. In the context of obesity, although it may be difficult to fully avoid identity-related perceptions due to visible body characteristics, individuals may deny external stereotypes or minimize their identity depending on the context (30, 31).

Therefore, the findings of the present study suggest that certain dimensions of EA may serve as critical mechanisms that strengthen the link between WSS and EE in individuals with overweight and obesity. This multidimensional assessment is considered informative for planning more targeted and personalized interventions for this population. According to ACT, EA includes behavioral withdrawal (e.g., avoiding situations that elicit distress), distraction (e.g., self-harm), emotional numbing (e.g., substance use, dissociation), and direct attempts to alter internal experiences (e.g., self-talk, suppression) (32). This approach conceptualizes eating pathology through six core processes (acceptance, cognitive defusion, present-moment awareness, self-as-context, values, and committed action) and, by targeting EA, aims to enable individuals to experience unwanted internal events without attempting to change them (33). Within this framework, current findings indicate that ACT-based interventions decrease immature and neurotic defenses, increase mature defense styles and psychological flexibility, and significantly reduce BMI (34).

On the other hand, distress endurance and distress aversion emphasize the individual's capacity to act in accordance with their values despite distressing internal experiences. (35). While strategies such as distraction and suppression demonstrated significant mediating effects, the lack of significance in the mediating effects of distress endurance and distress aversion suggests that these dimensions may be related to broader functional domains. Another dimension with no significant mediating relationship is behavioral avoidance, which generally refers to the tendency to physically avoid negative stimuli (36). The absence of a significant mediating relationship in this dimension may indicate that participants resorted to cognitive and emotional avoidance strategies rather than physically withdrawing from distressing situations. Indeed, one of the central concepts emphasized in ACT is cognitive fusion, which refers to the tendency to perceive one's thoughts as absolute truths and to become overly identified with them (35). Studies conducted with individuals with obesity have shown a significant association between cognitive fusion and EE (37). In this context, the relatively stronger influence of cognitive processes on eating behaviors may help explain the non-significant mediating effect observed for this dimension.

Since there are no studies in the literature evaluating the relationship between WSS and EE within the framework of EA subdimensions, this study makes a valuable contribution to the field. The main reason for this gap is the uncertainty regarding the measurement of EA. It has been reported that the most widely used scale, the Acceptance and Action Questionnaire–II (AAQ-II), inadequately reflects the multidimensional structure of EA and largely measures neuroticism and negative affect (38). In contrast, MEAQ is considered a comprehensive tool that assesses EA across six subdimensions and has high theoretical compatibility with third-wave therapies (38, 39).

However, the study has some limitations. The sample size for the current study was determined to be 200 individuals using G*Power software to ensure sufficient statistical power. All participants were overweight or obese individuals who volunteered to participate through hospitals and healthy nutrition clinics. Due to time constraints and difficulties in recruiting obese individuals, particularly through voluntary participation, the study was unable to obtain a representative and demographically homogeneous sample. Findings on gender distribution in the relevant literature indicate that women are at greater risk of stigmatization and experience more intense discrimination than men. This situation is further reinforced by stricter social norms regarding the female body and idealized body representations in the media (40). Therefore, future research should explore gender-specific pathways and incorporate longitudinal designs to assess causal relationships. Additionally, in the present study, obesity was evaluated solely using BMI, which may be insufficient to capture important parameters such as regional fat distribution. Future studies are encouraged to include complementary measures, such as waist circumference, alongside examinations of gender differences.

CONCLUSION

To our knowledge, this is the first study to assess the mediating role and specific dimensions of EA in examining the relationship between WSS and EE in overweight and obese individuals. Our findings suggest that EE behavior increases as the level of WSS rises in overweight and obese individuals. In addition, it was concluded that the procrastination, distraction/suppression, and repression/denial subdimensions of EA had a significant mediating effect on this relationship. However, no significant mediation effect was observed for the behavioral avoidance, distress aversion, and distress endurance subdimensions. These findings suggest that the behavioral dimension of EA may play a comparatively limited role in the relationship between WSS and EE. In addition, the insignificant mediating effects of distress endurance and distress aversion suggest that these dimensions may be related to broader areas of functionality. From a clinical perspective, structuring interventions that target specific avoidance strategies within the frameworks of ACT, psychodynamic therapy, and cognitive-behavioral approaches may help make interventions both more individualized and more effective.

Ethical Approval: The Istanbul Gelisim University Ethics Committee granted approval for this study (date: 24.12.2021, number: 2021-40).

Informed Consent: Informed consent was obtained from all participants.

Conflict of Interest: The authors declare that they have no conflict of interest.

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Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Contribution Categories		Author Initials
Category 1	Concept/Design	D.G., G.M.S., O.K.
	Data acquisition	D.G.
	Data analysis/Interpretation	D.G.
Category 2	Drafting manuscript	D.G.
	Critical revision of manuscript	G.M.S., O.K.
Category 3	Final approval and accountability	D.G., G.M.S., O.K.

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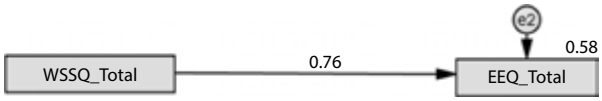
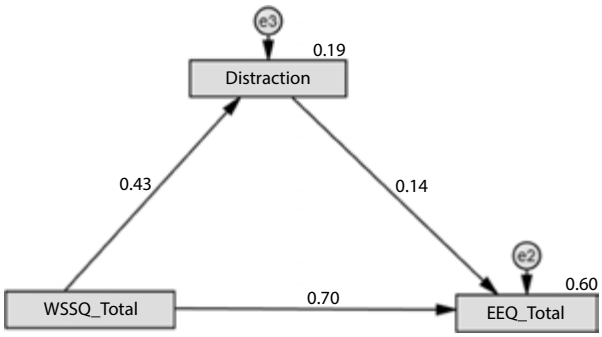


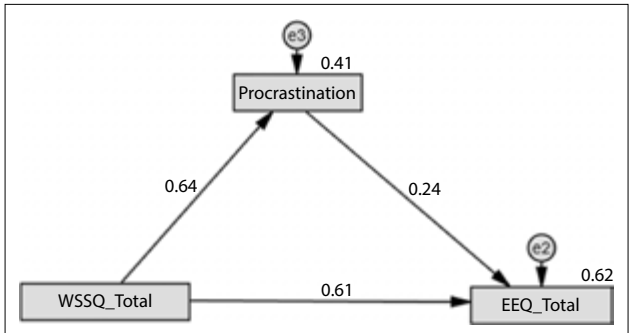
Appendix 1. The direct effect of weight self-stigma on emotional eating.



Effects	Distraction/ suppression		Emotional eating	
	β	Standard error	β	Standard error
WSSQ R^2 Total effect (c path)			0.764* 0.585	0.029
WSSQ R^2 (a path)	0.432* 0.598	0.042		
WSSQ (c′ path)			0.704*	0.030
Distraction/ suppression (b path) R^2			0.137* 0.187	0.045
Indirect effect			0.059 (0.023, 0.121)	

*p<0.05. WSSQ: Weight Self-Stigma Questionnaire.

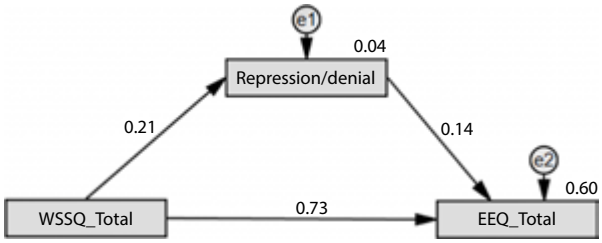
Appendix 2. The mediating effect of distraction/ suppression in the relationship between weight self-stigma and emotional eating.



Effects	Procrastination		Emotional eating	
	β	Standard error	β	Standard error
WSSQ R^2 Total effect (c path)			0.764* 0.585	0.029
WSSQ R^2 (a path)	0.640* 0.618	0.032		
WSSQ (c′ path)			0.608*	0.034
Procrastination (b path) R^2			0.244* 0.410	0.057
Indirect effect			0.156* (0.104, 0.253)	

*p<0.05. WSSQ: Weight Self-Stigma Questionnaire.

Appendix 3. The mediating effect of procrastination in the relationship between weight self-stigma and emotional eating.



Effects	Repression/ denial		Emotional eating	
	β	Standard error	β	Standard error
WSSQ R^2 Total effect (c path)			0.764*	0.029 0.585
WSSQ R^2 (a path)	0.209*	0.044 0.044		
WSSQ (c' path)			0.734*	0.027
Repression/ denial (b path) R^2			0.142*	0.043 0.602
Indirect effect			0.030 (0.012, 0.062)	

*p<0.05. WSSQ: Weight Self-Stigma Questionnaire.

Appendix 4. The mediating effect of repression/denial in the relationship between weight self-stigma and emotional eating.

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RESEARCH ARTICLE

Turkish validity and reliability study of the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) Scale

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ABSTRACT

Objective: The use of alcohol, cigarettes, and substances contributes to the global burden of disease and causes acute harms, including high-dose use, as well as chronic problems such as addiction and infectious diseases. Among preventable diseases, smoking, alcohol, and substance use have been among the top ten causes of illness-related mortality.

Method: This study aimed to examine the Turkish validity and reliability of the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) Scale. Two different sample groups (n=339) were interviewed by experienced clinicians. The Fagerstrom Nicotine Dependence Test (FNDT), Alcohol Use Disorder Identification Test (AUDIT), and Drug Use Disorder Identification Test (DUDIT) were also administered to examine correlations with ASSIST.

Results: To analyze the internal consistency of ASSIST, Cronbach's alpha coefficients were calculated for each group, ranging from 0.70 to 0.98. To examine the factor structure of the scale, exploratory factor analysis was conducted, and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was higher than 0.60, while Bartlett's Test of Sphericity was significant (KMO>0.60, $p<0.05$). Based on factor loadings, all items loaded onto a single factor except the "sedatives and hallucinogens" item, in which items 2–4 were grouped in factor 1 and items 6 and 7 were grouped in factor 2. ASSIST Tobacco scores were significantly correlated with FNDT scores (0.70 for Group 1 and 0.74 for Group 2). ASSIST Alcohol scores and total scores were significantly correlated with AUDIT and DUDIT scores, respectively (0.92 for Group 1 and 0.94 for Group 2; 0.91 for Group 1 and 0.90 for Group 2, respectively).

Conclusion: It was concluded that ASSIST v3.1 can be applied to screen for cigarette, alcohol, and substance use/abuse in general psychiatry and psychiatric counseling centers in our country. Future studies conducted in different populations would provide new data regarding the effectiveness of ASSIST and contribute to both the literature and daily practice.

Keywords: Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST), reliability, screening, validity

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INTRODUCTION

Substance use contributes to the global burden of disease, causing acute harms such as high-dose use and chronic problems such as addiction and infectious diseases (1). Globally, in 2016, 4.2% of life-year losses were attributed to alcohol use and 1.3% were attributed to substance use (2). Smoking, alcohol, and substance use are among the top ten preventable causes of death in the United States (3). According to a World Health Organization report, while 35 million people have a substance use disorder, only one out of seven people receives treatment (4). It is estimated that approximately 96 million people in the European Union (29% of the adult population aged 15–64) have tried illicit substances at some point in their lives ((1) According to the results of the Attitude and Behavior Survey toward Tobacco, Alcohol, and Substance Use in the General Population conducted in our country in 2018, 3.1% of individuals aged 15–64 reported having tried at least one substance, including cannabis, at least once in their lifetime. The majority of this group were male users (94%) (5). Although the use of alcohol, tobacco products, and opioids is considered a greater threat in terms of addiction risk, a study conducted in the United States reported that the prevalence of hallucinogen abuse/use disorder in the adult population ranged between 0.6% and 1.7% (6). Similarly, inhalant use rates in the United States have been reported to range between 0.4% and 0.9% (7). As recent data from Turkiye are limited, it appears difficult to provide a reliable prevalence estimate.

Alcohol and other substance abuse also pose risk factors for individuals and their families, leading to various problems in social, financial, legal, and relationship domains. Globally, with the increasing tendency for people to use more than one substance simultaneously or at different times, the overall risks associated with alcohol and substance abuse tend to increase.

Screening and brief intervention describe an approach that aims to identify and provide interventions for substance abuse in general health settings. As health care reform progresses globally and larger numbers of individuals enter the medical system, it is expected that the number of those needing interventions for substance abuse issues will increase. Innovative care delivery models, such as the patient-centered medical home, have acknowledged the need for behavioral health integration and workforce training. The Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) offers a streamlined mechanism for routine screening for these problems, an efficient short-term intervention to meet the needs of most individuals by assisting them in reducing or stopping hazardous use, knowledge of approved pharmacotherapies for substance use disorders that can be implemented in primary care, and resources for obtaining specialty care when needed (8). A number of screening and assessment approaches have been developed to identify substance abuse. The Alcohol Use Disorder Identification Test has been widely recommended for alcohol screening and evaluation and is applied as a routine screening element in primary care health systems (9). The 10-item version of the Drug Abuse Screening Test (DAST) is among the developed and validated tools for substance use screening and assessment that can be used in primary care populations (10). The Fagerstrom Test for Nicotine Dependence has been widely used in the evaluation of nicotine dependence levels (11). Although the Addiction Severity Scale (ASI) can be used to evaluate alcohol and substance use as a valuable tool, its administration takes between 45–60 minutes, which may be time-consuming in primary care or practical use (12). The use of a screening and evaluation tool that can assess tobacco, alcohol, and substance use together in practice would facilitate the identification of use in individuals.

The Alcohol, Smoking, and Substance Involvement Screening Test Scale is an international instrument developed and approved by the World Health Organization (WHO) to screen alcohol, tobacco products, and substance use in primary care and general health settings (13). ASSIST offers several advantages over instruments such as the Alcohol Use Disorder Identification Test (AUDIT), DAST, or the Fagerstrom Test for Nicotine Dependence. While AUDIT and DAST are substance-specific and focus primarily on alcohol or drug use, ASSIST provides a comprehensive assessment across multiple substance categories, including alcohol, tobacco, opioids, stimulants, cannabis, and hallucinogens. This allows clinicians to detect polysubstance use patterns more effectively. Moreover, ASSIST is grounded in the WHO's cross-cultural validation framework, enabling consistent use in diverse populations and clinical contexts. Its structured scoring system also facilitates risk stratification (low, moderate, high) and guides appropriate intervention planning, making it a more versatile and inclusive screening tool for substance-use problems in both research and clinical settings.

The digital adaptation of ASSIST extends beyond the traditional paper-and-pencil format, enabling users to complete the screening conveniently on mobile devices or online platforms. The ASSIST Checkup—sometimes referred to as ASSIST-Plus—was developed by the University of Adelaide to allow individuals to self-assess their alcohol, tobacco, and other psychoactive substance use, providing immediate personalized feedback and harm-reduction advice when needed (14). This digital version has been shown to save time and resources in clinical settings and can be implemented effectively in primary care, waiting rooms, or telehealth contexts. By combining automated scoring, risk-level stratification, and tailored intervention recommendations, the digital ASSIST represents a significant improvement over the conventional format in terms of accessibility and clinical utility.

Recognition of alcohol or substance use and early intervention are very important in our country, as has been repeatedly emphasized in previous studies. Screening for tobacco products, alcohol, and substance abuse in patients presenting to primary health care services provides an early warning opportunity to inform at-risk populations about the risks of use, which could lead to intervention at early stages. The screening tool appears to have important consequences, including referrals to addiction centers from counseling centers and general health services, especially primary care centers. Although ASSIST was originally designed for use in primary care settings, we aimed for our sample to consist of individuals presenting to a psychiatry outpatient clinic. In Turkiye, a validity and reliability study of the Turkish version was conducted among individuals on parole or probation, demonstrating its suitability for that group (15). However, the limited number of participants using inhalants, hallucinogens, or sedatives represents a notable limitation of that study.

Therefore in this study, we aimed to translate the scale into Turkish and to evaluate its validity and reliability.

METHODS

Participants

The study was conducted between September 2019 and April 2022. It was designed with two different sample groups: the first group (n=209) included participants who applied to the Erenkoy Training and Research Hospital psychiatry outpatient clinic, while the second group (n=130) included participants who applied to the Erenkoy Training and Research Hospital Addiction Counseling and Detoxification Centers and Counseling Centers. Interviews with the participants were conducted by psychiatrists and clinical psychologists who took part in the research. The inclusion criteria were literacy, being between the ages of 18 and 65, and volunteering to participate in the study. The exclusion criteria were defined as the presence of active mental disorders (primary psychotic disorder, primary mood disorder, organic mental disorder) or physical illness (chronic medical illnesses) that might hinder the interview, as well as being intoxicated or in a withdrawal stage from alcohol or substances.

The study was approved by the Erenkoy Training and Research Hospital Local Ethical Committee (dated 08.10.2019, protocol no: 55), and all study procedures were designed in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants after providing verbal information about the study.

Translation Procedures

To determine the language validity of the ASSIST, the items in the English version of the scale were translated into Turkish by two experienced clinicians and two experts who graduated from the Department of English Language and Literature. The translated texts were compared to create a final version, and discrepancies were revised. The Turkish form was then back-translated into English by two experts, and the back-translated version was evaluated by clinicians for inconsistencies with the original version. Finally, to evaluate the language clarity and intelligibility of this version of the scale, 15 participants and 15 health care workers completed the scale. The assessments were examined for incongruent expressions or misinterpretations, and feedback was obtained regarding the final adapted version. Additionally, two researchers from the team administered the scale in a pilot study to 10 patients who applied to the counseling center for substance use disorder (SUD), and no problems with language comprehension were observed.

Instruments

Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST)

The first version of ASSIST (v1.0) was developed by the WHO in 1997. The scale was designed to be administered more quickly than previous diagnostic

substance use scales and to have the ability to screen for all risky substances/drugs, not only alcohol or tobacco products. It was also designed for use in primary care treatment centers and to have cross-cultural compatibility. The newer version, ASSIST v3.0, was later revised to ASSIST v3.1, which was planned for clinical use in health centers, while v3.0 was recommended for research studies.

ASSIST v3.1 is an 8-item paper-and-pencil questionnaire administered by a healthcare worker and takes approximately 5–10 minutes to complete. ASSIST is culture-independent and can be used in many cultures; it is designed to screen for the use of tobacco products, alcohol, marijuana, cocaine, amphetamine-type stimulants, tranquilizers, hallucinogens, inhalants, opioids, and "other" substances.

Total score points are calculated by summing the scores of questions 2 through 7. Responses to the substance use by injection item (S8) are not included in the substance use scoring; however, use of substances by injection is considered a high-risk behavior associated with overdose, addiction, Human Immunodeficiency Virus (HIV), Hepatitis C Virus (HCV), and Hepatitis B Virus (HBV) infections, as well as more severe substance-related problems.

The ASSIST scale assigns a risk score for each substance, and these scores are used to initiate brief interventions with patients regarding their substance use. Scores for each substance fall into one of three risk categories: low, moderate, or high. The categories are defined as follows: low risk (0–10 points for alcohol; 0–3 points for other substances), moderate risk (11–26 points for alcohol; 4–26 points for other substances), and high risk (>26 points for alcohol and other substances). After the risk assessment, the most appropriate intervention ("no treatment needed," "short intervention," or "expert assessment") is determined for that level of use. In addition, ASSIST obtains information from patients about substance use and related problems both over the lifetime and within the last three months. The scale results can identify many substance-related problems such as intoxication, regular use, addiction, high-risk use, and drug injection (13).

Fagerstrom Nicotine Dependence Test (FNDT)

The Fagerstrom Nicotine Dependence Test was developed by Fagerstrom and is widely used to evaluate the level of nicotine addiction in smokers (11). The test contains six questions, and the level of addiction is evaluated according to the responses. The highest score that can be obtained is 10; scores of 0–3 indicate low, 4–6 indicate moderate, and 7–10 indicate high levels of addiction. A Turkish reliability study was conducted by Uysal et al. (16), and the test was found to be moderately reliable (Cronbach's alpha: 0.56).

Alcohol Use Disorder Identification Test (AUDIT)

The scale was designed in 1989 and developed by Babor et al. (17). AUDIT is a 10-item scale that assesses drinking habits, alcohol consumption levels, and alcohol-related problems. The first three questions indicate risky alcohol use: the fourth, fifth, and sixth questions indicate dependence symptoms, while the remaining questions indicate alcohol abuse. Although different cut-off points have been used in studies, the recommended cut-off point is 8, which is used to identify potentially risky alcohol use. The Turkish translation of the scale was conducted by Saatcioglu et al. (18) The Cronbach's alpha coefficient was reported as 0.59 for the first interviewer and 0.65 for the second interviewer.

Drug Use Disorder Identification Test (DUDIT)

DUDIT is an 11-item questionnaire developed to identify substance use. The scale, similar to the AUDIT, was developed by Berman et al. in 2005 (19). Total scores range from 0 to 44, with higher scores indicating more severe drug use problems. The Turkish validity study of DUDIT was conducted by Evren et al. (20), and Cronbach's alpha coefficient was found to be 0.93.

Statistical Analysis

Descriptive statistics for age, gender, education, and occupational status, including the mean scores of self-reported psychometric scales, were reported. Cronbach's alpha coefficient, item-total score correlations, and Cronbach's alpha coefficients if an item was deleted were used to analyze the scale's reliability. Exploratory factor analysis was performed using principal component analysis with varimax rotation, and factors with an eigenvalue greater than 1 and items with factor loadings greater than 0.35 were taken into consideration. Correlations between ASSIST and other clinical measures, including the AUDIT, DUDIT, and Fagerstrom Nicotine Dependence Test (FNDT) scales, were examined using the intraclass correlation test. A p value of <0.05 was accepted as the level of significance. Analyses were conducted using SPSS v26.0 and AMOS v26.0 software.

Table 1: Descriptive statistics

Descriptive statistics	Group 1		Group 2		Descriptive statistics	Group 1		Group 2	
	n	%	n	%		n	%	n	%
Gender					Smoking				
Male	108	51.7	119	91.5	None	78	37.3	39	30
Female	101	48.3	11	8.5	Yes	131	62.7	91	70
Education					Alcohol use				
Illiteracy	7	3.3	0	0	None	147	70.3	48	36.9
Literacy	17	8.2	3	2.4	Yes	62	29.7	82	63.1
Primary school	27	13	2	1.5	Drug use				
Secondary school	14	6.7	16	12.3	None	182	87.1	119	91.5
High school	37	17.8	32	24.6	Yes	27	12.9	11	8.5
University	107	51	77	59.2	Psychiatric comorbidity				
Relationship					None	2	1	59	45.4
Single	112	53.6	65	50	Major depression	54	25.8	37	28.4
Married	75	35.8	50	38.4	Anxiety disorder	63	30.1	20	15.4
Widowed	6	2.9	5	3.9	Bipolar disorder	14	6.7	4	3.1
Seperated	16	7.7	10	7.7	Schizophrenia	31	14.8	3	2.3
Work					ADHD	11	5.3	0	0
Unemployed	47	22.4	49	37.9	Eating disorder	34	16.3	7	5.4
Housewife	39	18.6	6	4.6	History of parole/probation				
Worker	69	33	39	30.2	None	197	94.2	129	99.2
Tradesmen	13	6.2	30	23.2	Yes	12	5.8	1	0.8
Retired	7	3.3	2	1.5	Family history of alcohol/substance use				
Student	34	16.5	3	3.1	None	189	90.4	107	82.3
Physical comorbidity					Yes	20	9.6	23	17.7
None	160	76.5	12	9.3	Family history of primary psychiatric disorder				
Yes	49	23.5	118	90.7	None	167	79.9	104	80
					Yes	42	20.1	26	20

ADHD: Attention deficit hyperactivity disorder.

RESULTS

Sociodemographic Data

The proportions of male and female participants in the first group were similar (51.7% male, 48.3% female), whereas the majority of participants in the second group were male (92.9%). Single individuals predominated in both groups (53.6% and 49.2%, respectively). Compared to the first group, the second group had a higher rate of alcohol use (70.3% vs. 36.9%). Substance users were in the minority in both groups (12.9% and 7.1%, respectively). Most participants in the first group, as expected, had one or more psychiatric diagnoses (Table 1).

ASSIST Risk Levels

In both groups, individuals who required brief intervention or more intensive intervention related to tobacco use predominated. The frequency of groups requiring intervention for alcohol use and other substance use was higher in the second group (Table 2).

Reliability Analysis and Factor Structure of the ASSIST

To analyze the consistency of ASSIST, Cronbach's alpha coefficients were calculated for each group, ranging from 0.70 to 0.98 (Table 3).

To evaluate the factor structure of the scale, exploratory factor analysis was performed. The Kaiser-

Table 2: ASSIST risk level

Drug	No intervention n (%)	Brief intervention n (%)	Intense intervention n (%)
Group 1 (n=209)			
Tobacco	99 (47.4)	82 (39.2)	28 (13.4)
Alcohol	167 (79.9)	24 (11.5)	18 (8.6)
Cannabis	185 (88.5)	15 (7.2)	9 (4.3)
Cocaine	198 (94.7)	6 (2.9)	5 (2.4)
Amphetamine	196 (93.8)	6 (2.9)	7 (3.3)
Inhalants	202 (96.7)	1 (0.5)	6 (3)
Sedatives/hypnotics	189 (90.4)	15 (7.2)	5 (2.4)
Hallucinogens	201 (96.2)	4 (1.9)	4 (1.9)
Opiates	200 (95.7)	3 (1.3)	6 (3)
Other	196 (93.8)	8 (3.8)	5 (2.4)
Group 2 (n=130)			
Tobacco	5 (3.3)	63 (48.5)	60 (46.2)
Alcohol	31 (23.2)	78 (60)	18 (13.8)
Cannabis	81 (62.6)	35 (26.9)	11 (8.5)
Cocaine	68 (52.4)	55 (42.3)	5 (3.3)
Amphetamine	75 (57.1)	48 (36.9)	4 (3)
Inhalants	106 (81.5)	18 (17)	2 (1.5)
Sedatives/hypnotics	107 (82.3)	19 (16.5)	2 (1.5)
Hallucinogens	108 (84.3)	17 (13.2)	3 (2.5)
Opiates	90 (69.2)	33 (25.4)	5 (3.4)
Other	35 (27.3)	89 (69.5)	4 (3.2)

ASSIST: Alcohol, Smoking, and Substance Involvement Screening Test.

Table 3: Reliability statistics

Drug	Cronbach's Alpha (Group 1)	Cronbach's Alpha (Group 2)
Tobacco	0.90	0.85
Alcohol	0.91	0.70
Cannabis	0.91	0.85
Cocaine	0.93	0.74
Amphetamine	0.93	0.78
Inhalants	0.98	0.79
Sedatives/hypnotics	0.84	0.80
Hallucinogens	0.91	0.82
Opiates	0.97	0.83
Other	0.91	0.84

Meyer-Olkin (KMO) measure of sampling adequacy was higher than 0.60, and Bartlett's Test of Sphericity was significant (KMO>0.60, p<0.05).

The "Tobacco" subscale was evaluated in terms of consistency with the literature and was reduced to six items. The subscales of "Alcohol," "Marijuana," "Cocaine," "Amphetamine," "Inhalants," "Opioids," and "Other" were evaluated with seven items. Based on the factor loadings, all of these items loaded onto a single factor, and it was appropriate to calculate a total score for these items.

The "Sedatives and Hallucinogens" subscales were evaluated with seven items. Based on the factor loadings, items 2–4 were grouped as the first factor, and items 6 and 7 contributed to the second factor (Table 4).

Convergent and Divergent Validity of ASSIST: Correlations of ASSIST Scores with AUDIT, DUDIT, and FNDT Scales

ASSIST Tobacco scores were significantly correlated with FNDT scale scores (0.70 for Group 1 and 0.74 for Group 2). ASSIST Alcohol scores and total scores were significantly correlated with AUDIT and DUDIT scores, respectively (0.92 for Group 1 and 0.94 for Group 2; 0.91 for Group 1 and 0.90 for Group 2, respectively) (Table 5, 6).

Table 4: ASSIST validity factor analysis statistics

	Factor											
	Tobacco	Alcohol	Cannabis	Cocaine	Amphetamine	Inhalants	Sedatives		Hallucinogens		Opiates	Other
	1	1	1	1	1	1	1	2	1	2	1	1
Group 1 (n=209)												
Q 1	0.90	0.87	0.71	0.71	0.90	0.72	0.84		0.89		0.88	0.76
Q 2	0.89	0.94	0.81	0.80	0.84	0.97	0.78		0.96		0.83	0.94
Q 3	0.75	0.94	0.82	0.82	0.83	0.97	0.72		0.91		0.84	0.92
Q 3.4		0.85	0.73	0.73	0.82	0.70	0.77		0.95		0.87	0.93
Q 4	0.74	0.88	0.87	0.87	0.81			0.77		0.88	0.77	0.72
Q 5	0.76	0.84	0.83	0.73	0.86	0.97		0.79		0.91	0.70	0.79
KMO (Kaiser-Meyer-Olkin)	0.74	0.73	0.79	0.75	0.77	0.74	0.77	0.76	0.77	0.69		
Bartlett's Test p value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
Group 2 (n=130)												
Q 1	0.92	0.88	0.91	0.94	0.91	0.92	0.88		0.99		0.91	0.94
Q 2	0.92	0.88	0.84	0.94	0.94	0.97	0.87		0.96		0.96	0.81
Q 3	0.74	0.87	0.86	0.92	0.83	0.97	0.80		0.93		0.97	0.93
Q 3.4		0.7	0.7	0.72	0.92	0.98	0.70		0.95		0.92	0.82
Q 4	0.87	0.81	0.89	0.90	0.81			0.84		0.86	0.91	0.86
Q 5	0.80	0.86	0.84	0.83	0.86	0.97		0.93		0.92	0.94	0.81
KMO (Kaiser-Meyer-Olkin)	0.83	0.87	0.83	0.89	0.85	0.90	0.77	0.85	0.90	0.81		
Bartlett's Test p value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		

ASSIST: Alcohol, Smoking, and Substance Involvement Screening Test; Q 1: How often have you used the substance(s) in the last 3 months?; Q 2; How often have you felt a strong desire or urge to use it in the last 3 months?; Q 3: How often has the substance use caused health, social or financial problems in the last 3 months?; Q 3.4: Have you failed to do what you would normally be expected to do because of your use in the last 3 months?; Q 4: Have any of your relatives ever expressed concern about your use?; Q 5: Have you ever tried to cut down or stopped using and failed?

Table 5: DUDIT-AUDIT-FNBT risk levels

	Low risk	Moderate risk	High risk
Group 1 (n=209)			
FNDT	133 (63.6)	37 (17.7)	39 (18.7)
	Risk -	Risk +	
DUDIT	188 (90)	21(10)	
AUDIT	170 (81.3)	39 (18.7)	
Group 2 (n=130)			
FNDT	46 (35.3)	30 (23)	54 (41.5)
	Risk -	Risk +	
DUDIT	55 (42.3)	75 (57.7)	
AUDIT	46 (35.4)	84 (64.6)	

FNDT: Fagerstrom Nicotine Dependence Test; DUDIT; Drug Use Disorder Identification Test; AUDIT; Alcohol Use Disorder Identification Test.

Table 6: Concordance correlation between ASSIST and FNDT/AUDIT/DUDIT scales

		Intraclass correlation (Group 1)	Intraclass correlation (Group 2)
ASSIST-tobacco	FNDT	**0.70**	**0.74**
ASSIST-alcohol	AUDIT	**0.92**	**0.94**
ASSIST-substance	DUDIT	**0.91**	**0.90**

Concordance correlation between ASSIST-Tobacco and FNDT was significant. Concordance correlation between ASSIST-Alcohol and AUDIT was perfect. Concordance correlation between ASSIST-Substance and DUDIT was perfect. ASSIST: Alcohol, Smoking, and Substance Involvement Screening Test; FNDT: Fagerstrom Nicotine Dependence Test; DUDIT: Drug Use Disorder Identification Test; AUDIT: Alcohol Use Disorder Identification Test.

DISCUSSION

The research was carried out to measure the validity and reliability of the scale in Turkish by following the translation instructions specified by the WHO (21). Conceptual, material, semantic, and operational equivalence were taken into account during the translation process (22). The scale was carefully revised, considering semantic inconsistencies and local adaptation, through forward and backward translation procedures. It was translated into Turkish using terms equivalent to the original English wording, such as "Alkol" for alcoholic beverages in the Alcohol category, "Esrar" for Cannabis in the Substance categories, "Kokain" for Cocaine, "İnhalanlar" for Inhalants, "Amfetaminler" for amphetamine-type stimulants, "Halüsinojenler" for Hallucinogens, and "Opioid" for Opioids. However, to represent certain items under the "Other" category, street terms such as "bonzai" were also included.

Interviews with the participants showed that the questions were not difficult to answer and were consistent with their expectations for a health interview. More importantly, there was no confusion regarding the flow, format, or structure of the interview. The scale is concise and easy to administer and interpret for clinicians, patients, and researchers. Unlike other substance abuse screening tests, ASSIST was designed to provide lifetime estimates of substance-related risk as well as current status.

In our study, the reliability scores of ASSIST for all items showed Cronbach's alpha values ranging between 0.70 and 0.98. Values above 0.75 are generally accepted as indicators of good reliability (23). The reliability values observed in our study were similar to those reported in previous ASSIST reliability studies conducted in different countries (24, 25).

In our study, the ASSIST Tobacco, Alcohol, Marijuana, Cocaine, Amphetamine, Inhalants, Opioids, Tranquilizers, Hallucinogens, and Other Substances subscales were evaluated using seven items. When factor structure analysis was conducted for all of these items, the dataset was found to be suitable for analysis (KMO>0.60, $p<0.05$). The "Tobacco," "Alcohol," "Marijuana," "Cocaine," "Amphetamine," "Inhalants," "Opioids," and "Other" items loaded onto a single factor. Therefore, it would be appropriate to calculate a total score for these subscales. However, the "Sedatives and Hallucinogens" items loaded onto two distinct factors. Items 2–4 loaded onto the first factor, while items 6 and 7 loaded onto the second factor. Thus, it would be more appropriate to calculate separate total scores for these two factors rather than a single total score for the "Sedatives and Hallucinogens" subscale.

In our study, intraclass correlation analysis was performed between ASSIST (Tobacco/Alcohol/Substance) and the FNDT, AUDIT, and DUDIT scales. The intraclass correlation coefficients ranged between 0.70 and 0.92, and the correlations were found to be significant.

Differences in ASSIST scores between groups (low and moderate-high risk) play an important role as indicators of the construct validity of the ASSIST scale and its ability to discriminate between samples with substance use. Preventive intervention programs aim to target at-risk populations at early stages to minimize the risk of progression to substance use disorder. Therefore, it is important to provide healthcare professionals with functional screening tools that are easy to implement for alcohol, tobacco, and other substances in a variety of clinical settings. Screening tools such as ASSIST provide opportunities to identify

and engage individuals in need of treatment and can be useful for increasing motivation, promoting behavior change, and reducing health care costs (26–28). In a study conducted with adults, the Voice Computer Assisted Self-Interview System (VCASIS) and traditional interview methods were compared, and high consistency was observed between the two methods in identifying medium-high risk individuals (29). Kane et al. (30) used a VCASIS-based ASSIST and reported high agreement between toxicology reports and cannabis and cigarette use as described in ASSIST. Combining screening and brief intervention is the most effective method for reducing problematic alcohol use among individuals at risk (31, 32), and also for other high-risk substance users (33).

This study has some limitations. Our study had a small sample size, which might limit the power of the results. Although the original version of ASSIST was recommended for use as a screening tool in primary care, the sample in our study consisted of individuals who applied to a psychiatry outpatient clinic; therefore, the results cannot be fully generalized to general health care settings. In our country, a Turkish validity and reliability study of this scale was previously conducted with individuals on parole or probation, and it was shown to be a valid measurement tool in this population (15). However, the very small number of inhalant, hallucinogen, and sedative users was an important limitation of that study. The lack of confirmatory factor analysis might also be considered a strong limitation, although the scale was found to be valid in our study. As the comparator scales (FNDT and AUDIT) have demonstrated relatively low internal consistency in previous Turkish studies, this may have indirectly affected the reliability results observed in the present study. Nevertheless, the consistency of our findings with validity results reported in previous studies may be considered evidence to the contrary. In addition, statement bias due to judicial reasons may have complicated the reliability of the results. In our study, validity and reliability data were collected from populations at different risk levels.

One of the strengths of our study was that participants who voluntarily applied for psychiatric care may have contributed to obtaining more valid responses. At the same time, it was important that the participants in the study had a balanced gender distribution. It is well known that concomitant alcohol and substance use is common among individuals who apply to psychiatry clinics. In a study conducted in our country, nicotine use disorder (57.4%), alcohol abuse and addiction (21.9%), and sedative/hallucinogen use disorder (9%) were reported among patients in an inpatient clinic (34). These data are consistent with the findings of our study.

Our results suggest that the Turkish version of ASSIST can be used as part of a general public health approach in settings such as counseling centers and general psychiatry services to screen for cigarette, alcohol, and substance use. The findings of this study indicate that the Turkish version of ASSIST is a valid and reliable screening tool for alcohol and substance use in the adult psychiatric population. These results are similar to previous studies conducted in other languages and populations, which demonstrated the validity of ASSIST as a screening tool for alcohol, tobacco products, and substance use (35–41).

CONCLUSION

In conclusion, ASSIST v3.1 can be applied as a screening tool for cigarette-, alcohol-, and substance-related problems in general psychiatry and psychiatric counseling centers in our country. Future studies conducted in different populations would provide further evidence regarding the effectiveness of ASSIST and contribute to both the literature and daily clinical practice.

Ethical Approval: The Erenkoy Training and Research Hospital for Psychiatry and Neurological Diseases Ethics Committee granted approval for this study (date: 08.10.2019, number: 55).

Informed Consent: Informed consent was obtained from all participants.

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Contribution Categories		Author Initials
Category 1	Concept/Design	R.B.
	Data acquisition	B.U, E.C., G.A., F.K.Y.
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RESEARCH ARTICLE

The Turkish validity and reliability of the Distress Tolerance Scale in youth in a clinical sample

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ABSTRACT

Objective: This study aims to examine the reliability and validity of the Turkish version of the Distress Tolerance Scale (DTS) in a clinical sample of children and adolescents.

Method: The study included a total of 198 children and adolescents between the ages of 10 and 17. To confirm the factor structure of the Turkish version of the DTS, confirmatory factor analysis was conducted. Convergent validity was assessed using a Spearman correlation matrix plot. Cronbach's alpha was calculated to evaluate internal consistency. The intraclass correlation coefficient, along with the Bland-Altman graphical method, was employed to examine test–retest reliability. All statistical analyses were evaluated at a significance level of $p<0.05$.

Results: The confirmatory factor analysis demonstrated model fit indices of $\chi^2/df=1.724$, Comparative Fit Index (CFI)=0.947, Goodness-of-Fit Index (GFI)=0.906, Normed Fit Index (NFI)=0.884, Tucker-Lewis Index (TLI)=0.934, Incremental Fit Index (IFI)=0.948, and Root Mean Square Error of Approximation (RMSEA)=0.061, indicating an acceptable fit. The Spearman correlation matrix plot revealed a negative relationship between the subscales of the DTS and the Revised Child Anxiety and Depression Scale – Child Version. Cronbach's alpha values for the DTS subscales ranged from 0.694 to 0.775, while the coefficient for the general distress tolerance factor was 0.884, indicating good internal consistency. The intraclass correlation coefficients assessing test–retest reliability ranged from 0.703 to 0.839. Bland-Altman plots demonstrated a reliable level of agreement between test and retest scores.

Conclusion: The Turkish version of the DTS is a valid and reliable tool for assessing distress tolerance in children and adolescents.

Keywords: Distress tolerance scale, psychometric properties, reliability, validity, youth

INTRODUCTION

The ability to endure and experience negative psychological states is referred to as distress tolerance. These states arise from cognitive or physical processes and manifest as emotions that often drive efforts to alleviate distress (1). The concept of distress tolerance consists of four factors. Tolerance refers to the individual's capacity to withstand distress and their perception of how unbearable the experience feels. Appraisal involves perceiving distress as unacceptable, feeling embarrassed about experiencing distress,

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and believing that one's coping abilities are weaker compared to those of others. Absorption indicates the extent to which negative emotions dominate the individual's attention and interfere with their functioning. Regulation describes the individual's extensive efforts to avoid negative emotions and the tendency to disengage from them as quickly as possible (1).

Emotional regulation and distress tolerance are closely related concepts (2). The association between distress tolerance and emotion regulation is characterized by the strategies developed by individuals to manage negative emotions (3). Research has shown an association between psychopathology and emotion regulation strategies during development (4). Therefore, it is important to understand the effects of distress tolerance on mental health. Distress tolerance, which has been the subject of increasing research, has been shown to be associated with various psychiatric disorders in young people. Problematic alcohol use, heavy drinking, delinquent behaviors, anxiety, depression, disordered eating attitudes, problematic internet use, and nonsuicidal self-injury are among the conditions associated with distress tolerance (5–10). Therefore, it is important to have reliable assessment methods for distress tolerance, which is linked to many psychiatric disorders in children and adolescents.

Experimental methods for measuring distress tolerance typically assess how long individuals persist in tasks involving physical or psychological stressors (11, 12). These methods provide an objective outcome independent of self-report. However, they have several limitations. First, persistence in these tasks may be influenced by factors other than distress tolerance, such as motivation or task persistence (1, 13). Additionally, physical stress paradigms, such as the cold-pressor task, primarily measure tolerance for physical discomfort rather than emotional distress. This limits their generalizability to affective experiences (14). These limitations of behavioral experiments have led to the need to measure the concept of distress tolerance by alternative means, such as self-report methods.

Simons and Gaher conducted the development and validation study of the Distress Tolerance Scale (DTS) among university students to measure the ability to tolerate distress. According to their study, the DTS consists of four first-order factors: tolerance, appraisal, absorption, and regulation, in accordance with the conceptual analysis of distress tolerance. Furthermore, the mean of these four first-order subscales yields a single second-order factor: the general distress tolerance (GDT) factor. While the internal consistency of the GDT factor was good, the subscales also showed adequate internal consistency. It was further demonstrated that the DTS maintains stability over time. Moreover, the DTS showed a negative relationship with affect dysregulation and a positive relationship with positive affectivity in validity analyses (1).

In the literature, there are only a few studies investigating the validity and reliability of the DTS in children and adolescents. In You and Leung's study, the factor structure and psychometric properties of the DTS were analyzed in a large general population of Chinese teenagers aged 12 to 19 years. In their study, they reported that a hierarchical model emerged from the exploratory factor analysis and was supported by the data. In addition, they found that the strength of the correlation between negative affectivity and distress tolerance was higher in female adolescents compared to males (15). In another study, the DTS was assessed for its factor structure and validity in both community and clinical samples. Researchers confirmed the four-factor hierarchical model in a clinical group of adolescents aged 10 to 18 years with primary emotional disorders. They also showed that the DTS regulation score increased with age in the community sample (16). In a study conducted with adolescents with chronic physical diseases in Taiwan, a nine-item, two-factor structure of the Chinese version of the DTS was identified (17).

As far as we know, no validity and reliability study has been conducted on the DTS among children and adolescents in our country. However, two separate studies have examined the validity and reliability of the Turkish version of the DTS in adult samples. Sargın et al. (18) identified a three-factor structure in the adult sample: tolerance, regulation, and self-efficacy. Nevertheless, in the study conducted by Akın et al. (19), it was shown that the model fit of the four-factor structure in the original scale was good.

To our knowledge, our study is the first to adapt and evaluate the reliability and validity of the DTS for Turkish teenagers. It appears that the initial factor structure proposed by Simon and Gaher may vary depending on age and sample characteristics. Thus, identifying the most suitable factor structure for young individuals in the Turkish sample is essential. This study aimed to translate the DTS into Turkish and examine its psychometric properties in a clinical

sample of children and adolescents. While distress tolerance has been extensively studied in adult populations, research focusing on children and adolescents remains limited. We expect that the adaptation of the DTS will contribute to the literature by enabling further studies on distress tolerance in Turkish youth.

METHODS

Participants

The present study was conducted using a cross-sectional research design. To ensure the applicability of the scale in clinical samples, the sample group consisted of young people who applied to a child and adolescent psychiatry outpatient clinic. The sample size was determined according to the Rule of Thumb, which indicates that for validity and reliability assessments, the number of participants should be at least 10 times the total number of items in the scale (20). Thus, the 15-item scale was administered to 198 young individuals aged 10 to 17 who volunteered to participate in the study. All participants were native Turkish children and adolescents who volunteered for the study and provided their consent. The study included children and adolescents who could adequately speak, read, and write Turkish to complete the scales. Exclusion criteria included the presence of psychiatric disorders that might prevent children and adolescents from engaging in the assessment process, such as intellectual disability and autism spectrum disorder, or being in the acute phase of a psychotic disorder or bipolar disorder. The study was conducted at a city hospital child and adolescent psychiatry outpatient clinic between December 2024 and April 2025. Ethical approval was obtained from the Ankara Bilkent City Hospital Ethics Committee on 27.11.2024 (approval number: TABED-2-24-443). Written consent was obtained from the participating children and adolescents, as well as from their parents. All study procedures adhered to the Declaration of Helsinki.

Procedure and Translation of DTS

To conduct validity and reliability analyses of the DTS among Turkish youth, permission was obtained from Jeffrey S. Simons, the developer of the scale. The English version of the DTS was translated into Turkish by a native bilingual Turkish speaker and a native Turkish-speaking English teacher. The authors and an English language specialist compared the two translated versions and produced a revised translation. A further translation of the Turkish text into English was then carried out by a different English teacher. Upon comparing the back-translation with the original English version of the DTS, the authors identified discrepancies and finalized the translation process by revising the Turkish version accordingly. Subsequently, fifteen adolescents completed the scale in a pilot study and provided feedback on the comprehensibility of the items. It was observed that children over the age of 10 were able to easily understand the scale items. The authors carefully analyzed each item to detect potential comprehension issues or changes in meaning related to language and terminology. Ultimately, the authors implemented modifications to the DTS, leading to the completion of the final translated version.

Instruments

Youth who participated in our study were evaluated using a sociodemographic form, the Turkish version of the Distress Tolerance Scale, the Revised Child Anxiety and Depression Scale – Child Version (RCADS-CV), and the Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA). To assess the test-retest reliability of the scale, we administered the DTS to 39 volunteers two weeks after their initial completion.

Sociodemographic Form

This form was prepared by the authors to investigate participants' characteristics, including age, gender, and clinical features.

Distress Tolerance Scale (DTS)

Simons and Gaher created the DTS to measure individual differences in the capacity to tolerate distress. The scale is a 15-item, 5-point Likert-type self-report measure, with responses ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). The DTS consists of four subscales: Tolerance, Regulation, Appraisal, and Absorption. In addition, the GDT factor is calculated as the mean score of the four DTS subscales, forming the higher-order structure of the scale. Higher scores on the DTS reflect greater distress tolerance (1).

Revised Child Anxiety and Depression Scale – Child Version (RCADS-CV)

This scale was designed to assess anxiety disorders and depression in children and adolescents. (21) The instrument comprises 47 items on a four-point Likert scale, with each item rated from 0 to 3. There

are two versions of the scale, one completed by the child and one by the parent. In our study, the child-completed form was used. Gormez et al. (22) conducted the Turkish adaptation, reliability, and validity study in children aged 8 to 17 years. We used the RCADS-Child Scoring Program version 3.2 in Excel to calculate the scores.

Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA)

Gullone and Taffe adapted this scale from the Emotion Regulation Questionnaire created by Gross and John for an adult population (23). The ERQ-CA is a self-report instrument designed to evaluate variations in the use of two emotion regulation strategies. The scale includes 10 items across two subdimensions: Expressive Suppression (ES) and Cognitive Reappraisal (CR), assessed using a 5-point Likert scale ranging from 1 to 5. Higher scores on the subscales indicate greater use of the corresponding emotion regulation strategy. The Turkish adaptation of the scale was carried out by Tetik and Cenkseven Önder, who demonstrated that the ERQ-CA is valid for children and adolescents aged 10 to 18 years (24).

Statistical Analysis

The analysis was carried out using the free and open-source software R (version 4.4.1, https://cran.r-project.org), SPSS for Windows Version 23.0 statistical package (Chicago, IL), and AMOS (version 23) by an academic biostatistician. The assumption of normal distribution for numerical variables was assessed using the Kolmogorov-Smirnov goodness-of-fit test and graphical approaches (Q-Q plot, histogram). Median (25^{th} percentile–75^{th} percentile) values were reported for numerical variables lacking normal distribution, and frequency and percentage values were reported for categorical variables.

In this study, validity (construct, convergent) and reliability (internal consistency, test-retest reliability) analyses of the DTS were conducted. Construct validity was examined using confirmatory factor analysis (CFA). The present research adhered to the four-factor hierarchical model established by Simons and Gaher (1). This decision was based on the theoretical coherence of the model, its strong empirical foundation in previous literature, and the need for comparability across studies. Moreover, the original structure aligns well with the conceptualization of distress tolerance as a multidimensional construct. Overall model fit was assessed using Chi-square Goodness of Fit (χ^2/df), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Goodness of Fit Index (GFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), and Incremental Fit Index (IFI). One method used to determine construct validity is calculating the correlation coefficient between the relevant scale and external measures (convergent validity). To assess convergent validity, Spearman's rank correlation coefficient was used to calculate the correlation between the DTS scores and the RCADS-CV and ERQ-CA scores. The correlation coefficient (r) is classified as very strong for values between 0.90 and 1.0, strong for 0.70–0.89, moderate for 0.40–0.69, poor for 0.20–0.39, and very poor when below 0.19 (20). The correlation matrix was plotted using the "metan" package (25).

In the reliability analysis of the Turkish version of the DTS, test-retest reliability was evaluated with the Spearman correlation coefficient and the Intraclass Correlation Coefficient (ICC), while Bland-Altman plots were employed to determine measurement agreement over time. The ICC ranges from 0.00 to 1.00, where values between 0.50 and 0.75 indicate moderate reliability, values between 0.75 and 0.90 indicate good reliability, and values above 0.90 represent excellent reliability (26). The "blandr" package in R software was used to generate Bland-Altman graphs (27). The reliability of the DTS was assessed using Cronbach's alpha coefficient calculated across the 15 items. If Cronbach's alpha ranges from 0.60 to 0.79, the scale can be considered quite reliable; if it ranges from 0.80 to 1.00, it can be considered highly reliable (20). The statistical significance level was set at $p<0.05$.

RESULTS

The scale was administered to 198 participants aged 10-17 years (median=15.0, 25^{th}–75^{th} percentile=13.0-16.2). Among the participants, 62.1% (n=123) were female and 37.9% (n=75) were male. The study found that among the adolescents, the rates of psychiatric disorders were as follows: major depressive disorder 35.4% (n=70), attention-deficit/hyperactivity disorder 29.8% (n=59), generalized anxiety disorder 13.6% (n=27), social anxiety disorder 7.6% (n=15), conduct disorder 6.1% (n=12), obsessive-compulsive disorder 4.0% (n=8), specific learning disorder 4.0% (n=8), and oppositional defiant disorder 3.5% (n=7).

Results of Validity Analysis

In our study, the construct validity of the DTS was evaluated, and CFA was applied to validate the

Table 1: Confirmatory factor analysis results

Parameter	Abbreviation	Acceptable range	Initial model	Final model
Chi-Square Fit Test	CMIN/df	CMIN/df≤3	2.882	1.724
Comparative Fit Index	CFI	0.95≤CFI≤0.97	0.852	0.947
Goodness of Fit Index	GFI	0.85≤GFI≤0.90	0.840	0.906
Normed Fit Index	NFI	0.90≤NFI≤0.95	0.793	0.884
Tucker-Lewis Index	TLI	TLI≥0.95	0.828	0.934
Incremental Fit Index	IFI	0.90≤IFI≤0.95	0.854	0.948
Root Mean Square Error of Approximation	RMSEA	0.05≤RMSEA≤0.08	0.098	0.061

Table 2: Findings on reliability

	ICC (95% CI)	Cronbach's alpha	r_s	p
F1	0.703 (0.501–0.833)	0.775	0.704	<0.001
F2	0.807 (0.662–0.894)	0.769	0.831	<0.001
F3	0.823 (0.688–0.903)	0.757	0.813	<0.001
F4	0.779 (0.618–0.878)	0.694	0.764	<0.001
GDT	0.839 (0.714–0.912)	0.884	0.850	<0.001

F1: Tolerance; F2: Appraisal; F3: Absorption; F4: Regulation; GDT: General distress tolerance; ICC: Intraclass Correlation Coefficient; CI: Confidence interval; rs: Spearman correlation coefficient.

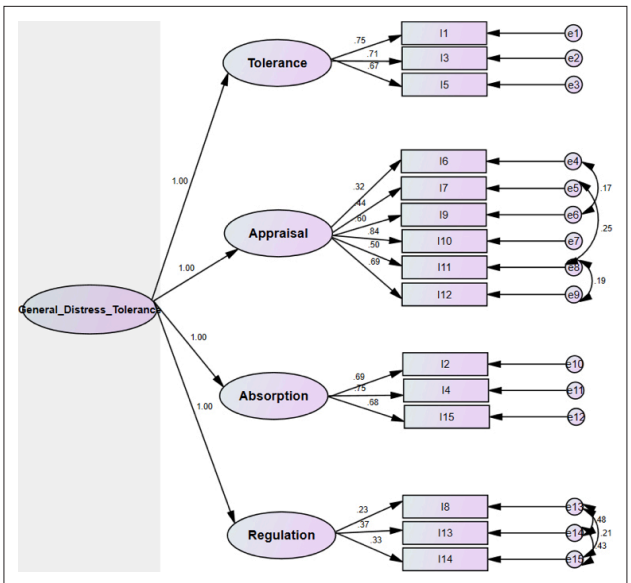

Figure 1. Diagram of confirmatory factor analysis (adjusted model).

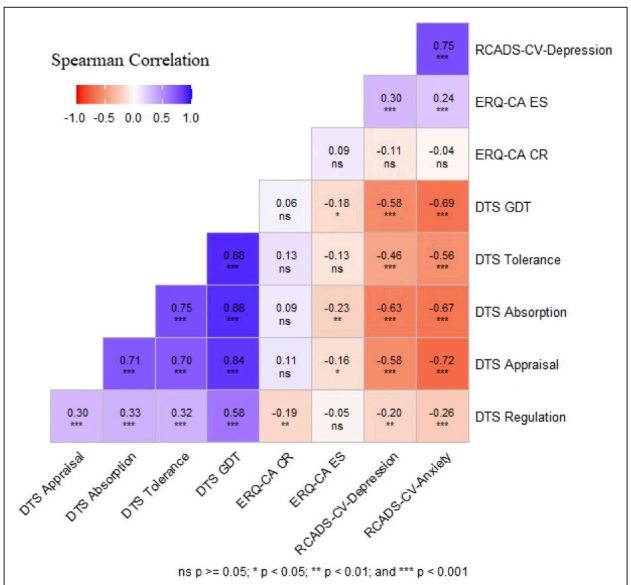

Figure 2. Correlation matrix plot showing the relationships between the subdimensions of the DTS and the scales of the ERQ-CA and RCADS-CV.

RCADS-CV: Revised Child Anxiety and Depression Scale – Child Version; ERQ-CA: Emotion Regulation Questionnaire for Children and Adolescents; ES: Expressive Suppression; CR: Cognitive Reappraisal; DTS: Distress Tolerance Scale; GDT: General Distress Tolerance.

factor structure. The original hierarchical model (1), consisting of four first-order factors and one second-order factor, was fitted to the modeling data (n=198), and the fit measures were reported (Final model in Table 1, Fig. 1). Some fit indices were acceptable (GFI=0.906, IFI=0.948, and RMSEA=0.061), whereas others indicated a poor fit (TLI=0.934 and NFI=0.884). Considering the modification indices shown in Table 1, it was concluded that the values were at an acceptable level in terms of the model fit. Consequently, a valid scale structure consisting of 15 items, four first-order factors, and one second-order factor was confirmed.

According to the Spearman correlation matrix plot (Fig. 2), used to determine convergent validity, a significant negative moderate correlation was identified between the GDT factor and the tolerance and absorption subscale scores of the DTS and the RCADS-CV anxiety score (r=-0.689, r=-0.558, r=-0.674, respectively; p<0.001 for all). The appraisal subscale score of the DTS demonstrated a significant negative strong correlation with the RCADS-CV anxiety score (r=-0.722, p<0.001), whereas the regulation subscale score showed a significant negative weak correlation

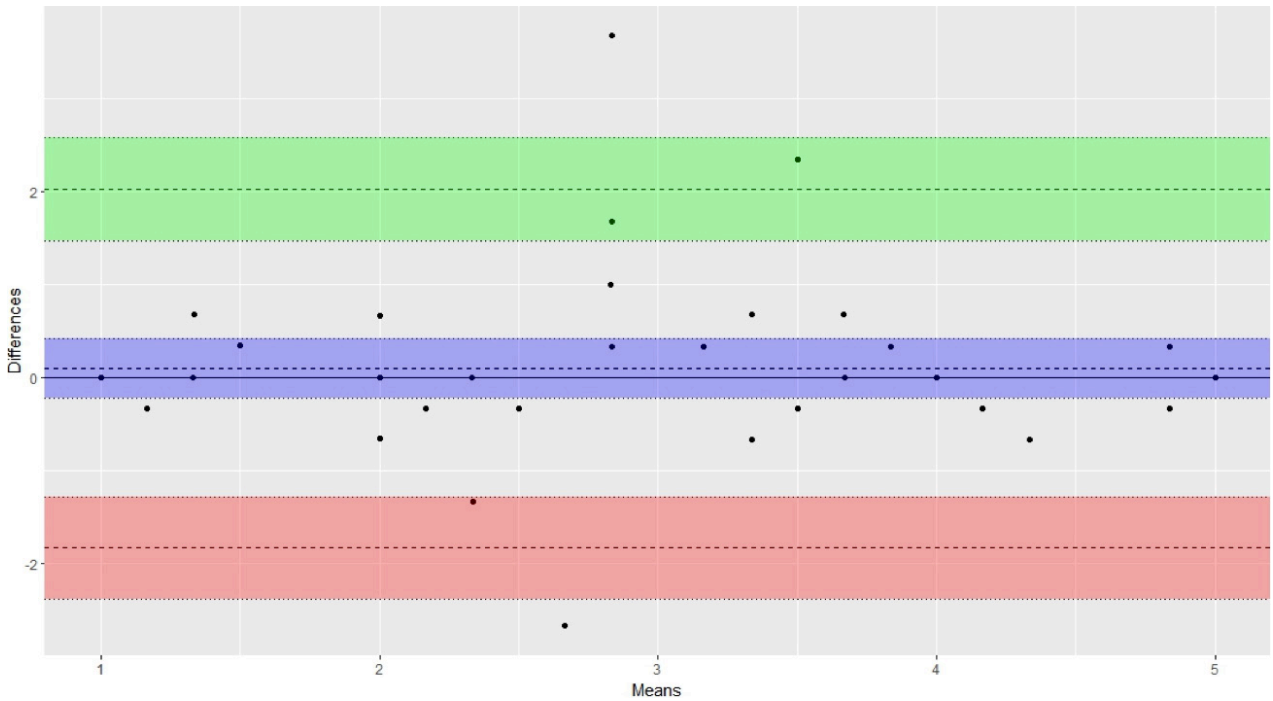

Figure 3. Bland-Altman plot illustrating the agreement between the two measurement time points for the tolerance subscale. The blue shaded area represents the mean difference and its 95% confidence interval. In the plot, green highlights the upper limit of agreement and red highlights the lower limit (mean±1.96 SD). Each dot corresponds to a participant's average measurement versus the difference between the two methods.

with the RCADS-CV anxiety score (r=-0.260, p<0.001). A significant negative moderate correlation was found between the GDT factor and the tolerance, absorption, and appraisal subscale scores of the DTS and the RCADS-CV depression score (r=-0.582, r=-0.459, r=-0.632, r=-0.576, respectively; p<0.001 for all). The regulation subscale score of the DTS showed a significant negative weak correlation with the RCADS-CV depression score (r=-0.203, p=0.004). In addition, a significant negative very weak correlation was observed between the GDT factor and the appraisal subscale score of the DTS and the ECQ-CA ES score (r=-0.183, p=0.010; r=-0.164, p=0.021, respectively), while the absorption subscale score showed a significant negative weak correlation with the ERQ-CA ES score (r=-0.231, p=0.001). Finally, the ERQ-CA CR score showed a significant negative very weak correlation with the regulation subscale score of the DTS (r=-0.193, p=0.007).

Results of Reliability Analysis

In our study, the internal consistency of the DTS was assessed using Cronbach's alpha. The alpha coefficients obtained from the analysis were 0.775 for the tolerance subscale, 0.769 for the appraisal subscale, 0.757 for the absorption subscale, and 0.694 for the regulation subscale (Table 2). Cronbach's alpha coefficient for the GDT factor was found to be 0.884. According to Cronbach's alpha coefficients, the subdimensions of the scale can be considered reliable. The total of 15 items of the scale also demonstrated high reliability based on Cronbach's alpha coefficient (20).

To determine the test-retest reliability of the DTS, 39 participants completed the scale again two weeks after their initial assessment. Spearman's correlation coefficients were calculated to determine the relationship between the two measurements. The findings demonstrated a significant, strong positive correlation between the initial and follow-up assessments (p<0.001 for all). ICC coefficients were also calculated to assess test-retest reliability. The ICC coefficient for the tolerance subscale was found to be 0.703, indicating moderate reliability. For the appraisal, absorption, regulation, and GDT factors, ICC coefficients ranged between 0.779 and 0.839, indicating good reliability (Table 2). Finally, the data points in the Bland-Altman graphs being very close to the zero line indicate that the agreement between the test-retest results was at a reliable level (Fig. 3–6).

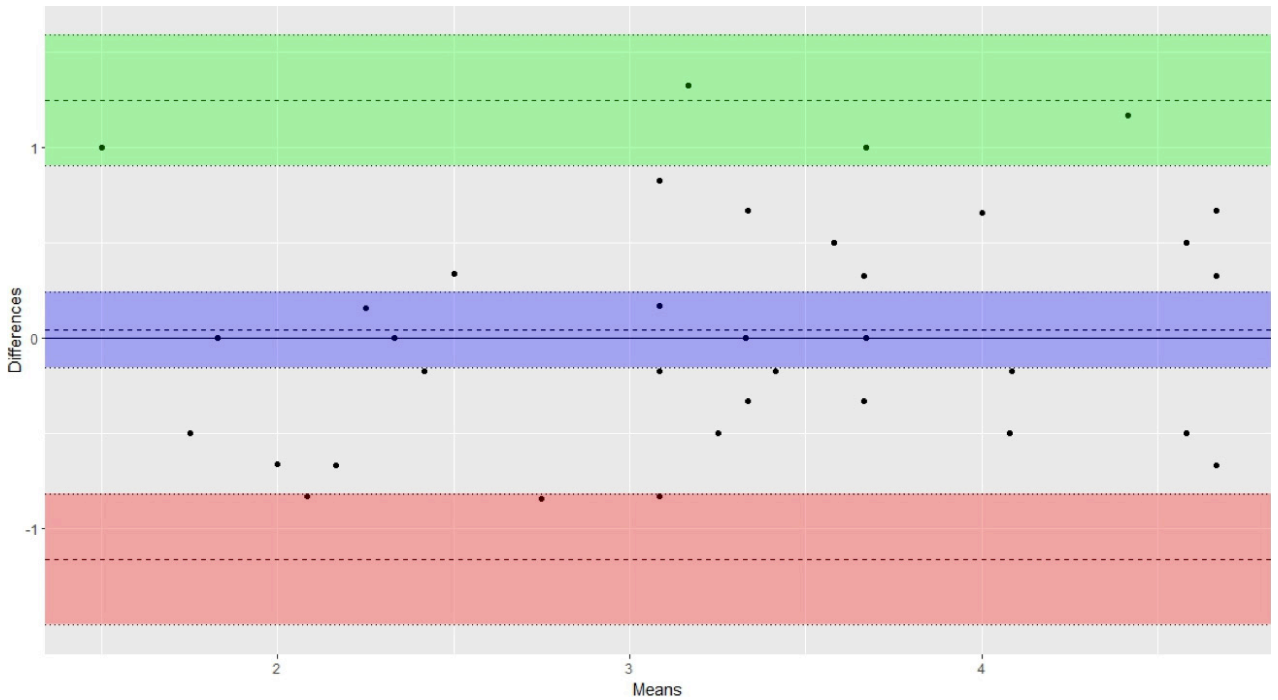

Figure 4. Bland-Altman plot illustrating the agreement between the two measurement time points for the appraisal subscale. The blue shaded area represents the mean difference and its 95% confidence interval. In the plot, green highlights the upper limit of agreement and red highlights the lower limit (mean±1.96 SD). Each dot corresponds to a participant's average measurement versus the difference between the two methods.

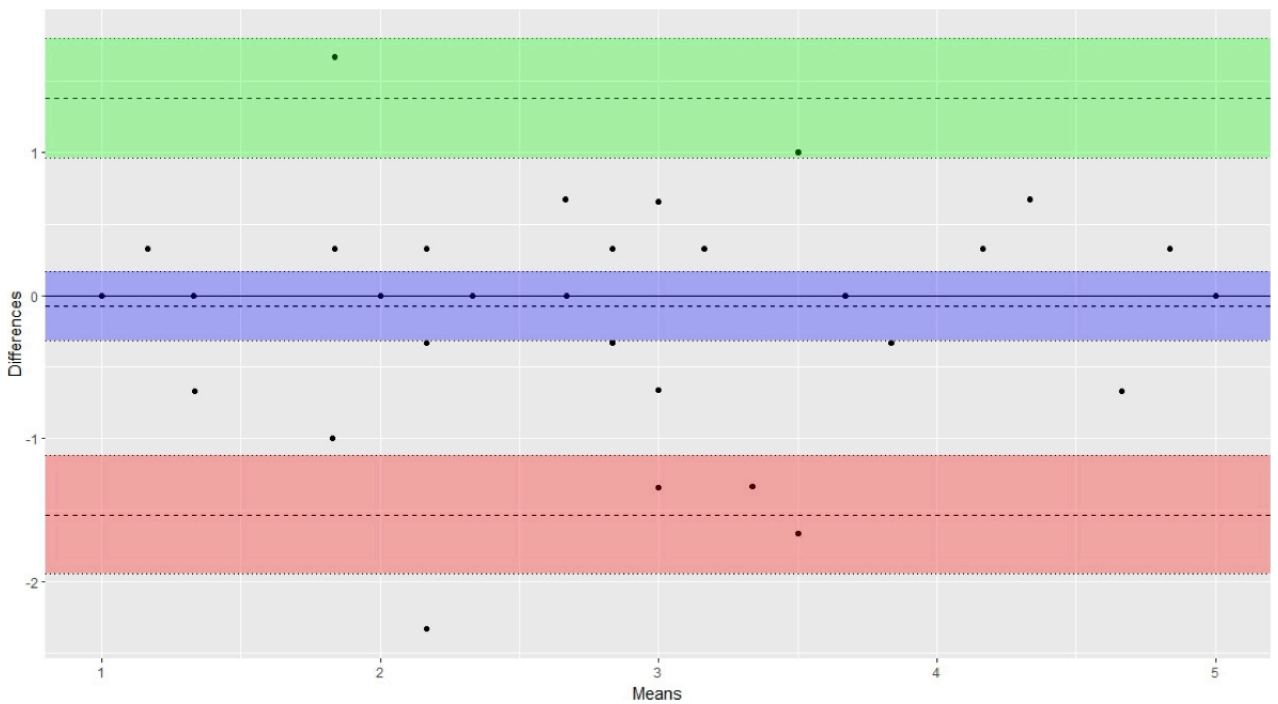

Figure 5. Bland-Altman plot illustrating the agreement between the two measurement time points for the absorption subscale. The blue shaded area represents the mean difference and its 95% confidence interval. In the plot, green highlights the upper limit of agreement and red highlights the lower limit (mean±1.96 SD). Each dot corresponds to a participant's average measurement versus the difference between the two methods.

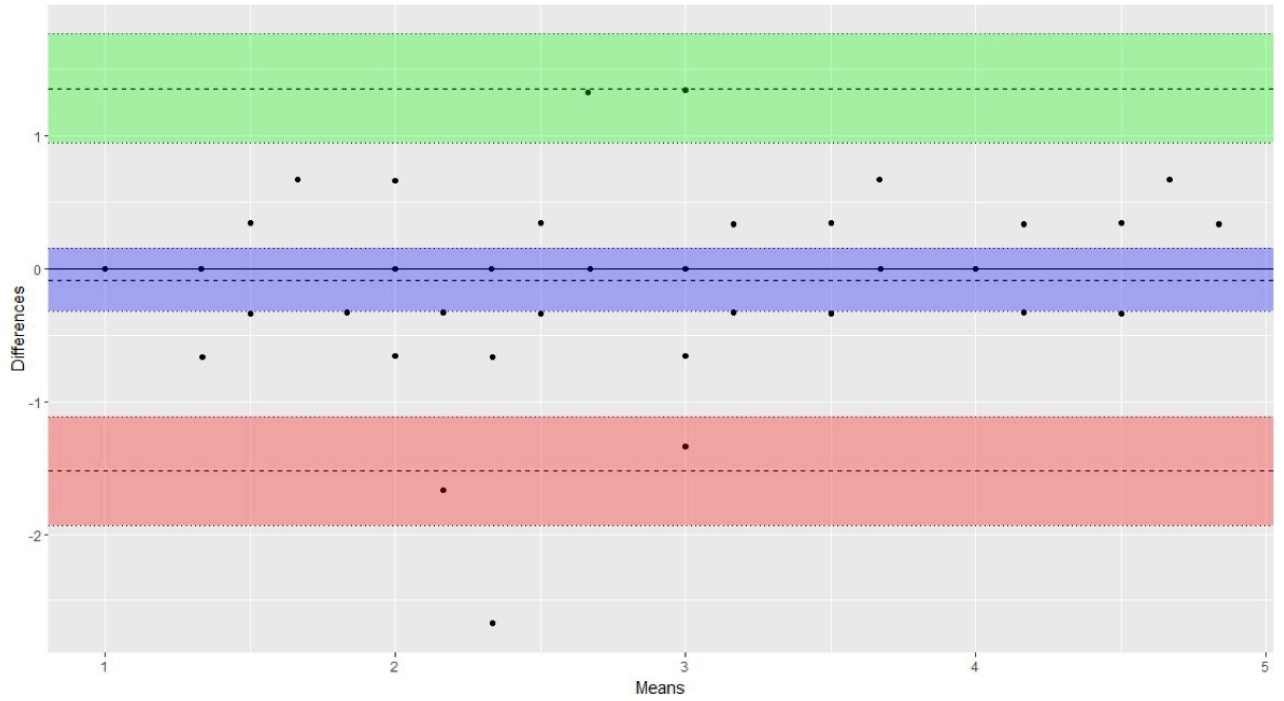

Figure 6. Bland-Altman plot illustrating the agreement between the two measurement time points for the regulation subscale. The blue shaded area represents the mean difference and its 95% confidence interval. In the plot, green highlights the upper limit of agreement and red highlights the lower limit (mean±1.96 SD). Each dot corresponds to a participant's average measurement versus the difference between the two methods.

DISCUSSION

Our study demonstrated that convergent validity, CFA, test-retest reliability, and internal consistency analyses confirmed the DTS as a valid and reliable instrument for assessing distress tolerance in a Turkish youth sample. The outcomes of the validity and reliability analyses are examined below in accordance with the literature.

In our study, CFA indicated that the original hierarchical model of the DTS, consisting of 15 items, four first-order factors, and one second-order factor, showed an acceptable model fit. Simons and Gaher conducted two separate studies in which they developed the DTS and found that the single-factor model consisting of 15 items did not fit well. Consequently, a hypothesized hierarchical model comprising four first-order factors indicative of a single second-order GDT factor was shown to have a significantly better fit (1). However, various studies in the literature have proposed different factor structures for the DTS. In You and Leung's study, it was shown that the Chinese version of the DTS consists of four first-order factors: tolerance, absorption, appraisal, and regulation. It also has a second-order factor of general distress intolerance comprising the first three of these factors. Notably, item 6 of the DTS was placed under the regulation factor instead of appraisal (15). In Tonarely and Ehrenreich-May's study, the four-factor hierarchical structure showed the best model fit in young people aged 10-18 years in a clinical sample. This structure was comparable to the one validated by You and Leung. However, item 6 was categorized under the appraisal factor, as in the original version (16). In a Portuguese study conducted with children aged 6-13 years who had emotional disorders, five different factor structures of the DTS proposed in the literature were evaluated. As a result, it was suggested that Tonarely and Ehrenreich-May's model was the most appropriate for the clinical sample (28). According to these studies, regulation is not considered part of the GDT factor. However, from a conceptual standpoint, as noted in the original development study of the DTS, distress tolerance and distress regulation are closely interrelated (1). Since the factor structure in Simons and Gaher's study showed an acceptable fit in our sample, we believe that the original hierarchical model can be applied to the Turkish youth sample.

In the present study, a significant negative correlation was found between the GDT factor and all subscales of the DTS and the RCADS anxiety and depression scores. Caiado et al. (28) reported that the DTS subscale scores were negatively correlated with the RCADS anxiety and depression scores. In addition, You and Leung found a significant correlation between distress intolerance and levels of anxiety and depression as assessed by the Depression Anxiety Stress Scale (15). Similar to our study, the DTS regulation subscale score was found to be relatively weakly associated with anxiety and depression levels in both studies (15, 28). These findings indicate that adolescents may experience negative emotions without a corresponding urge to immediately suppress or eliminate them. Contrary to our expectations, our study showed only a poor correlation between distress tolerance and emotion regulation strategies. In a recent study, it was shown that low distress tolerance significantly predicted increased utilization of rumination, avoidance, and suppression, but not reappraisal, as emotion regulation strategies (29). It is thought that the use of various tools to measure emotion regulation may explain the differing results. In addition, Milam and Judah's study suggests that emotion regulation may be more effective in facilitating distress tolerance among individuals with higher levels of cognitive control (30). This suggests that there are many factors that may mediate the association between distress tolerance and emotion regulation, and further studies should be conducted to identify these factors. Based on these findings, it was concluded that the DTS is related to anxiety, depression, and emotion regulation, but measures a different construct.

The internal consistency of the DTS was assessed using Cronbach's alpha coefficients, which ranged from 0.69 to 0.88, indicating that the scale's internal consistency is reliable. Simons and Gaher evaluated the internal consistency of the DTS at two different time points. In the initial assessment, alpha coefficients ranged from 0.70 to 0.82. Six months later, a follow-up evaluation yielded alpha coefficients ranging from 0.73 to 0.85, further supporting the scale's reliability over time (1). Similarly, You and Leung (15) found that the scale was internally consistent, with alpha coefficients ranging from 0.75 to 0.91. Caiado et al. (28) also determined that the scale exhibits good internal consistency, as evidenced by alpha values of 0.70 or higher. In Tonarely and Ehrenreich-May's study, the internal consistency of the DTS in a clinical sample was found to range from questionable to good, with Cronbach's alpha coefficients between 0.58 and 0.86 (16). Overall, while minor variations exist depending on sample characteristics and study design, the DTS has generally demonstrated acceptable internal consistency.

In our study, the test-retest reliability of the DTS was assessed using various statistical and graphical approaches, including Spearman's correlation coefficients, ICC values, and Bland-Altman plots. The ICC values for the subscales and the GDT factor of the DTS ranged from 0.703 to 0.839, indicating moderate to good test-retest reliability. Simons and Gaher reported good test-retest reliability for the second-order scale of the DTS over a six-month period, with an ICC value of 0.61 (1). In our study, Spearman correlation coefficient values between the two evaluations conducted at two-week intervals ranged from 0.70 to 0.85. Leu and Yeung, on the other hand, found the stability of the scale to be moderate at follow-up over a six-month interval (r=0.31-0.48) (15). This difference may be related to the variation in the time intervals used in studies assessing test-retest reliability. Consequently, based on the Spearman correlation coefficients, ICC values, and Bland-Altman plots for each subdimension, we can assert that the DTS is both reproducible and consistent over time.

This study has some limitations. First, the sample was limited to children and adolescents from a psychiatry outpatient clinic, which may affect the generalizability of the findings to non-clinical populations. Additionally, since the scales used to examine convergent validity were only validated for ages 10–17, DTS could not be evaluated in younger children. Future studies should address this age group. The cross-sectional design also prevents causal inferences. Test-retest reliability was evaluated in a limited portion of the sample (n=39), restricting conclusions regarding temporal stability. Finally, the diagnostic heterogeneity of the sample may have influenced DTS scores, as varying levels of internalizing and externalizing symptoms could contribute to differences in distress tolerance. Prior longitudinal research indicates that distress tolerance shows distinct associations with anxiety, attention-deficit/hyperactivity disorder, and oppositional defiant disorder symptoms (31). This diversity should be taken into account when interpreting the current findings.

CONCLUSION

The findings of this research suggest that the Turkish version of the DTS is a valid and reliable tool for evaluating distress tolerance in clinically referred Turkish children and adolescents aged 10 to 17 years. The scale demonstrated acceptable psychometric properties and may serve as a valuable instrument for both clinical assessment and research in child and adolescent mental health settings. Future studies are encouraged to replicate these findings in community samples and younger age groups, as well as to investigate the predictive value of distress tolerance in various psychological outcomes.

Ethical Approval: The Ankara Bilkent City Hospital Ethics Committee granted approval for this study (date: 27.11.2024, number: TABED-2-24-443).

Informed Consent: Informed consent was obtained from all participants.

Conflict of Interest: The authors declare that they have no conflict of interest.

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	Data acquisition	B.N.T.K., M.O.
	Data analysis/Interpretation	M.O., H.A.
Category 2	Drafting manuscript	M.O., B.N.T.K., H.A., K.A.B.
	Critical revision of manuscript	G.S.D., E.C.
Category 3	Final approval and accountability	M.O., B.N.T.K., H.A., K.A.B., G.S.D., E.C.
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RESEARCH ARTICLE

Effects of transcranial direct current stimulation on inhibition-related oscillatory brain activity during an emotional antisaccade task

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ABSTRACT

Objective: Previous studies have shown that transcranial direct current stimulation (tDCS) applied to the dorsolateral prefrontal cortex (dlPFC) can enhance attentional performance and influence emotional processing. However, the neural mechanisms underlying these effects are not fully understood. This study aimed to investigate oscillatory changes following tDCS over the dlPFC, with the hypothesis that anodal stimulation of the right dlPFC would modulate inhibition-related oscillations in the presence of threatening faces compared with left dlPFC stimulation.

Method: Thirty-six healthy participants underwent bilateral tDCS to the dlPFC. One group received anodal tDCS to the right dlPFC and cathodal to the left dlPFC, while the second group received the opposite montage. A control group received sham stimulation. Before and after stimulation, behavioral performance and event-related theta oscillations were recorded during an antisaccade task involving neutral and angry faces.

Results: Compared to the left-dlPFC group, the right-dlPFC group showed lower theta responses at F3 after anodal stimulation, particularly during antisaccade trials with angry faces, which are known to impose higher inhibitory demands due to threat salience. No group differences were found in saccade latencies. These findings suggest that anodal right dlPFC stimulation modulates oscillatory activity related to inhibitory control under emotionally salient conditions.

Conclusion: A decrease in theta oscillations following anodal tDCS over the right dlPFC may indicate enhanced inhibitory control during the processing of threatening stimuli. These results point to a potential role of dlPFC-targeted tDCS in regulating cognitive control and emotional processing, particularly in individuals with difficulties in these domains. However, the directionality and causality of these effects cannot be conclusively established due to limitations of the current study design.

Keywords: Antisaccade, event-related oscillations, theta band, transcranial direct current stimulation

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INTRODUCTION

The antisaccade task is a cognitive task used to assess inhibitory control by suppressing reflexive eye movements and initiating voluntary movements in the opposite direction (1). This process engages brain regions such as the frontal eye fields (FEF), the dorsolateral prefrontal cortex (dlPFC), the superior colliculus, and the basal ganglia (2, 3). Modified versions, such as the emotional antisaccade task, use emotionally valenced stimuli (e.g., angry faces), which reduce reaction times compared to neutral faces, suggesting heightened arousal and attentional engagement (4). Angry faces were selected in this study due to their well-documented capacity to rapidly capture and sustain attention and their increased salience in peripheral vision, which imposes greater demands on inhibitory control mechanisms in antisaccade tasks (5–7).

This study investigated whether transcranial direct current stimulation (tDCS) targets and modulates dlPFC excitability, a critical region for inhibitory control and cognitive functions. The dlPFC plays a key role in inhibiting reflexive saccades toward visual stimuli and facilitating antisaccade execution. Lesions or disruptions to the dlPFC impair antisaccade performance, highlighting its essential inhibitory role (8). The dlPFC directly inhibits saccade initiation via modulation of the superior colliculus and is crucial for suppressing reflexive saccades. While the basal ganglia and thalamus contribute to this control, their roles are considered secondary. Notably, the right dlPFC is particularly implicated in emotion-related cognitive control, exerting top-down regulation over limbic regions such as the amygdala during threat processing (e.g., angry faces) and facilitating attentional disengagement from emotionally salient stimuli (9, 10). A systematic review summarizing 26 studies combining tDCS and eye-tracking demonstrated that tDCS, particularly when targeting prefrontal regions, can modulate oculomotor behaviors and related cognitive and emotional processes across both healthy and clinical populations (11). Despite growing interest in tDCS, studies specifically examining its effects on inhibitory control at the neural and behavioral levels while considering emotional valence remain scarce in the literature. By addressing this gap, the current study has the potential to offer novel insights into the neurocognitive underpinnings of executive function and inform the development of more targeted, evidence-based interventions for both clinical and non-clinical populations.

A growing body of literature investigates correlates of inhibitory control during the antisaccade task, with particular focus on event-related potentials (ERPs) (12, 13). Components such as the N200 and P300 are linked to cognitive mechanisms underlying response inhibition and error detection (14), both critical for antisaccade performance. Research suggests that tDCS targeting the left dlPFC can enhance reaction times and modulate ERP responses, with studies showing that tDCS increases P300 amplitude, an ERP marker associated with selective attention, conflict monitoring, and response inhibition, particularly in cognitive control tasks such as the Flanker task (15).

Beyond ERPs, oscillatory dynamics—particularly in the theta range (4–7 Hz)—play a crucial role in cognitive control, including antisaccade inhibition mechanisms. Frontal midline theta activity, associated with top-down executive control, increases during response inhibition, error monitoring, and conflict resolution (16, 17). While beta and alpha oscillations have also been linked to antisaccade performance (18), van Noordt et al. (19) showed that medial frontal theta activity increases during response preparation and enhances post-error, suggesting theta's role in both proactive and reactive control. Although tDCS modulates theta activity in cognitive control paradigms (20, 21), its role in antisaccade inhibition remains underexplored. Examining theta activity in emotional antisaccade tasks may reveal neural mechanisms of inhibition and cognitive-emotion interactions, complementing ERP research.

In summary, the antisaccade task is a robust measure of dlPFC function, with event-related oscillations (EROs) providing insights into its electrophysiological underpinnings. tDCS over the dlPFC can enhance inhibitory control by modulating neural circuits. This study explores oscillatory brain activity changes during an emotional antisaccade task following tDCS to the dlPFC, particularly examining the influence of emotional valence (angry faces) on inhibitory control. It builds on existing research linking the dlPFC to cognitive control and its interaction with emotion (3, 8). By analyzing theta oscillations, this study aims to deepen understanding of inhibitory control (16, 17, 19) and contribute to targeted interventions for inhibitory dysfunction. We hypothesize that anodal tDCS over the right dlPFC will more effectively modulate inhibition-related theta oscillatory activity, particularly in response to threatening (angry) faces, compared to neutral faces and to anodal tDCS over the left dlPFC or the sham condition.

METHODS

Participants

This study employed a randomized, placebo-controlled design in which 36 healthy individuals aged between 20 and 40 years (23 women; mean age=23.3, standard deviation [SD]=4.4 years) were assigned to one of three groups using a computer-generated, permutation-based randomization procedure: (1) right anodal/left cathodal tDCS targeting the right dlPFC (n=11; four women, mean age=24, SD=1.7 years), (2) left anodal/right cathodal tDCS targeting the left dlPFC (n=10; eight women, mean age=22, SD=0.3 years), or (3) sham stimulation (n=15; 11 women, mean age=23.6, SD=1.2 years). All participants were recruited through online advertisements and university bulletin boards. Exclusion criteria included a history of psychiatric or neurological disorders, self-reported current psychiatric or neurological conditions, use of medications (e.g., psychotropic drugs), left-handedness, and the presence of implanted medical devices (e.g., brain stimulators, pacemakers, shrapnel, or surgical clips) (22).

Emotional Antisaccade Task

Immediately before and after tDCS, participants completed an emotional antisaccade task. The task followed Ansari and Derakshan's design (23), using angry and neutral facial expressions as targets (24). The face images were selected from the Karolinska Directed Emotional Faces (KDEF) (24) database, with an equal number of five male and five female identities (cf. (25)). The task consisted of eight blocks, each with 40 trials, including two blocks per condition: angry antisaccade, neutral antisaccade, angry prosaccade, and neutral prosaccade. Following a practice session, the experiment began with one of the four block types and alternated throughout the session. The order of these blocks varied across participants to minimize order effects. Each trial began with a fixation cross presented for an intertrial interval (ITI) that was continuously jittered between 2600 and 3600 ms, with values randomly drawn from a uniform distribution on each trial. Participants were instructed to maintain their gaze on the fixation cross. After the fixation cross disappeared (with a 200 ms gap), a face (3.3°×6°) appeared 11° to the left or right of the center of the screen. On prosaccade blocks, participants were instructed to look at the face, while on antisaccade blocks, they were instructed to look away from the face to its mirror position on the screen as quickly as possible without directly gazing at it. The faces remained on the screen for 600 ms (Fig. 1).

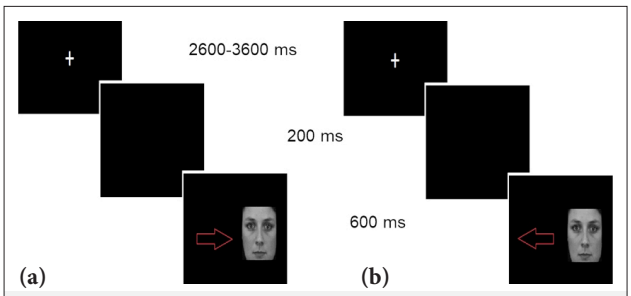

Figure 1. A schematic example of a prosaccade trial **(a)** and an antisaccade trial **(b)**.

tDCS Protocol

Thirty-six healthy participants received either 20 minutes of 2 mA active stimulation (11 with right anodal/left cathodal dlPFC stimulation and 10 with left anodal/right cathodal dlPFC stimulation) or sham stimulation (15 participants) using a bilateral montage. During stimulation, participants were instructed to sit quietly with their eyes open without performing any tasks. tDCS was delivered using a battery-powered direct current (DC) stimulator (NeuroConn, Ilmenau, Germany) and two saline-soaked rubber electrodes (5×7 cm), each covered with a 35 cm^2 sponge. Approximately 6 mL of saline solution was applied to each side of the sponge (front and back), totaling 12 mL per sponge. Electrode placement was determined using the BeamF3 online calculator (26), which incorporated individual head measurements (head circumference, nasion-inion distance, and tragus-tragus distance) based on the 10/20 electroencephalography (EEG) system. For active stimulation, the anode was placed over either the left dlPFC (F3) or the right dlPFC (F4), while the cathode was positioned over the corresponding region in the contralateral hemisphere, following a consistent montage across participants. The 5 cm edge of the sponge was oriented parallel to the ear, while the 7 cm edge was oriented parallel to the forehead. Before placement, hair at the electrode sites was parted to ensure optimal electrode-scalp contact. Two elastic straps secured the electrodes, maintaining impedance below 5 kΩ throughout the session. In the sham condition, electrodes were placed identically (F3 for half of the participants and F4 for the other half), but the current was ramped up to 2.0 mA and then ramped down at the beginning and end of the stimulation period to maintain participant blinding. The antisaccade task was administered both before and after tDCS while the EEG cap remained in place, with a consistent interval of no more than five minutes between tDCS completion and post-stimulation testing.

EEG Data Acquisition and Preprocessing

The EEG recordings were conducted in a quiet, dark room at the Neurotechnology and Bioinformatics Laboratory, Uskudar University. Data were recorded using the international 10–20 system with 30 Ag–AgCl active electrodes fixed to an elastic cap (Brain Products, Munich, Germany). The left mastoid served as the offline reference, and the ground electrode was placed at the medial frontal site. Eye movements were tracked using two electrodes placed around the right eye. Signals were amplified using the actiCHamp Plus system (0.1–250 Hz bandpass filter, 500 Hz sampling rate). Stimuli were displayed on a monitor positioned 50 cm from participants, with one computer controlling presentation and another dedicated to EEG recording.

Saccade latencies (SLs) were computed from the difference between the left and right horizontal electrooculogram (HEOG) signals. Saccades were identified as peaks, with those exceeding 50 μV in the expected direction (polarity) classified as valid. SLs with durations shorter than 80 ms or longer than 500 ms were excluded (23).

EEG preprocessing and oscillatory analysis were performed using BrainVision Analyzer (v2.2.2.8298, available at https://www.brainproducts.com). Raw data were filtered with a 0.5–60 Hz bandpass and a 50 Hz notch filter. Data were re-referenced to the averaged mastoid electrodes. Segments with prolonged artifacts were interpolated, and ocular artifacts were corrected using an ocular correction (classical regression-based algorithm, (27). Ocular correction was applied without time-range restrictions and conducted prior to segmentation. Data were segmented from -100 to+700 ms relative to each experimental condition. Fast muscle artifacts were removed using a semi-automated procedure; segments exceeding 50 μV/ms, 200 μV/200 ms, or showing <0.5 μV activity were excluded. Baseline correction was applied using a −100 ms pre-stimulus interval. Cleaned segments were averaged across the four conditions and extracted from nine electrodes (C3, C4, Cz, F3, F4, Fz, P3, P4, and Pz). Each participant's condition-specific averaged data was filtered in the theta band (4–7 Hz). The largest peak-to-peak difference (in microvolts) between 0 and 500 ms after the presentation of the faces was identified using the peak detection feature in BrainVision, and all detected peaks were then visually verified for accuracy. Finally, the event-related theta oscillatory responses for each experimental condition were analyzed and compared.

Questionnaires

The trait subscale of the State-Trait Anxiety Inventory (STAI-T) (28) was used to assess individual differences in baseline anxiety, which are known to influence cognitive control and emotional processing, both relevant to antisaccade task performance and potentially modulated by tDCS. The STAI-T comprises 20 self-report items rated on a four-point Likert scale (total scores 20-80), with seven reverse-scored items; higher scores indicate greater trait anxiety. The scale demonstrates strong internal consistency (α=0.89), and its Turkish adaptation (29) shows high psychometric quality (test-retest r=0.73). In this study, internal consistency was α=0.85.

The Attentional Control Scale (ACS) (30) includes 20 items assessing voluntary attentional control on a four-point scale, where higher scores reflect better control. The original version shows good reliability (α=0.88; test-retest r=0.61), and the Turkish adaptation (31) maintains acceptable consistency (α=0.78; item-total correlations 0.28-0.45). In the current study, reliability was α=0.80.

Procedure

Before the experiment, all participants were fully informed about the procedures and potential tDCS side effects before providing written consent. They performed the antisaccade task both before and immediately after tDCS, with reaction time, accuracy, and EEG data recorded to assess stimulation effects. After the session, participants were asked verbatim: "Do you think you received real tDCS stimulation?" All procedures were conducted at Uskudar University's Neurotechnology and Bioinformatics Laboratory in compliance with the Declaration of Helsinki ethical guidelines and were approved by the Uskudar University Clinical Research Ethics Committee (Approval No: 61351342/2017/04).

Statistical Analyses

Age, STAI-T, and ACS scores were compared among the three groups using one-way analysis of variance (ANOVA), while gender distribution was analyzed using a chi-square test. SLs and peak-to-peak amplitudes of event-related theta oscillations were calculated during the antisaccade task, which included neutral and angry face conditions. One participant from the right tDCS group was excluded from the behavioral analysis due to abnormally high SLs, identified as outliers relative to the group distribution. After excluding this participant from the right tDCS group, SLs were confirmed to be normally distributed across all conditions (Shapiro–

Table 1: Descriptives for the ACS and the Trait Subscale of The State-Trait Anxiety Inventory across groups

	Age		ACS		STAI-T	
	Mean	SD	Mean	SD	Mean	SD
Left tDCS	22	0.3	50.78	2.95	43	2.74
Right tDCS	24	1.7	52.75	2.86	38.88	1.86
Sham	23.6	1.2	55.67	1.48	41.93	2.05

ACS: Attentional Control Scale; STAI-TA: State-Trait Anxiety Inventory-Trait Subscale; tDCS: tDCS: Transcranial direct current stimulation; SD: Standard deviation.

Wilk test: all p>0.05). Therefore, results are reported as means and analyzed using parametric statistical tests. Mean SLs were analyzed using repeated-measures ANOVA. The within-subject factors included tDCS session (pre vs. post), face emotion (angry vs. neutral), and task condition (prosaccade vs. antisaccade), while the between-subject factor was group (left tDCS, right tDCS, or sham). Additionally, percent change scores were calculated using the following formula:

*((Pre-tDCS-Post-tDCS)/Post-tDCS)*100*.

Peak-to-peak amplitudes of EROs in the theta band were analyzed using repeated-measures ANOVA. Within-subject factors included electrode location (C3, C4, Cz, F3, F4, Fz, P3, P4, and Pz), tDCS session (pre vs. post), face emotion (angry vs. neutral), and task condition (prosaccade vs. antisaccade), while the between-subject factor was group (left tDCS, right tDCS, or sham). Subsequently, reduced repeated-measures ANOVA designs were employed to determine the source of the observed effects in terms of group and electrode location. To this end, separate post hoc ANOVAs were conducted for each electrode location, with within-subject factors including tDCS session (pre vs. post), face emotion (angry vs. neutral), and task condition (prosaccade vs. antisaccade), and the between-subject factor being group (left tDCS, right tDCS, or sham). The significance threshold was adjusted to p=0.006 (0.05/9) to correct for multiple comparisons.

Moreover, percent change scores were calculated for the three groups to evaluate the relative change in theta oscillatory responses between pre- and post-tDCS sessions, using the same formula as for the behavioral scores. Difference scores between prosaccade and antisaccade task conditions were then computed separately for angry and neutral faces and analyzed using one-way ANOVAs to determine which emotion or group contributed to the observed effect (corrected p=0.025 (0.05/2)). Finally, we explored potential correlations between SLs and significant theta oscillatory findings identified in the study, applying a Bonferroni-corrected significance threshold of p=0.0006.

RESULTS

No significant adverse events or unintended side effects were reported, and none of the participants realized they had received sham stimulation. For STAI-T (F(2.29)=0.88, p=0.43) and ACS (F(2.33)=1.83, p=0.18), the results indicate that the differences between groups were not statistically significant. In terms of age and gender, there were no statistically significant differences across the three groups (age: F(2.33)=0.64, p=0.53; gender: χ^2(2, N=36)=5.32, p=0.07). These results suggest that the groups were comparable in terms of age, gender, attentional control, and trait anxiety at baseline (Table 1).

Changes in Saccade Latencies

Descriptive statistics for antisaccade task SLs by condition are presented in Table 2.

A three-way repeated-measures ANOVA revealed significant main effects of tDCS session (pre vs. post) (F(1.32)=9.94, p=0.004) and congruency condition (antisaccade vs. prosaccade blocks) (F(1.32)=376.959, p=0.0001) on SLs. Participants exhibited slightly faster SLs following the tDCS session compared to pre-tDCS (mean SLs: 214.62±4.54 ms vs. 207.68±4.19 ms). Additionally, mean SLs were faster during prosaccade blocks, where participants were instructed to look at the faces, compared to antisaccade blocks, which required them to look away from the faces (170.35±3.31 ms vs. 251.95±5.79 ms). A significant interaction between emotion (angry vs. neutral) and tDCS session (pre vs. post) was also observed (F(1.32)=267.58, p<0.019). The mean change in SLs between pre- and post-tDCS sessions was significantly larger for neutral faces (216.04±4.79 ms vs. 207.1±4.17 ms) compared to angry faces (213.21±4.37 ms vs. 208.26±4.28 ms) (Fig. 1). In contrast, there was no significant tDCS session × group interaction (p>0.05).

Changes in Event-Related Oscillatory Responses

Peak-to-peak amplitudes of ERO in the theta band were analyzed using repeated-measures ANOVA. The results revealed a significant main effect of condition

Table 2: Summary of antisaccade task SLs by condition for three groups, pre- and post-tDCS

Condition	Group	Pre-tDCS		Post-tDCS	
		Mean	SD	Mean	SD
Prosaccade neutral	Left tDCS	181.62	30.52	167.83	28.20
	Right tDCS	168.29	8.40	166.39	11.48
	Sham	169.58	18.17	170.42	15.57
Prosaccade angry	Left tDCS	174.53	26.81	169.27	28.88
	Right tDCS	166.98	8.70	166.21	12.52
	Sham	172.16	23.26	170.89	15.50
Antisaccade neutral	Left tDCS	266.90	49.55	246.98	37.04
	Right tDCS	245.96	22.24	244.85	23.50
	Sham	263.85	41.55	246.13	37.06
Antisaccade angry	Left tDCS	258.55	43.42	246.60	36.93
	Right tDCS	247.61	23.05	244.24	27.24
	Sham	259.44	33.56	252.34	36.79

SLs: Saccade latencies; tDCS: Transcranial direct current stimulation; SD: Standard deviation.

(antisaccade vs. prosaccade blocks) ($F(1.33)=10.14$, $p=0.003$) and location ($F(8.264)=7.91$, $p=0.0001$) on theta oscillatory responses. Theta oscillatory responses were higher for all participants during prosaccade blocks, where participants were instructed to look at the faces, compared to antisaccade blocks, which required them to look away from the faces (4.665±0.196 vs. 4.156±0.16) (Fig. 2a). The group effect was marginally significant ($F(2.33)=2.94$, $p=0.06$). The right tDCS group showed the lowest theta oscillatory responses (left: 4.888±0.299>sham: 4.451±0.244>right: 3.893±0.285) (Fig. 2b).

Moreover, a significant interaction between electrode location, tDCS (pre vs. post), emotion (angry vs. neutral), condition (antisaccade vs. prosaccade), and group (left tDCS, right tDCS, or sham) was observed ($F(16.264)=2.83$, $p<0.007$). To further explore this interaction, follow-up ANOVAs were conducted. To examine the main effect of electrode location, each electrode group was analyzed separately. A significant interaction was observed exclusively at the F3 electrode ($F(2.33)=9.24$, $p=0.001$). When percentage change scores between pre- and post-tDCS sessions, as well as difference scores between prosaccade and antisaccade conditions, were evaluated across the three groups for the F3 electrode, the largest changes were observed in response to angry faces ($F(2.33)=4.21$, $p=0.024$) (Fig. 3). The Bonferroni post hoc test revealed that this effect was particularly prominent in the anodal tDCS over the right dlPFC group compared to the sham group ($p=0.02$) (Fig. 3b, also see Fig. 4 for difference scores in each condition).

Correlations

Potential correlations were examined between the significant theta oscillatory findings and SLs, as well as measures from the State-Trait Anxiety Inventory and the Attentional Control Scale. No significant correlations were observed between these scales and any of the identified behavioral or theta oscillatory effects.

DISCUSSION

The present study explored the effects of anodal tDCS over the dlPFC on EROs in the theta band during antisaccade tasks involving emotional face stimuli. Our findings indicated that anodal tDCS over the right dlPFC reduced theta oscillatory responses at frontal electrode sites (F3) compared to the sham group, with this effect being more pronounced in response to angry faces. These results highlight the significant role of the right dlPFC in regulating inhibitory control, particularly under emotionally salient conditions.

Theta Oscillations and Inhibitory Control

Theta oscillations are widely recognized as key neural markers of cognitive control, particularly response inhibition. The observed changes in theta oscillations following anodal tDCS over the right dlPFC align with prior research demonstrating increased activation in frontal regions, including the dlPFC, FEF, and supplementary motor area (SMA), during antisaccade tasks (32). Theta oscillations are linked to top-down cognitive control (16). Increased theta coupling between prefrontal and posterior regions during

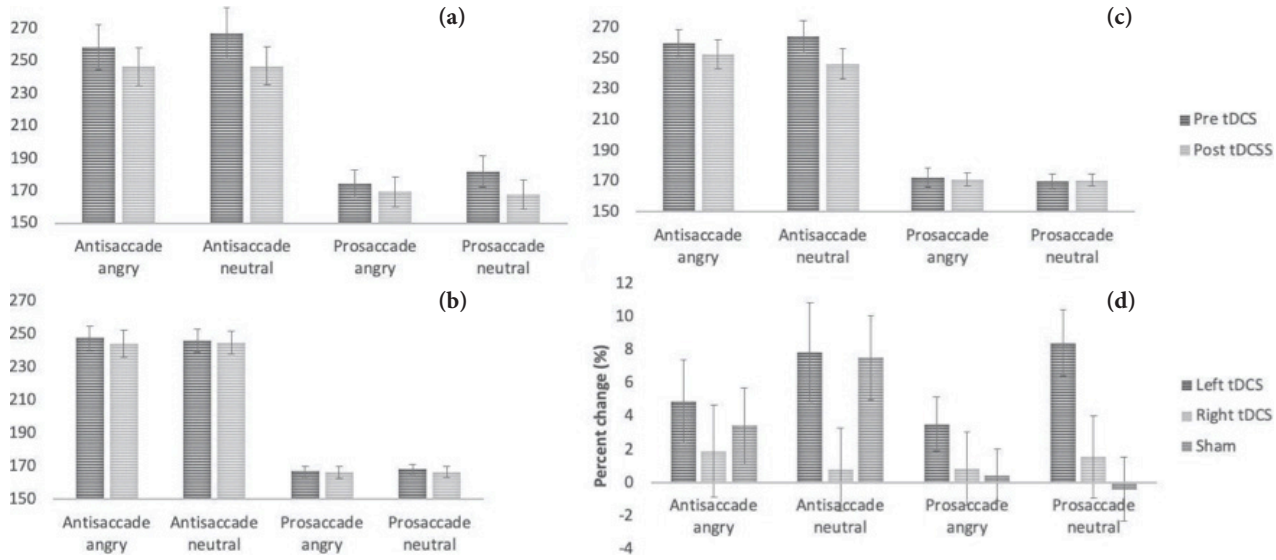

Figure 2. Panels a, b, and c display mean saccade latencies (SLs) (y-axis, in milliseconds) for the antisaccade task among participants receiving left transcranial direct current stimulation (tDCS) **(a)**, right tDCS **(b)**, and sham stimulation **(c)**. Each panel compares pre- and post-tDCS sessions (upper right legend), with separate bars for angry versus neutral face stimuli under both prosaccade and antisaccade conditions. Panel **d** presents the percentage change in SLs between pre- and post-tDCS applications for each group (bottom right legend). Error bars represent the condition-specific standard errors of the mean.

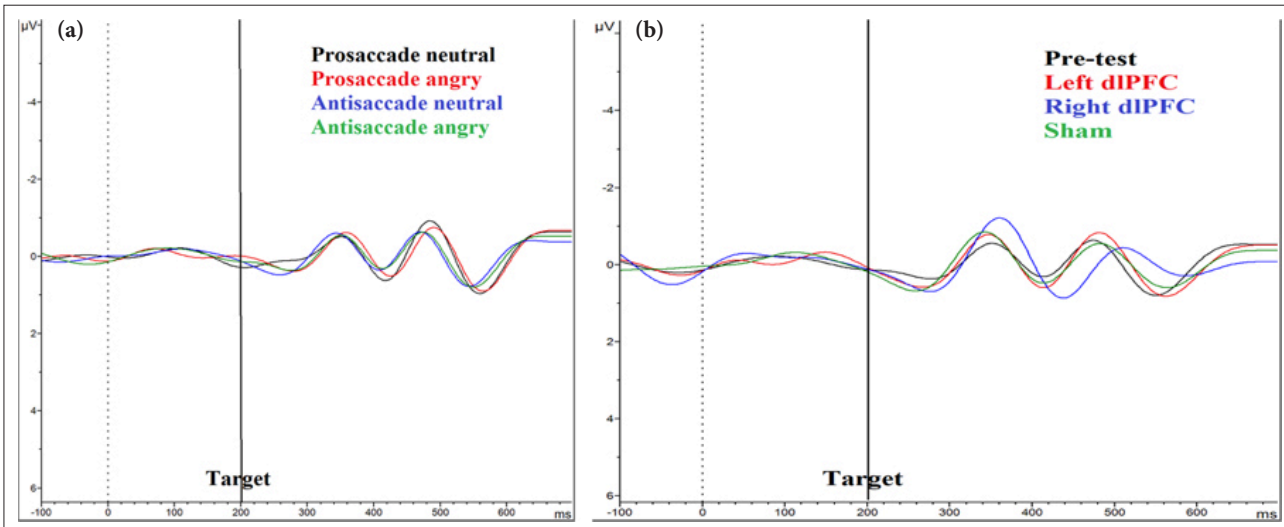

Figure 3. (Panel a) Grand-averaged event-related theta oscillations at the Fz electrode, pooled across all experimental conditions and participants during the pre-transcranial direct current stimulation (pre-tDCS) session. **(Panel b)** Grand average event-related theta oscillations in response to angry faces during antisaccade trials at the Fz electrode. The pre-tDCS line reflects the group average prior to stimulation, whereas the post-tDCS lines are shown separately for each group. The stimulus was presented at 200 ms.

task switching reflects increased cognitive control demands (33). Lower resting-state theta power has been associated with failures in response inhibition. Theta activity also increases with higher working memory load (34) and serves as a marker of motor inhibition, as evidenced by elevated frontal theta in No-Go trials (35).

Interestingly, our findings diverge from much of the existing literature, as we observed a decrease in theta EROs after antisaccade trials, precisely when cognitive control demands were heightened, particularly in response to angry faces. This contrasts with previous studies that typically report increased theta activity under conditions requiring greater inhibitory control,

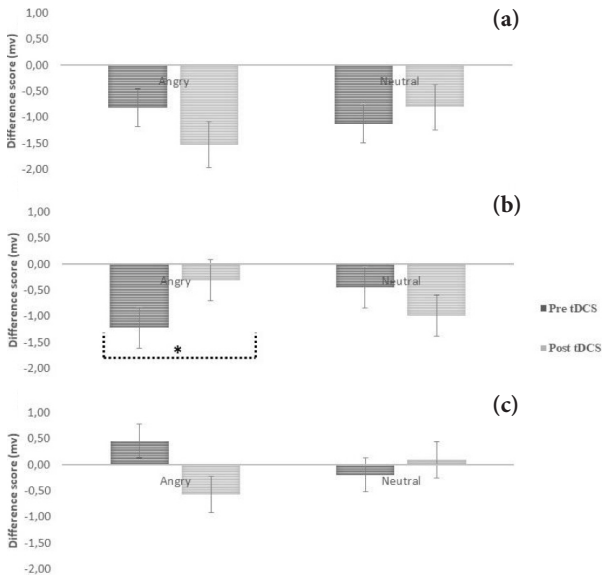

Figure 4. Difference scores for theta oscillatory responses were presented separately for the two emotional conditions by subtracting theta activity during prosaccade trials from that during antisaccade trials at the F3 electrode. These difference scores are presented for each transcranial direct current stimulation (tDCS) group before and after tDCS sessions: left tDCS **(a)**, right tDCS **(b)**, and sham **(c)**. Error bars represent the condition-specific standard errors of the mean.

suggesting that emotional valence may differentially modulate theta oscillatory dynamics in the context of response inhibition. On the other hand, this challenges the traditional view that theta oscillatory responses uniformly increase with cognitive effort. Notably, the relationship between theta oscillations and cognitive efficiency appears to follow a non-linear, inverted U-shaped pattern. Snipes et al. (36) demonstrated that moderate increases in theta power enhance cognitive performance, whereas excessive theta activity elevations due to cognitive overload or fatigue impair functional efficiency. In this context, the observed decrease in theta activity following anodal tDCS over the right dlPFC may reflect a shift toward optimized neural efficiency and resource allocation. This may indicate that tDCS helps streamline cognitive control processes, reducing the neural effort required to perform complex tasks such as the antisaccade paradigm.

Theta Oscillations and Emotional Processing

The heightened demand for inhibitory control aligns with prior research demonstrating increased activation in frontal regions, including the dlPFC, FEF, and SMA (26), as well as elevated theta power during antisaccade tasks (37). Furthermore, the greater theta activity observed in response to emotional faces (38) further supports the involvement of theta oscillations in regulating cognitive control under emotionally salient conditions. These findings reinforce the idea that emotionally charged stimuli necessitate stronger cognitive control mechanisms to override automatic responses, a process reflected in theta power modulation.

Furthermore, a network-based perspective from functional magnetic resonance imaging (fMRI) studies indicates that antisaccade trials show stronger functional connectivity between key regions, including the salience network, default mode network (DMN), frontoparietal network (FPN), and amygdala, compared to prosaccade trials. Additionally, angry facial expressions necessitate greater functional connectivity within the salience network, which likely facilitates the detection of emotionally relevant stimuli. The DMN may contribute to internal cognitive states, while the FPN is more involved in the cognitive control aspects of the antisaccade task. Increased engagement of the ventrolateral prefrontal cortex and orbital regions in response to angry faces suggests additional regulatory mechanisms involved in emotional inhibition and attentional reorientation (39), whereas happy faces predominantly recruit parieto-occipital, temporal, and cerebellar regions. These findings support the idea that emotionally salient stimuli, such as angry faces, demand greater cognitive resources and involve widespread neural recruitment for efficient inhibitory control and attentional modulation.

tDCS and Its Role in Inhibitory Control

Our results align with previous studies demonstrating the modulatory effects of tDCS on cognitive and emotional processing. Other studies have shown that anodal stimulation over the left dlPFC can increase theta power (40), whereas anodal stimulation over the right inferior frontal cortex has been associated with decreased theta amplitude at EEG recording sites during rest (41). These discrepancies highlight the importance of stimulation parameters and task demands in shaping tDCS effects on oscillatory dynamics.

We observed that anodal tDCS over the right dlPFC decreased theta oscillations on the left hemisphere (F3). Although we did not assess the effects of tDCS on functional connectivity, this result may reflect modulation of tDCS on interhemispheric connectivity. According to Zheng et al. (42), tDCS has a significant impact on interhemispheric connectivity; their study showed that applying anodal tDCS to the right inferior frontal gyrus (IFG) decreased interhemispheric connectivity between the right and left IFG.

The diminished theta activity observed post-tDCS in the right dlPFC group during antisaccade trials suggests that stimulation may reduce the need for compensatory cognitive control mechanisms. By enhancing functional connectivity and optimizing network efficiency, tDCS facilitates cognitive performance by shifting neural processing dynamics toward a more efficient state. This supports the potential application of tDCS as a non-invasive neuromodulatory tool for refining cognitive and emotional regulation processes.

tDCS over the right dlPFC enhances inhibitory control in antisaccade tasks by improving reaction times and reducing errors (43). However, findings remain mixed, likely due to variations in task complexity and individual differences (44). In our study, although tDCS modulated theta oscillatory activity, no significant behavioral effects on antisaccade accuracy were observed. This dissociation between neural and behavioral outcomes may suggest that EEG measures are more sensitive to subtle changes in cortical processing than overt behavioral performance, particularly in paradigms with high within-subject variability. It is important to explicitly acknowledge that EEG findings were not directly mirrored by behavioral effects. This may be due to the acute, relatively low-intensity (2 mA) stimulation. Higher intensities (≥2 mA) or repeated sessions may be needed to engage deeper cortical layers and induce longer-lasting neural plasticity (45). While the acute effects of brain stimulation have been observed in cortical areas, prolonging stimulation duration or incorporating repeated sessions could enhance learning-based plasticity, thereby increasing the likelihood of behavioral modulation. Moreover, individual differences, including baseline neurophysiological states and cognitive traits, likely contribute to variability in behavioral responses to noninvasive neuromodulation.

Limitations

Although all participants were presumed to be right-handed based on self-report, handedness was not formally assessed in this study. This represents a notable limitation, as individual differences in hemispheric dominance may influence the effects of lateralized tDCS stimulation. While participants did not use their hands to respond during the antisaccade task, hemispheric asymmetries related to handedness could still impact neural processing. Future studies employing lateralized neuromodulation protocols should include a standardized assessment of handedness to account for its potential influence on outcomes. Another limitation of the study is the absence of a structured diagnostic interview (e.g., Structured Clinical Interview for DSM; SCID). Although self-reported psychiatric or neurological conditions and past psychiatric/neurological history were used as exclusion criteria, formal clinical assessments were not conducted. Given that the study focused on healthy participants, structured interviews were not implemented; however, their inclusion would have strengthened the screening process. Additionally, the exclusive focus on angry facial expressions limits the generalizability of the findings to other emotional contexts. Moreover, the complexity of the 2×2×2×3 factorial design applied across nine electrode sites may have exceeded the statistical power provided by the available sample size, potentially limiting the interpretability of some effects even with Bonferroni correction. Although cluster-based permutation methods offer a powerful, data-driven approach for detecting spatiotemporal clusters of activity, they are less well suited for testing predefined interaction effects within complex factorial designs. A key limitation of the study is the absence of eye-tracking data; relying solely on EEG and behavioral measures to infer saccadic activity may limit the precision in capturing oculomotor dynamics such as saccade amplitude and velocity, which are more accurately measured using dedicated eye-tracking systems. This limitation may partly explain the lack of significant behavioral findings observed in the study. Additionally, the lack of effective connectivity analyses (e.g., Granger causality) limits insights into directional interactions between brain regions. Future studies should incorporate such methods to clarify the network-level effects of tDCS during emotional antisaccade tasks.

Implications and Future Directions

The present study contributes to the growing body of research on the neurophysiological underpinnings of cognitive control and the role of tDCS in modulating neural activity. Our results suggest that anodal tDCS over the right dlPFC may potentially, though speculatively, enhance inhibitory control by reducing theta oscillatory responses, particularly in the presence of threatening stimuli. The findings support the use of tDCS in modulating underlying neural oscillations to enhance inhibitory control, highlighting its potential as a valuable tool for cognitive and affective interventions. Future studies should explore the long-term effects of repeated tDCS sessions in larger samples, individual differences in tDCS responsiveness, and the potential translational applications of these findings in clinical populations, such as individuals with anxiety or impulse control disorders.

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	Data acquisition	B.S., Z.T., B.Sari
	Data analysis/Interpretation	B.S., Z.K., B.M., B.Sari
Category 2	Drafting manuscript	B.S., Z.K., Z.T., B.Sari
	Critical revision of manuscript	B.S., Z.K., Z.T., B.M., B.Sari
Category 3	Final approval and accountability	B.S., Z.K., Z.T., B.M., B.Sari
Other	Technical or material support	Z.K., B.Sari
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RESEARCH ARTICLE

Psychiatric correlates of child marriage before age 15: A case-control study from Turkiye

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ABSTRACT

Objective: Child marriage gives rise to a wide range of problems for young girls whose psychosocial development is incomplete at the time of marriage. The objective of this case-control study is to compare a sample of girls who married at an early age with two control groups (i.e., unmarried peer adolescents and adults who married after 18 years of age) in terms of sociodemographic characteristics and psychiatric diagnoses.

Method: A total of 120 female participants were included: the child marriage group (CM; n=40), adolescent peers (CG1; n=40), and adults married at ≥18 years (CG2; n=40). Psychiatric diagnoses were assessed using the Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL). Participants completed the Beck Depression Inventory, Brief Symptom Inventory, State-Trait Anxiety Inventory I-II, Coopersmith Self-Esteem Inventory, and Multidimensional Scale of Perceived Social Support.

Results: The CM group exhibited higher rates of lower parental education, lower family income, and a greater prevalence of extended/fragmented family structure compared with both control groups ($p<0.05$). The CM group also showed significantly higher rates of major depressive disorder (MDD) and post-traumatic stress disorder (PTSD) compared with CG1 ($p=0.022$; $p=0.012$) and CG2 ($p=0.004$; $p=0.012$). Postmarital suicide attempts were more prevalent in the CM group than in the CG2 group ($p=0.002$).

Conclusion: Child marriage was associated with lower socioeconomic and educational status, a higher prevalence of MDD and PTSD, lower self-esteem, lower perceived social support, and higher rates of suicidal behavior. These findings underscore the importance of preventive strategies, targeted mental health interventions, and strengthened social support systems for girls at risk of early marriage.

Keywords: Adolescent mental health, child marriage, early marriage, psychiatric disorder

INTRODUCTION

Child marriage, defined as marriage before the age of 18, remains a major global public health and human rights concern (1). It is regarded as both forced and premature, even in cases where it appears consensual, as children are not developmentally capable of fully comprehending the physical, emotional, and social

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consequences of marriage (2). Each year, more than 12 million girls marry before age 18; recent global estimates indicate that 19% of women aged 20–24 years were married before 18 and 4% before 15 (3). Approximately 650 million women and girls are currently living with the consequences of child marriage, with rates varying substantially across and within countries (4). The prevalence is particularly high in South Asia, Sub-Saharan Africa, and parts of the Middle East (3).

Under Turkish civil law, the legal marriage age for both men and women is 17, although under exceptional circumstances, marriage at 16 years may be permitted by judicial decision (5). In cases where one of the parties involved in marriage is under the age of 15, the marriage is considered a form of child abuse (6). Despite these legal frameworks, sociocultural norms in some regions of Turkiye sustain the practice (7). Based on the latest data from the Turkiye Demographic and Health Survey (2018), among women aged 25–49 years, 14.7% were married before the age of 18 and 2% before the age of 15 (8). In 1998, the same survey reported that 7.6% had been married before age 15, decreasing to 5.0%, 4.4%, and 4.0% in 2003, 2008, and 2013, respectively (8). Despite the declining prevalence of early marriage in Turkiye, it remains a prominent practice in certain regions.

Early marriage interrupts a critical period of childhood development and deprives children of fundamental rights such as living with their parents, freedom of expression, opportunities for play, and social interaction with peers (9). Entering marriage at a young age imposes adult responsibilities, including housekeeping and childcare, and often leads to school dropout, which in turn results in social isolation and reduced life satisfaction (10–12). Consequently, child marriage is associated with a high likelihood of severe mental health problems (2). While prior research has mainly focused on social, sexual, and reproductive outcomes, fewer studies have systematically examined the psychological impact of child marriage (13, 14). Existing literature has linked early marriage to depression, anxiety disorders, post-traumatic stress disorder (PTSD), suicidality, and diminished life satisfaction (15-17). Studies from diverse contexts—including the United States, Iran, Niger, and Ethiopia—demonstrate that women who married before 18 report higher rates of psychiatric disorders compared to those who married later (18-21). However, the majority of studies have relied on self-report questionnaires, lacked standardized diagnostic interviews, or did not include control groups. Moreover, the literature has focused more extensively on marriages under the age of 18 than on those under the age of 15, despite the fact that the latter may potentially result in more substantial challenges.

The present study aims to address these gaps by comparing girls married before age 15 with unmarried adolescent peers and adult women married at or after 18 years, in terms of sociodemographic characteristics and psychiatric disorders, using structured interviews and standardized psychometric tools. We hypothesize that (i) girls married before the age of 15 will have significantly higher rates of psychiatric disorders compared to both control groups; and (ii) sociodemographic risk factors such as parental education and low socioeconomic status will differentiate the early marriage group.

METHODS

Participants

This cross-sectional case-control study was conducted at Gaziantep Cengiz Gokcek Maternity and Children's Hospital, a tertiary referral center that also receives judicial referrals of underage marriage cases for forensic psychiatric evaluation. Data collection was conducted between January 2013 and December 2014.

The study was designed with three groups (n=40 each) to allow comparisons addressing the primary aim—characterizing the sociodemographic and psychiatric profile of girls married before age 15—against both adolescent and adult controls. The child marriage group (CM group) comprised girls who had married before the age of 15 and were under 18 years old at the time of psychiatric evaluation; all were referred for forensic psychiatric assessment following a legal notice regarding underage marriage. The first control group (CG1) included healthy adolescent volunteers aged 15–18 years who were unmarried and recruited from patients attending the same hospital for routine medical examinations. The second control group (CG2) consisted of healthy adult women aged 18 years or older who had married at or after the legal age, also recruited from patients visiting the hospital for routine medical examinations. Participants were included in the study if they met the age and marital status criteria for their respective group, volunteered to participate, and were able to complete the assessment tools. Individuals were excluded if they

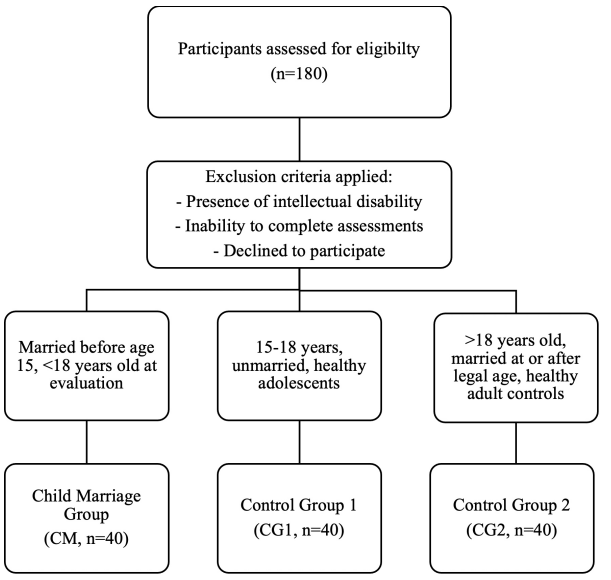

Figure 1. Flow diagram of participant selection.

had an intellectual disability, a psychotic disorder, a current manic episode, or an inability to complete the measures due to literacy or language barriers. Figure 1 shows the flow diagram of participant selection.

Procedure

This study was approved by the Ethics Committee of Gaziantep University (Approval number: 255, date 04.06.2012), in accordance with the Declaration of Helsinki. All participants, and, for those under 18 years of age, their parents or legal guardians, provided written informed consent prior to participation.

Participants in the child marriage group were referred to the hospital by judicial authorities following a legal notice regarding underage marriage. These cases were evaluated in the Child and Adolescent Psychiatry Outpatient Clinic as part of a forensic assessment process. Control groups were recruited from female patients attending the same hospital for routine medical examinations to ensure similar sociodemographic characteristics. All diagnostic interviews were conducted face-to-face by a child and adolescent psychiatry fellow (MD) trained in structured diagnostic assessments, under the supervision of a board-certified child and adolescent psychiatrist.

Each participant first completed a sociodemographic data form, after which they underwent a detailed psychiatric evaluation. For the child marriage group (CM) and adolescent peers (CG1), psychiatric diagnoses were established using the Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL). The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) version was used, as data collection was conducted before the Turkish validation of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) version became available. Although the K-SADS-PL is originally validated for ages 6–18, it was also administered to the adult control group (CG2) with minor wording adaptations to ensure methodological consistency and comparability of diagnostic assessment across all study groups.

Following the diagnostic interview, all participants completed the Beck Depression Inventory (BDI), Brief Symptom Inventory (BSI), State-Trait Anxiety Inventory I-II (STAI-I/II), Coopersmith Self-Esteem Inventory (CSEI), and Multidimensional Scale of Perceived Social Support (MSPSS). The age validity ranges of these instruments were confirmed based on Turkish adaptation studies. In instances where measures were used outside their original validated age range (e.g., CSEI in CG2), their use was justified to ensure comparability across groups.

Measures

Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL)

The K-SADS-PL is a semi-structured diagnostic interview designed to assess current and past psychiatric disorders in children and adolescents aged 6–18 years, based on DSM criteria (22). The Turkish reliability and validity study was conducted by Gokler et al. (23).

Beck Depression Inventory (BDI)

The BDI is a 21-item self-report measure that assesses the severity of depressive symptoms (24). Total scores range from 0 to 63, with symptom intensity categorized as follows: normal (0–9), mild (10–15), mild to moderate (16–19), moderate to severe (20–29), and severe (30–63). The Turkish validity and reliability study was conducted by Hisli (25).

Brief Symptom Inventory (BSI)

The BSI is a self-report instrument developed to assess a broad range of psychological symptoms across nine subscales (26). The Turkish adaptation was validated by Sahin et al. (27). The BSI was formulated through studies conducted using the Symptom Checklist-90-R. A modified version of the original

Table 1: Sociodemographic characteristics of the CM group and control groups (CG1, CG2)

Variables	CM group (n=40)	CG1 (n=40)	CG2 (n=40)	p	
				CM vs. CG1	CM vs. CG2
Age, years (Mean±SD)	15.72±0.90	16.03±1.10	22.37±1.87	0.182	**<0.001**
Education level, n (%)				**<0.001**	**<0.001**
Illiterate	27 (67.5)	0 (0)	1 (2.5)		
Compulsory education	11 (27.5)	4 (10.0)	13 (32.5)		
Further education	2 (5.0)	36 (90.0)	26 (65.0)		
Mother's education, n (%)				**<0.001**	**<0.001**
Illiterate	29 (72.5)	5 (12.5)	16 (40.0)		
Compulsory education	11 (27.5)	17 (42.5)	9 (22.5)		
Further education	0 (0)	18 (45.0)	15 (37.5)		
Father's education, n (%)				**<0.001**	**<0.001**
Illiterate	11 (27.5)	2 (5.0)	9 (22.5)		
Compulsory education	25 (67.5)	16 (40.0)	10 (25.0)		
Further education	4 (10.0)	22 (55.0)	21 (52.5)		
Family type, n (%)				**0.001**	**0.001**
Nuclear family	19 (47.5)	34 (85.0)	30 (75.0)		
Extended family	9 (22.5)	4 (10.0)	10 (25.0)		
Fragmented family	12 (30.0)	2 (5.0)	0 (0)		
Family income, n (%)				**<0.001**	**0.018**
Minimum wage or below	35 (87.5)	14 (35.0)	26 (65.0)		
Above minimum wage	5 (12.5)	26 (65.0)	14 (35.0)		

Bold indicates statistical significance (p<0.05). CM: Child marriage; CG1: Control group 1 (healthy adolescents); CG2: Control group 2 (healthy women married after age 18); SD: Standard deviation.

scale was employed, consisting of 21 items (21). The scale comprises nine subscales and global indices. The nine subscales include somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, and additional items; the three global indices are the Global Severity Index (GSI), the Positive Symptom Distress Index (PSDI), and the Positive Symptom Total (PST).

State-Trait Anxiety Inventory I-II (STAI-I/II)

The STAI consists of two 20-item self-report scales measuring state anxiety (STAI-I) and trait anxiety (STAI-II) (28). The reliability and validity of the Turkish version were tested and verified (29). While the scale is primarily recommended for individuals above the age of 14, it can be used with individuals whose literacy skills are above the middle school level. The total score for both scales ranges from 20 to 80, with a threshold score of 45. Higher scores on the scale indicate a greater degree of anxiety.

Coopersmith Self-Esteem Inventory (CSEI)

The Coopersmith Self-Esteem Inventory, developed by Stanley Coopersmith in 1967, is a scale designed to evaluate attitudes toward the self in different domains (30). The reliability and validity of the 25-item short version of the scale in Turkish were confirmed by Piskin (31). Higher scores are associated with greater self-esteem.

Multidimensional Scale of Perceived Social Support (MSPSS)

This brief scale is designed to assess the perceived sufficiency of social support. It was adapted from three different sources and aims to evaluate perceived social support through relationships with family, friends, and significant others. The total score is determined by summing all subscale scores. Higher scores on the scale indicate a greater perception of social support (32). Reliability and validity analyses of the Turkish version of the scale were performed for the 12–22 age group (33).

Table 2: Clinical psychiatric characteristics of the CM group and control groups (CG1, CG2)

Variables	CM group (n=40) n (%)	CG1 (n=40) n (%)	CG2 (n=40) n (%)	p	
				CM vs. CG1	CM vs. CG2
Psychiatric disorders (any)	20 (50)	20 (50)	23 (57.5)	0.501[2]	1.000[2]
Major depressive disorder	15 (37.5)	4 (10.0)	6 (15.0)	**0.022**[2]	**0.004**[2]
Bipolar disorder	0 (0)	0 (0)	0 (0)	NA	NA
Anxiety disorders	16 (40)	16 (40)	19 (47.5)	0.499[2]	1.000[2]
PTSD	7 (17.5)	0 (0)	0 (0)	**0.012**[1]	**0.012**[1]
Psychotic disorders	0 (0)	0 (0)	0 (0)	NA	NA
OCD	2 (5)	4 (10)	3 (7.5)	1.000[1]	0.675[1]
Eating disorders	1 (2.5)	0 (0)	0 (0)	1.000[1]	1.000[1]
ADHD	2 (5)	1 (2.5)	1 (2.5)	1.000[1]	1.000[1]
Elimination disorders	3 (7.5)	0 (0)	3 (7.5)	1.000[1]	**0.241**[1]
Tic disorders	0 (0)	0 (0)	1 (2.5)	1.000[1]	NA

Bold indicates statistical significance (p<0.05). [1]Fisher's Exact Test; [2]Chi-square Test. CM: Child marriage; CG1: Control group 1 (healthy adolescents); CG2: Control group 2 (healthy women married after age 18); PTSD: Post-traumatic stress disorder; OCD: Obsessive-compulsive disorder; ADHD: Attention-deficit/hyperactivity disorder; NA: Not applicable.

Statistical Analysis

SPSS for Windows version 22.0 was used to perform statistical analyses. Percentages, means, and standard deviations for each scale were calculated as the main statistics. The Shapiro–Wilk test was conducted to assess the normality of the data. For mean comparisons, a t-test (vs. Mann–Whitney U test) was used when the data were normally (vs. non-normally) distributed. Correlations for normally distributed data were computed using the Pearson correlation coefficient. The values were not adjusted for multiple testing, and the statistical significance level was set at p<0.05.

RESULTS

A total of 120 participants were included (n=40 per group). Mean ages were 15.72±0.90 (CM), 16.03±1.10 (CG1), and 22.37±1.87 (CG2). Within the CM group, 15% of the participants were illiterate, 27.5% had completed primary school, 52.5% had dropped out of primary school, and 5% had dropped out of high school. In CG1, 25% of the participants were high school graduates, while the remaining 75% were currently enrolled in high school. In CG2, 32.5% had completed primary school, 32.5% had dropped out of high school, and 32.5% were high school graduates. The CM group had significantly higher rates of parental illiteracy compared with both control groups (maternal illiteracy: 72.5% [n=29]; paternal illiteracy: 27.5% [n=11]; p<0.05). Sociodemographic characteristics of the participants are presented in Table 1.

Psychiatric diagnoses assessed by the K-SADS-PL for the CM and control groups are presented in Table 2. The CM group had significantly higher rates of major depressive disorder (MDD) (p=0.022) and PTSD (p=0.012) compared with adolescent peers, with no significant differences observed for other disorders. Compared with CG2, the CM group also showed a significantly higher prevalence of MDD (p=0.004) and PTSD (p=0.012), while other diagnoses were similar between the groups. Furthermore, suicide attempts were more prevalent in the CM group, with 10% (n=4) occurring before marriage and 22.5% (n=9) after marriage, compared with 5% (n=2) and 0% in CG2, respectively; postmarital suicide attempts were significantly higher in the CM group than in CG2 (p=0.002). Suicidality characteristics, including suicidal ideation and suicide attempts before and after marriage, are presented in Table 3.

Finally, scale score comparisons revealed that the CM group had significantly higher Beck Depression Inventory scores (z=-2.732, p=0.006) and lower Coopersmith Self-Esteem Inventory scores (z=-2.030, p=0.042) compared with CG2. Furthermore, the CM group exhibited lower Multidimensional Scale of Perceived Social Support total scores, as well as diminished scores on the "friends" and "significant others" subscales, compared with both CG1 (t=-3.039, p=0.003) and CG2 (t=-4.607, p<0.001). Scale score comparisons for all groups are presented in Table 4.

Table 3: Suicidality characteristics of the CM group and control groups (CG1, CG2)

Variables	CM group (n=40) n (%)	CG1 (n=40) n (%)	CG2 (n=40) n (%)	p	
				CM vs. CG1	CM vs. CG2
Suicidal ideation during evaluation				**0.003**	**0.013**
No	29 (72.5)	39 (97.5)	38 (95.0)		
Yes	11 (27.5)	1 (2.5)	2 (5.0)		
Premarital suicide attempt				0.116	0.675
No	36 (90.0)	40 (100.0)	38 (95.0)		
Yes	4 (10.0)	0 (0)	2 (5.0)		
Postmarital suicide attempt					
No	31 (77.5)	–	40 (100.0)		**0.002**
Yes	9 (22.5)	–	0 (0)		

Bold indicates statistical significance (p<0.05). CM: Child marriage; CG1: Control group 1 (healthy adolescents); CG2: Control group 2 (healthy women married after age 18).

Table 4: Psychometric scale scores in the CM group and control groups (CG1, CG2)

Variables	CM group (n=40)	CG1 (n=40)	CG2 (n=40)	p	
				CM vs. CG1	CM vs. CG2
BDI	16.00 (5.00–28.00)	12.50 (8.00–22.75)	7.00 (2.50–13.00)	0.859*	**0.006***
CSEI	60 (42.50–73.75)	62.00 (56.00–71.00)	68.00 (61.00–75.00)	0.377*	**0.042***
STAI-1	43 (28.50–56.25)	43.00 (29.25–51.00)	40.00 (32.75–47.00)	0.394*	0.220*
STAI-2	46.6±12.14	45.37±9.79	44.41±7.03	0.621**	**0.036****
BSI					
Depression	5.50 (2.25–12.00)	3.50 (1.00–7.50)	3.50 (1.00–7.50)	0.885*	**0.031***
Anxiety	4.00 (2.00–15.00)	3.00 (1.00–8.50)	3.00 (1.00–8.50)	0.779*	0.078*
Psychoticism	3.00 (1.00–8.00)	2.00 (0.00–6.75)	2.00 (0.00–6.75)	0.147*	0.349*
Somatization	5.00 (2.00–10.75)	5.00 (1.00–6.00)	5.00 (1.00–6.00)	0.791*	0.238*
Obsessive-compulsive disorder	5.00 (2.00–13.00)	5.50 (2.00–11.00)	5.50 (2.00–11.00)	0.059*	0.661*
Interpersonal sensitivity	5.00 (2.00–10.75)	4.00 (2.00–10.50)	4.00 (2.00–10.50)	0.776*	0.584*
Hostility	4.00 (1.00–9.00)	4.00 (1.00–6.00)	4.00 (1.00–6.00)	0.242*	0.643*
Phobic anxiety	4.00 (1.25–7.75)	2.00 (0.25–4.75)	2.00 (0.25–4.75)	0.688*	0.100*
Paranoid ideation	5.50 (2.00–11.00)	6.00 (1.25–11.75)	6.00 (1.25–11.75)	0.802*	0.927*
Additional items	4.00 (2.00–10.00)	1.00 (0.00–6.00)	1.00 (0.00–6.00)	0.442**	**0.012****
Global Severity Index	29.00 (14.24–42.75)	25.00 (11.25–32.00)	25.00 (11.25–32.00)	0.348*	0.238*
MSPSS total score	42.03±15.53	53.22±16.70	59.80±17.20	**0.003****	**<0.001****
Family support	20.00 (16.50–26.00)	27.00 (20.00–28.00)	27.00 (20.00–28.00)	0.146*	**0.003***
Friends support	9.00 (4.00–18.00)	20.00 (12.00–26.00)	20.00 (12.00–26.00)	**<0.001***	**0.001***
Significant other support	6.00 (4.00–14.50)	16.00 (13.00–27.00)	16.00 (13.00–27.00)	**0.001***	**<0.001***

Data are presented as median (IQR) or mean±SD (standard deviation), as appropriate. Bold indicates statistical significance (p<0.05). *: Mann–Whitney U test; **: Independent t–test. CM: Child marriage; BDI: Beck Depression Inventory; CSEI: Coopersmith Self–Esteem Inventory; STAI: State–Trait Anxiety Inventory; BSI: Brief Symptom Inventory; MSPSS: Multidimensional Scale of Perceived Social Support.

DISCUSSION

Child marriage represents a major public health and human rights concern that requires preventive efforts (1). The findings of the present study indicate that the child marriage group faced a dual burden, consisting of increased psychiatric morbidity—including MDD, PTSD, and suicidality—as well as significant social disadvantages, reflected in disrupted education, lower family income, parental illiteracy, and less supportive family structures.

Socioeconomic disadvantage is a well-documented determinant of child marriage. Prior studies have shown that the likelihood of early marriage is more than twice as high among families living in poverty, where daughters are often perceived as an economic burden and marriage is viewed as a means to reduce financial responsibility (34). Low parental education has similarly been linked to increased risk, consistent with our observation that most mothers in the case group were illiterate and had never attended school (35). In addition, participants in the case group were more likely to come from fragmented or extended families, where economic hardship and limited resources may further facilitate early marriage. Comparable results have been reported in previous studies, which found a higher prevalence of child marriage among girls with less educated parents and identified multiple socioeconomic correlates, including welfare dependency, educational level, and place of residence (36, 37).

Marriage at an early age also implies the interruption and premature termination of schooling. In our study, all participants in the child marriage group dropped out of school before completing compulsory education. The low educational level of women functions both as a cause and as a consequence of child marriage (38). Prior research emphasizes a bidirectional relationship: lower parental and individual education increases the likelihood of early marriage, while child marriage itself restricts educational opportunities and perpetuates educational disadvantage (15). This cycle not only limits the educational attainment of affected girls but also perpetuates socioeconomic vulnerability across generations, transferring the risk of early marriage to their offspring. Due to the adverse consequences linked to early marriage, prevention efforts should monitor young girls whose schooling gets interrupted and support them in continuing their education. Several studies in the literature have pointed out that encouraging young girls to attend school, especially during secondary education, serves as a protective factor against early marriage (39, 40). Taken together, these findings emphasize the importance of improving access to education, supporting vulnerable families, and implementing awareness programs that target communities with low socioeconomic resources to prevent child marriage.

In addition to sociodemographic correlates, our study also examined psychiatric disorders in the child marriage group, revealing significant associations with trauma-related and affective disorders, as well as suicidal behaviors. The prevalence of PTSD was higher among participants in the child marriage group (17.5%) compared with both adolescent and adult controls. Studies have shown that the incidence of PTSD is higher among those who married without individual consent, lived with extended family after marriage, were exposed to physical and emotional violence from the husband, were not acquainted with the husband before marriage, or had an unemployed husband (e.g., military service, criminal conviction) (16). These findings are consistent with reports from South Asia and Sub-Saharan Africa, where child marriage has been linked to intimate partner violence and post-traumatic symptomatology (19, 20). Nevertheless, most participants in our study did not report marriage as traumatic to the extent of developing PTSD, reflecting the role of sociocultural norms in shaping perceptions of early marriage (34). In Turkiye, early marriage is often socially normalized and arranged by families; yet even in this normative context, premature separation from parents, marital conflict, and early sexual initiation can increase vulnerability to trauma-related psychopathology (7).

Within this framework, multiple and chronic traumas, such as taking on responsibilities for caring for a family, home, and children before being ready; experiencing unplanned and unintended pregnancies; having low social support; and facing economic difficulties are thought to result in MDD and adjustment disorder rather than PTSD. In line with this, our findings demonstrated higher rates of MDD, lower self-esteem, reduced social support, and more frequent suicide attempts in the child marriage group compared with controls. Self-report scales broadly aligned with the diagnostic findings: relative to control groups, girls married before 15 endorsed higher depressive symptoms on the BDI and lower scores on the CSEI. On the BSI, elevations were observed for the Depression subscale and Additional Items, whereas the Global Severity Index did not differ, suggesting a selective internalizing burden rather than pervasive psychopathology. These results are consistent with prior studies showing that child marriage is associated with increased vulnerability to internalizing disorders and trauma-related symptoms (9, 41). Given that psychiatric disorders emerging during adolescence can have lasting impacts into adulthood with significant functional impairment, interventions aimed at early detection and prevention of depressive symptoms in at-risk groups are critically needed.

Our results also indicate a higher prevalence of suicidal ideation in the child marriage group compared to both adolescent and adult controls. Importantly, while premarital suicide attempts were comparable with the adult group, postmarital attempts were significantly more frequent among the child marriage group, suggesting that stressors specific to early marriage contribute to increased suicide risk. Research has shown that the frequency of suicidal thoughts, plans, and acts in adolescents is greatly increased by the experience of psychological trauma (17, 42). Therefore, numerous studies in the literature have focused on the link between sexual abuse and suicidal behavior, but insufficient attention has been given to the relationship between suicidal behavior and child marriage. Our findings underscore the need to recognize child marriage as a contextual risk factor for suicidality and highlight the importance of implementing measures during legal procedures and psychiatric treatment to monitor and prevent suicidal behavior.

In terms of perceived social support, children who married at an early age reported receiving less support compared to adolescent peers and adults who married after the age of 18. Specifically, support from friends was notably lower in the case group, which may be related to obligations of living with in-laws, separation from peers due to interrupted schooling, and limited opportunities to maintain social networks (2). Prior research has shown that social support is a protective factor against the negative mental health consequences of child marriage (20). Although our study did not include a detailed statistical evaluation of these associations, the findings suggest that insufficient social support, together with broader sociodemographic vulnerabilities such as poverty and low educational attainment, may contribute to the psychological burden of early marriage. These interrelated factors likely interact, with disadvantage both increasing the risk of child marriage and compounding its adverse mental health effects. Taken together, these results underscore not only the importance of preventing child marriage but also the need to strengthen peer relationships, educational continuity, and social connectedness as protective factors for young girls' mental health.

The present study contributes to the limited literature by examining multiple aspects of the mental health correlates and risk factors associated with child marriage, using two distinct control groups (peer adolescents and adults married at or after 18 years of age) and semi-structured diagnostic interviews to assess psychiatric disorders. However, several limitations should be acknowledged. First, the cross-sectional design restricts the ability to make causal inferences. Second, the relatively small sample size may limit statistical power and the generalizability of the findings. Third, the involvement of legal procedures in recruiting participants for the child marriage group may have influenced their responses during psychiatric evaluation. Finally, some of the psychometric measures and the semi-structured interview used have established reliability and validity only for certain age ranges; although they were applied across all groups for comparability, this may have introduced measurement bias. Future research should employ larger, community-based samples and longitudinal designs to clarify temporal relationships and strengthen causal interpretations.

CONCLUSION

In conclusion, lower socioeconomic status, extended or fragmented family environments, lower parental education levels, and discontinuation of compulsory schooling were identified as factors associated with child marriage. The findings indicate that marriage at an early age is linked to a higher likelihood of developing major depressive disorder, post-traumatic stress disorder, and suicidal behavior. These results emphasize the importance of recognizing child marriage not only as a legal or social issue but also as a significant mental health concern, warranting early identification, targeted prevention strategies, and comprehensive psychosocial interventions for those affected.

Ethical Approval: The Gaziantep University Ethics Committee granted approval for this study (date: 04.06.2012, number: 255).

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RESEARCH ARTICLE

Validation and psychometric evaluation of the Turkish version of the Reward Deficiency Syndrome Questionnaire (RDSQ-29)

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ABSTRACT

Objective: This study aimed to assess the validity and reliability of the Turkish version of the Reward Deficiency Syndrome Questionnaire (RDSQ-29), a scale designed to measure characteristics associated with reward deficiency syndrome, including activity, risk-seeking behavior, lack of sexual dysfunction, and social concerns.

Method: A total of 481 participants completed the Turkish version of the RDSQ-29 along with related psychological scales. Confirmatory Factor Analysis was conducted to evaluate the scale's factor structure. A bifactor model, comprising one general factor and four specific factors, was tested for suitability. Model fit was assessed using χ^2, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR) indices. Internal consistency was measured with Cronbach's alpha, and test-retest reliability was evaluated at a two-week interval. Pearson correlation analyses were performed for criterion validity.

Results: The bifactor model demonstrated an acceptable fit ($\chi^2(362)=1396.31$, $p<0.001$, RMSEA=0.077, CFI=0.916, TLI=0.906, SRMR=0.072). Factor loadings for the general factor ranged between 0.044 and 0.851, while subscale loadings varied. Although some items (RDSQ-1, RDSQ-2, RDSQ-23, and RDSQ-27) showed low loadings, they were retained following consultation with the original developers. The total scale showed strong internal consistency ($\alpha=0.920$), with subscale values ranging from 0.671 to 0.813. Test-retest reliability was high for the total score ($r=0.884$) and subscales ($r=0.717$ to 0.887). Significant correlations with impulsivity and anxiety supported the scale's criterion validity. Gender differences were found, with women scoring lower on the total scale and the Lack of Sexual Satisfaction subscale, while men scored higher on the Social Concern and Risk-Seeking Behavior subscales.

Conclusion: The findings indicate that the Turkish RDSQ-29 is a valid and reliable tool for assessing reward deficiency syndrome and related traits, supporting its use in both clinical and research contexts.

Keywords: Validity, reliability, Reward Deficiency Syndrome Questionnaire-29

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INTRODUCTION

Reward Deficiency Syndrome (RDS) is a neurobiological framework proposing that various psychiatric disorders may arise from dysfunctions within the brain's reward circuitry, particularly disturbances in dopaminergic signaling pathways. RDS is characterized by reduced reward responsiveness and is frequently associated with genetic variations, such as the A1 allele of the dopamine D2 receptor (DRD2) gene, which is linked to diminished dopamine receptor density and impaired signaling efficiency (1–3). This neurobiological vulnerability may predispose individuals to impulsive, compulsive, and addictive behaviors, including substance use disorders, obesity, and other maladaptive reward-seeking tendencies (4, 5).

Psychiatric models of RDS emphasize the combined influence of genetic predispositions and environmental factors on neurobiological responses to reward stimuli. Individuals with dopamine-related polymorphisms may be more likely to engage in compensatory behaviors when faced with stress or reduced reward sensitivity, increasing the risk for psychiatric complications such as anxiety, depression, and post-traumatic stress disorder (6, 7). Neuroimaging research corroborates these associations by demonstrating reduced activation in reward-related brain regions—particularly the ventral striatum—during reward-cue and reward-anticipation tasks among individuals showing RDS-related characteristics (8, 9).

The significance of RDS lies in its broad interconnections with several psychiatric disorders. Conditions such as addiction, attention deficit hyperactivity disorder (ADHD), and mood disorders share symptom profiles that reflect underlying disruptions in reward processing. For instance, individuals with ADHD frequently display reward-related deficits that parallel those attributed to RDS, linking impulsivity and reward-seeking behaviors to common neurobiological mechanisms (10, 11). These conceptual overlaps have contributed to the development of related constructs—such as anhedonia, reward sensitivity, hedonic dysregulation, and impulsivity—while RDS remains distinct in its explicit emphasis on genetic and neurobiological pathways underlying reward dysfunction (9, 12, 13).

Although RDS intersects with these constructs, important conceptual distinctions persist. Anhedonia, defined as a diminished ability to experience pleasure, is commonly measured with tools such as the Snaith-Hamilton Pleasure Scale (SHAPS) (14). Reward sensitivity refers to the intensity of an individual's response to reward cues and is typically assessed with Behavioral Activation System (BAS) scales (15). Hedonic dysregulation captures fluctuating patterns of reward experience associated with maladaptive behavior (16). Impulsivity, characterized by a tendency to act without forethought, is frequently measured using instruments such as the Barratt Impulsiveness Scale (BIS-11) (17). While these constructs describe important facets of reward-related functioning, RDS uniquely highlights specific neurogenetic mechanisms—particularly dopamine receptor anomalies—that differentiate it from broader affective and behavioral traits (9, 12, 13, 18). This distinct neurobiological foundation has necessitated the development of assessment instruments tailored specifically to RDS.

Despite its increasing presence in psychiatric research, RDS remains a theoretically debated construct. It is not recognized as a formal diagnostic category in major classification systems such as the Diagnostic and Statistical Manual of Mental Disorders (DSM) or the International Classification of Diseases (ICD), and its conceptual boundaries overlap with several related dimensions, including anhedonia, impulsivity, and general deficits in reward processing. Rather than representing an established clinical disorder, RDS is better conceptualized as a theoretical neurobehavioral model that seeks to explain a cluster of motivational, affective, and behavioral tendencies associated with dopaminergic dysfunction. Accordingly, the present study approaches RDS as a conceptual framework rather than a diagnostic entity, acknowledging the ongoing discourse regarding its definition, validity, and clinical applicability.

To directly assess RDS, instruments such as the Reward Deficiency Syndrome Questionnaire (RDSQ-29) have been developed, offering a standardized measure of behavioral, emotional, and cognitive manifestations related to reward deficiency. Unlike assessment tools that examine reward dysfunction indirectly through related constructs, the RDSQ-29 specifically targets the multidimensional symptomatology of RDS. Accurate identification of RDS through measures like the RDSQ-29 may enhance clinical practice by facilitating early detection of at-risk individuals, informing personalized treatment strategies, and improving outcomes in disorders characterized by impulsivity and addiction (19).

Currently, no Turkish adaptation of the RDSQ-29 or any equivalent scale exists to assess RDS in Turkiye. Conducting a Turkish validity and reliability study of the RDSQ-29 is therefore essential for advancing psychiatric research in the region, evaluating the cross-cultural applicability of the RDS framework, and contributing culturally informed evidence to the international literature. The present study aims to translate, culturally adapt, and evaluate the psychometric properties of the RDSQ-29 in Turkiye, demonstrating that the Turkish version is a valid and reliable instrument for assessing reward deficiency and associated psychiatric symptoms.

METHODS

Ethics Approval and Consent to Participate

First, the necessary permissions were obtained from the corresponding author of the original development study of the RDSQ-29. Ethical approval for the study was obtained from the Non-Interventional Clinical Research Ethics Committee of Harran University on 27.05.2024, with decision number (HRÜ/24.07.17). The principles of the Declaration of Helsinki were adhered to in this research. As part of the study, participants were asked to complete an informed consent form and the study scales online.

Sample and Procedure

This study was conducted between June and July 2024. The Sociodemographic Data Form developed by the clinician, along with the Brief Sensation Seeking Scale (BSSS-8), the Barratt Impulsiveness Scale–11 Short Form (BIS-11), and the Reward Deficiency Syndrome Questionnaire (RDSQ-29), were prepared electronically and administered to participants online via SurveyMonkey. For factor-analytic procedures in scale adaptation studies, a sample size between 100 and 200 participants, or approximately 10 participants per item, is generally recommended (20). Accordingly, the minimum required sample size for the present study was determined based on the 29 items of the RDSQ-29, yielding a target of at least 290 participants (29×10). The study ultimately included 481 participants, exceeding the minimum recommended sample size. This larger sample strengthened the statistical power of the analyses and enhanced the generalizability of the findings. To assess test–retest reliability, the same set of scales was re-administered to a reachable subsample of 153 participants two weeks after the initial administration. Inclusion criteria consisted of being between 18 and 65 years of age and having sufficient educational and cognitive capacity to read, understand, and appropriately complete the study scales. Exclusion criteria included being younger than 18 or older than 65 years of age and lacking the necessary educational or cognitive ability to comprehend and complete the assessment forms.

Translation Process

To minimize differences in conceptualization and expression during the language adaptation of the RDSQ-29, the back-translation method was employed. The RDSQ-29 was independently translated into Turkish by two psychiatry specialists who were blinded to each other's translations. These translations were reviewed by the research team, combined into a single translation, and then back-translated into English by two other psychiatry specialists who had not participated in the initial translation process. The back-translation was evaluated by the research team and compared with the original RDSQ-29; it was found to be consistent with the original, and no modifications were deemed necessary. The Turkish version of the RDSQ-29 was then administered as a pilot test to 20 individuals of different genders, ages, and socioeconomic backgrounds. The responses were analyzed by the research team. Consequently, the research team concluded that the final Turkish translation was appropriate.

Assessment Tools

Sociodemographic Data Form

This form includes questions about participants' gender, age, marital status, occupation, and educational status.

Reward Deficiency Syndrome Questionnaire-29 (RDSQ-29)

The Reward Deficiency Syndrome Questionnaire-29 (RDSQ-29) is a psychometric tool developed to assess Reward Deficiency Syndrome, a condition characterized by an individual's inability to derive satisfaction from normal, everyday activities and a tendency to seek out novel and potentially risky behaviors to compensate for this deficiency. The RDSQ-29 was developed by Kenneth Blum et al. (18) as part of research efforts to better understand and measure this syndrome (19). The RDSQ-29 was formulated by generating 72 initial items based on existing literature and theories related to RDS, which were then refined through expert reviews and statistical analyses to arrive at the final 29-item version. The questionnaire

measures various dimensions of RDS, such as lack of sexual satisfaction, activity levels, social concerns, and risk-seeking behavior. Each item is rated on a 4-point Likert scale, ranging from 1 (totally disagree) to 4 (totally agree). The overall score is computed as the mean of all 29 items, with specific subscale scores calculated similarly for designated item groups. This instrument provides a comprehensive measure of the behavioral tendencies associated with RDS, facilitating both clinical assessment and research on the syndrome.

Barratt Impulsiveness Scale-11-Short Form (BIS-11-Sf)

The Barratt Impulsiveness Scale-11-Short Form is a scale developed to measure individuals' impulsivity. It was adapted into Turkish by Tamam et al. (2013) (21), who conducted a validity and reliability study. The scale consists of 15 items rated on a 4-point Likert scale and includes three subscales: attentional impulsiveness, motor impulsiveness, and non-planning. When calculating the scale score, item scores are summed; higher total scores indicate greater levels of impulsivity.

Brief Sensation Seeking Scale-8 (BSSS-8)

The Brief Sensation Seeking Scale-8, developed by Hoyle et al., was adapted to Turkish culture by Çelik and Turan (22). The Turkish version of the scale consists of eight items rated on a 5-point Likert scale (1=strongly disagree, 5=strongly agree). It is unidimensional and does not contain any reverse-coded items. High scores on the scale indicate a high level of sensation seeking, while low scores indicate a low level of sensation seeking. In the study in which the scale was adapted into Turkish, the reliability coefficient was found to be 0.79.

Statistical Analysis

The statistical methods used in this study focused on evaluating the psychometric properties of the scale through analyses of structural validity, reliability, and criterion validity.

To test the factor structure of the scale, Confirmatory Factor Analysis (CFA) was conducted. CFA was performed using the Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimator. WLSMV is recommended for categorical data, as it provides a refined approach using weighted least squares to improve standard error estimates and chi-square statistics. Model fit was evaluated using fit indices, including the chi-square test (χ^2), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR). An RMSEA value below 0.05 indicates a good fit, while a value below 0.08 suggests an acceptable fit. For CFI and TLI, values above 0.90 are considered acceptable, and values above 0.95 indicate an excellent fit. An SRMR value below 0.08 is also regarded as evidence of good model fit.

The model specified one general factor (F) and four specific factors (F1: Lack of sexual satisfaction, F2: Activity, F3: Social concern, F4: Risk-seeking behavior), and the validity of the bifactor structure was tested. While the general factor accounted for all items, the specific factors were linked to particular subdomains. Factor loadings were examined to assess the relationships between each item and its corresponding factor. Factor loadings of 0.30 and above were considered acceptable, while those of 0.50 and above were considered strong.

In a bifactor model, each item simultaneously loads onto a general factor and four specific factors. The general factor reflects the overarching construct of reward deficiency, capturing the shared variance across all items. The four specific group factors represent distinct subdomains that explain additional variance not accounted for by the general factor. In this framework, the specific factors are modeled as orthogonal to each other and to the general factor, allowing a clear examination of whether the total score primarily reflects a unified construct or whether the subscales contribute meaningful unique information. This approach is particularly appropriate for the RDSQ, as the scale was theoretically designed to measure a global reward deficiency dimension while also capturing more narrowly defined behavioral and emotional expressions of the construct. The bifactor structure therefore provides a more nuanced evaluation of the scale's multidimensional nature and the relative contribution of general versus domain-specific factors.

In the bifactor model used in this study, all items were specified to load onto the general factor, while only some items additionally loaded onto the specific group factors. As a result, certain items that appear without a loading under any specific factor in Figure 1 are not excluded from the analysis; instead, they contribute solely through their loading on the general factor. This indicates that such items primarily reflect the overarching reward deficiency construct rather than a distinct subdimension, which is consistent with the theoretical assumptions and analytic structure of bifactor modeling.

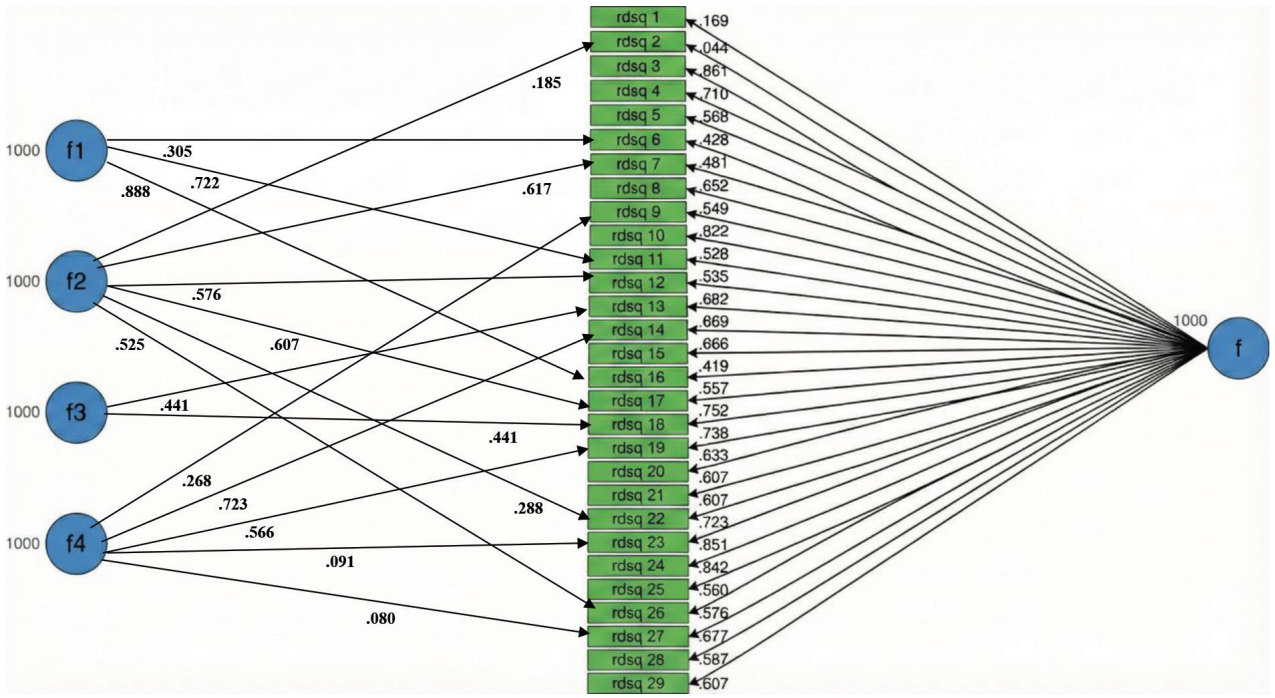

Figure 1. Confirmatory bifactor model of the Turkish Reward Deficiency Syndrome Questionnaire–29 (RDSQ-29) with standardized loadings.

The internal consistency of the scale was evaluated using Cronbach's alpha coefficient, which measures the consistency of items within a scale. Alpha values above 0.70 are deemed acceptable, values above 0.80 indicate good reliability, and values exceeding 0.90 suggest excellent internal consistency. Separate alpha coefficients were calculated for the total scale score and each subscale. Additionally, test-retest correlation was employed to assess the stability of the scale over time. The test-retest method involved administering the scale twice with a time interval between the two administrations, and correlation coefficients were calculated. A correlation coefficient of 0.70 or higher indicates that the scale demonstrates stability over time.

To assess the validity of the scale, Pearson correlation analysis was conducted within the scope of criterion-related validity. The Pearson correlation coefficient (r) was used to measure the linear relationship between two variables, with statistical significance levels (p-values) considered. Correlation analyses examined the relationships between the total scale score, subscale scores, and various psychometric variables (e.g., anxiety, impulsivity). Additionally, correlations between the scale scores and age were calculated to assess the scale's sensitivity to demographic variables.

To examine whether scale scores differed by gender, an independent-samples t-test was conducted. The independent-samples t-test is a parametric test used to compare the means of two independent groups. When the normality assumption was met, the t-test was employed to assess score differences between male and female participants. The significance level was set at $p<0.05$.

To ensure the applicability of all parametric tests, the assumption of normality was examined. The Kolmogorov-Smirnov and Shapiro-Wilk tests were conducted to assess normality of the distribution. All statistical analyses were performed using Mplus 8.3 and IBM SPSS Statistics 26.0 software.

RESULTS

Descriptive Characteristics of the Sample

Descriptive analyses were first conducted to characterize the study sample. A total of 481 participants were included in the analysis. The mean age was 35.33±10.33 years. Of the participants, 64.6% were female, 34.9% were male, and 0.4% preferred not to disclose their gender. Regarding marital status, 52.6% of participants were single, 46.8% were married, and 0.6% were divorced. In terms of educational level, the majority of the sample had

Table 1: Correlations between impulsivity and sensation seeking levels and RDSQ-29 scores

	BIS-total	BIS-non planning	BIS-motor impulsiveness	BIS-attentional impulsiveness	BSSS-total	Age
RDSQ-29-Total						
r	0.336	0.207	0.393	0.262	0.664	-0.182
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
RDSQ-29-Lack of Sexual Satisfaction						
r	0.301	0.269	0.257	0.244	0.394	-0.052
p	<0.001	<0.001	<0.001	<0.001	<0.001	0.255
RDSQ-29-Activity						
r	0.083	-0.020	0.180	0.054	0.313	0.002
p	0.068	0.655	<0.001	0.234	<0.001	0.963
RDSQ-29-Social Concern						
r	0.335	0.270	0.330	0.260	0.448	-0.172
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
RDSQ-29- Risk-Seeking Behavior						
r	0.235	0.151	0.270	0.182	0.627	-0.271
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

RDSQ-29: Reward Deficiency Syndrome Questionnaire-29; BIS: Barratt Impulsiveness Scale; BSSS: Brief Sensation Seeking Scale; p: p value; r: Correlation coefficient.

completed university education or higher (94.8%), while 5.2% had completed high school. Participants' occupational backgrounds included public sector employees (50.5%), private sector employees (20.8%), self-employed individuals (15.6%), students (10.1%), and unemployed individuals/housewives (2.9%). All participants reported no current psychiatric diagnosis. The survey link was disseminated via email, WhatsApp groups, and academic community networks, and participation was voluntary.

Age- and Gender-Related Differences

When examining the relationship between age and RDSQ scores, weak yet significant decreases were observed in RDSQ-Total scores as well as in the Social Concern and Risk-Seeking Behavior subscale scores (respectively; r=-0.182, p<0.001; r=-0.172, p<0.001; r=-0.271, p<0.001) (Table 1).

The Cronbach's alpha value for the RDSQ scale was calculated as 0.920. At the subscale level, Cronbach's alpha values were 0.671 for the Lack of Sexual Satisfaction subscale, 0.735 for the Activity subscale, 0.729 for the Social Concern subscale, and 0.813 for the Risk-Seeking Behavior subscale.

In the analysis examining the effect of gender on scale scores, women had significantly lower RDSQ-Total scores compared to men (p=0.001). At the subscale level, women scored significantly lower than men on the Lack of Sexual Satisfaction subscale (p<0.001), while no significant difference was found between genders in the Activity subscale (p=0.503). However, men scored significantly higher than women on the Social Concern subscale (p<0.001) and the Risk-Seeking Behavior subscale (p<0.001) (Table 2).

Structural Validity: Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) was conducted using Mplus (v8.3) software with the WLSMV estimator to evaluate the structural validity of the 29-item scale based on data from 481 participants. In this analysis, a general factor (F) accounting for all items and four theoretically based specific factors (F1–F4) were specified. The overall model fit indices were as follows: $\chi^2(362)=1396.31$, p<0.001, RMSEA=0.077 (90% confidence interval (CI) [0.073, 0.081]), CFI=0.916, TLI=0.906, and SRMR=0.072, indicating an acceptable model fit.

According to the analysis results, standardized loadings for the general factor (F) ranged from 0.044 to 0.851; for F1, loadings ranged from 0.305 to 0.888; for F2, loadings ranged from 0.185 to 0.617; and for F3, two items showed equal loadings of 0.441. For F4, loadings ranged from 0.080 to 0.723. Although RDSQ-1 loaded significantly on the general factor (p<0.001), its loading value was relatively low compared to other items (β=0.169). Similarly, item RDSQ-2 in the F2 subfactor (β=0.044) and items RDSQ-23 (β=0.091) and RDSQ-27 (β=0.080) in the F4 subfactor also showed low loadings (Fig. 1).

Table 2: Scale scores by gender

	Gender	Number	Mean	SD	p
RDSQ-29-Total	W	311	60.17	14.464	0.001
	M	170	64.66	14.840	
RDSQ-29-Lack of Sexual Satisfaction	W	311	4.06	1.552	<0.001
	M	170	5.54	2.122	
RDSQ-29-Activity	W	311	12.79	3.203	0.503
	M	170	12.59	3.182	
RDSQ-29-Social Concern	W	311	2.90	1.414	<0.001
	M	170	3.43	1.629	
RDSQ-29- Risk-Seeking Behavior	W	311	8.74	3.415	<0.001
	M	170	9.99	3.718	

RDSQ-29: Reward Deficiency Syndrome Questionnaire-29; SD: Standard deviation; W: Woman; M: Man; p: p value.

Convergent Validity

When examining correlations between RDSQ scores and impulsivity and anxiety levels, the RDSQ-Total score showed significant correlations with BIS-Total (r=0.336, p<0.001), BIS Non-Planning (r=0.207, p<0.001), BIS Motor Impulsiveness (r=0.393, p<0.001), BIS Attentional Impulsiveness (r=0.262, p<0.001), and BSSS-Total (r=0.664, p<0.001).

At the subscale level, the Lack of Sexual Satisfaction subscale showed significant correlations with all variables (r=0.244-0.394, p<0.001). The Activity subscale showed significant correlations only with Barratt Motor Impulsiveness (r=0.180, p<0.001) and BSSS-Total (r=0.313, p<0.001). The Social Concern subscale showed significant correlations with all variables (r=0.260-0.448, p<0.001). The Risk-Seeking Behavior subscale also showed significant correlations with all variables, with the highest correlation observed with BSSS-Total (r=0.627, p<0.001).

Reliability Analyses (Internal Consistency and Test–Retest Reliability)

The test-retest correlation for the RDSQ-Total score was found to be high and significant (r=0.884, p<0.001). Among the subscales, the highest test-retest correlation was observed for the Lack of Sexual Satisfaction subscale (r=0.887, p<0.001). The remaining subscales also showed significant test-retest correlations: Activity (r=0.787, p<0.001), Social Concern (r=0.717, p<0.001), and Risk-Seeking Behavior (r=0.880, p<0.001). These results demonstrate that the scale exhibits high reliability over time (Table 3).

The Cronbach's alpha coefficient for the RDSQ total scale was calculated as 0.920. At the subscale level, alpha values were 0.671 for Lack of Sexual Satisfaction, 0.735 for Activity, 0.729 for Social Concern, and 0.813 for Risk-Seeking Behavior. When Cronbach's alpha was recalculated after removing each item individually, an increase in the total reliability coefficient was observed only upon the removal of RDSQ-1 and RDSQ-2, for which alpha increased to 0.923. For all other items, removal resulted in either no meaningful change or a slight decrease in reliability, with alpha values remaining within the 0.915–0.920 range.

DISCUSSION

The present study aimed to evaluate the validity and reliability of the Turkish version of the Reward Deficiency Syndrome Questionnaire. The findings provide strong evidence supporting the psychometric robustness of the adapted scale. Confirmatory Factor Analysis results indicated an acceptable model fit, with fit indices aligning with recommended thresholds ($\chi^2(362)=1396.31$, p<0.001, RMSEA=0.077, CFI=0.916, TLI=0.906, SRMR=0.072), thereby supporting the structural validity of the Turkish version. Consistent with the original validation study (19), a bifactor structure comprising a general reward deficiency factor and four specific subfactors was replicated, indicating that the multidimensional framework of the RDSQ-29 was preserved in the Turkish adaptation.

Internal consistency analyses revealed high reliability for the total scale (Cronbach's α=0.920) and acceptable reliability levels for the subscales, although the Lack of Sexual Satisfaction subscale demonstrated a relatively lower Cronbach's alpha (α=0.671). This pattern mirrors findings from the original study (19), suggesting that while the general structure is robust, some subscales may require cautious interpretation. Furthermore, test-retest correlations over a two-week

Table 3: Test-retest correlation

	RDSQ-29-total (R)	RDSQ- 29-lack of sexual satisfaction (R)	RDSQ-29-activity (R)	RDSQ- 29-social concern (R)	RDSQ-29 risk-seeking behavior (R)
RDSQ-29-Total					
r	0.884	0.485	0.701	0.597	0.752
p	<0.001	<0.001	<0.001	<0.001	<0.001
RDSQ-29-Lack of Sexual Satisfaction					
r	0.465	0.887	0.198	0.377	0.198
p	<0.001	<0.001	0.017	<0.001	0.017
RDSQ-29-Activity					
r	0.598	0.121	0.787	0.277	0.457
p	<0.001	0.149	<0.001	0.001	<0.001
RDSQ-29-Social Concern					
r	0.603	0.457	0.386	0.717	0.515
p	<0.001	<0.001	<0.001	<0.001	<0.001
RDSQ-29- Risk-Seeking Behavior					
r	0.736	0.218	0.526	0.537	0.880
p	<0.001	0.009	<0.001	<0.001	<0.001

(R): Retest; RDSQ-29: Reward Deficiency Syndrome Questionnaire-29; p: p value; r: Correlation coefficient.

interval were high for the total score (r=0.884) and all subscales, confirming the temporal stability of the Turkish RDSQ-29.

Construct validity was further supported by significant correlations between RDSQ-29 scores and related constructs such as impulsivity and sensation seeking. Moderate to strong correlations were observed between the RDSQ-Total score and BIS-11 and BSSS scores, consistent with theoretical expectations linking reward deficiency with increased impulsivity and sensation-seeking traits (13, 19, 23, 24). These findings provide additional evidence of convergent validity for the Turkish version of the scale. Although the correlations between the RDSQ-29 and impulsivity measures were statistically significant, they were notably lower than those observed with sensation seeking. This discrepancy reflects the theoretical foundations of Reward Deficiency Syndrome, which emphasize heightened reward pursuit, novelty seeking, and risk-taking rather than cognitive or inhibitory components of impulsivity. Sensation seeking is conceptually closer to reward-driven motivation, and the stronger correlations observed in this study suggest that the RDSQ-29 more strongly captures motivational and behavioral aspects of reward processing. In contrast, impulsivity involves broader domains, including attentional and inhibitory control, which may not align as directly with the reward deficiency framework. Together, these findings provide important insight into the dimensions most prominently captured by the RDSQ-29 and clarify the differential relationships observed across external validity indicators. Although anhedonia is conceptually related to reward processing, the RDSQ-29 was designed to capture a broader reward deficiency framework that encompasses motivational, behavioral, and emotional components beyond hedonic capacity. Therefore, impulsivity- and sensation-seeking–based measures were deemed theoretically more appropriate indicators of concurrent validity. Moreover, significant negative correlations between age and RDSQ scores align with previous research suggesting that reward-seeking behaviors and impulsivity tend to decline with age (19).

Gender comparisons were conducted to determine whether reward deficiency–related traits manifest differently across demographic subgroups. Examining such subgroup variations is important for evaluating whether the scale functions equivalently across genders and for identifying potential differences in the behavioral and emotional expression of reward processing. These analyses help clarify whether certain components of reward deficiency—such as risk-taking, sensitivity to reinforcement, or social concern—may be more pronounced in one gender than the other, thereby providing meaningful insight into the differential

expression and clinical relevance of RDSQ-29 scores across populations. Gender differences observed in this study offer important insights into the manifestation of reward deficiency traits. Men scored higher than women on the RDSQ-Total score and the Social Concern and Risk-Seeking Behavior subscales, while women reported lower scores, particularly on the Lack of Sexual Satisfaction subscale. These results suggest that reward sensitivity and associated behaviors may vary between genders, a pattern also noted in previous studies addressing gender differences in impulsivity and sensation seeking (25–27). Given these considerations, it is essential that clinical assessment and intervention strategies account for gender-specific dynamics when addressing reward-related psychopathologies.

The use of a bifactor model provided an enhanced understanding of the scale's structure by allowing simultaneous modeling of a general RDS factor and specific dimensions. Although several items (RDSQ-1, RDSQ-2, RDSQ-23, and RDSQ-27) demonstrated lower-than-expected factor loadings, the decision to retain these items was based on theoretical considerations and consultation with the original scale developers. This approach highlights the need to preserve the theoretical integrity of the scale while also acknowledging the statistical complexities inherent in cross-cultural adaptation.

To further address item-level performance, it is important to note that several items (RDSQ-1, RDSQ-2, RDSQ-23, and RDSQ-27) demonstrated low standardized loadings in the bifactor model. Although these items contributed minimally to the specific factors, they still loaded significantly onto the general factor and were therefore retained in accordance with the original scale structure. Internal consistency analyses indicated that retaining these items did not substantially reduce reliability at the total-score level; however, their weak factor loadings suggest that item refinement or wording adjustments may be warranted in future Turkish adaptation studies. It is also possible that the relatively weak factor loadings observed for certain items—most notably RDSQ-2—are related to differences between our sample and the sample used in the original validation study. The behavioral and experiential characteristics captured by these items may not have been adequately represented in our non-clinical community sample, leading to restricted variance and, consequently, attenuated loadings. Limited representation of participants for whom these items are most relevant may therefore account for the reduced item–factor associations observed in the present analysis.

Despite the strengths of this study, several limitations must be acknowledged. First, data collection was conducted online, potentially limiting participation to individuals with internet access and introducing self-selection and sampling bias. Additionally, the use of a non-clinical community sample restricts the generalizability of the findings to psychiatric populations. Although this approach allows for efficient recruitment and broad participation, it limits the ability to evaluate the scale's performance in groups where reward-related pathology is more prominent. Future studies should examine the psychometric properties of the Turkish version of the RDSQ in clinical samples—such as individuals with substance use disorders, ADHD, or other conditions theoretically linked to reward deficiency. Furthermore, while convergent validity was examined through associations with impulsivity and sensation seeking, additional research involving external clinical criteria and discriminant validity assessments would strengthen the evidence base for the scale. Another important consideration concerns discriminant validity. In the present study, validation analyses focused primarily on constructs theoretically adjacent to reward deficiency, such as impulsivity and sensation seeking. Although these relationships supported convergent validity, discriminant validity could not be evaluated because non-RDS constructs (e.g., depression, anxiety, anhedonia) were not included. Future studies should incorporate such measures to determine the specificity of the Turkish RDSQ-29 and to more clearly differentiate reward deficiency from overlapping psychopathological dimensions. Despite these limitations, the present study provides an important initial step in adapting and validating the RDSQ for use in Turkish-speaking populations.

One of the primary strengths of this study lies in its use of a community-based sample rather than a purely university-based sample, thereby enhancing the generalizability of the findings. Furthermore, the large sample size (n=481 at the first step and n=153 at the second step) exceeded the minimum required for CFA, thereby increasing the study's statistical power and the reliability of parameter estimates. Notably, this study represents the first effort to validate the RDSQ-29 in a non-English-speaking context, contributing significantly to cross-cultural research on reward deficiency syndrome.

Future research should continue to explore the psychometric properties of the RDSQ-29 in diverse populations and languages. Particular attention should be paid to its ability to predict risk for addictive and compulsive behaviors over time, thereby expanding its utility as a preventive screening tool. Longitudinal designs assessing how changes in RDSQ-29 scores relate to clinical outcomes would offer valuable insights into the dynamic nature of reward deficiency phenomena. Ultimately, the Turkish version of the RDSQ-29 offers a reliable and valid tool for advancing research and clinical practice in the assessment of reward-related dysfunctions.

CONCLUSION

This study represents the first validity and reliability study of the original RDSQ-29 scale. The RDSQ-29 is a vital instrument in psychiatry and psychology, providing insights into reward processing that are essential for diagnosis, treatment, and education. The introduction of the RDSQ-29 creates an opportunity to explore the genetic, neurological, and psychological features associated with RDS and to examine its role in the development of psychiatric disorders.

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BRIEF REPORT

Bibliometric and visual analysis of the top 100 most cited articles on long-acting injectable antipsychotics

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ABSTRACT

Objective: Recently, there has been a notable increase in interest in long-acting injectable antipsychotics (LAIAs) and in the number of studies conducted in psychopharmacology. This study aims to identify and analyze the 100 most cited articles on LAIAs.

Method: The Web of Science (WOS) Core Collection database was analyzed using VOSviewer software to identify published articles on the subject. Information such as titles, authors, journals and publishers, number of citations, and years of publication was examined. The publications were then ranked according to the number of citations, and the top 100 most cited articles were subjected to further analysis.

Results: The total number of citations ranged from 65 to 1,044. The most cited article is the 'International Consensus Study of Antipsychotic Dosing' in 2010, published in The American Journal of Psychiatry, with 1,044 citations. The Journal of Clinical Psychiatry contributed the greatest number of articles to the top 100 most cited articles, with 20 articles, followed by The British Journal of Psychiatry and Schizophrenia Research, which contributed eight and seven articles, respectively. The oldest publication in the top 100 was published in 1998, and the two most recent articles were published in 2022.

Conclusion: This analysis allows researchers and clinicians to gain insight into the most recent and impactful work in this field, particularly in identifying potential avenues for future academic research.

Keywords: Bibliometric analysis, citation, long-acting injectable antipsychotic, VOSviewer

INTRODUCTION

Long-acting injectable antipsychotics (LAIAs) have been continuously developed and widely used since the early 1960s due to their advantages in the treatment of psychiatric disorders such as schizophrenia and bipolar disorder (1). Bibliometric analyses provide a statistical and quantitative review of articles in a specific field of study, allowing researchers to gain insight into the existing literature and identify potential areas for further research (2). This type of analysis can provide researchers with insight into the most recent and influential studies in the field, particularly in identifying potential avenues for future academic research. Bibliometric analysis has recently gained significant attention in the field

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of psychiatry, too (3–5). A recent study conducted in 2025 examined changes in research trends on LAIAs over the past 40 years through bibliometric analysis (5). The present study aimed to identify and analyze the 100 most cited articles on LAIAs using bibliometric analysis, specifically to identify potential avenues for future academic research.

METHOD

The Clarivate Analytics WoS Core Collection database was examined on December 12, 2024 using VOSviewer v1.6.20 (2). The search term "long-acting injectable antipsychotic" was selected. The publications were then ranked based on their citation count, and the top 100 cited articles were subjected to further analysis. In the event of two or more articles having the same number of citations, the more recent article was given priority. The full texts of each article were downloaded, and two authors reviewed each in detail. In cases where the two authors could not agree, the opinion of a third author was sought. Articles outside the field of psychiatry and not related to LAIAs were excluded. The publications were subjected to a systematic and rigorous evaluation process and were stratified according to several key criteria, including publication year, type, authors, countries, and journal of publication. Additionally, the evaluation process involved a comprehensive analysis of the publications' indexing status and total and annual citations (including self-citations). Furthermore, the frequency of keywords from the articles and co-authorships was evaluated, and a visual network analysis was conducted.

The data are presented using descriptive analysis. Data analysis was performed using SPSS v22.0. This study was approved by the Pamukkale University Ethics Committee with the decision dated 12.11.2024 and numbered 19.

RESULTS

The number of studies related to LAIAs has been increasing at a steady rate each year, with 1,420 articles published in the field of psychiatry in the WoS Core Collection between 1985 and 2024. The total number of citations ranged from 65 to 1,044. The mean number of citations was 149.24. The annual number of citations ranged from 3.33 to 90. The top 50 cited articles are shown in Appendix 1. The most cited article was the 2010 study International Consensus Study of Antipsychotic Dosing by Gardner et al.(6), published in The American Journal of Psychiatry, with 1,044 citations. The article with the highest annual citation rate was Mortality in People with Schizophrenia: A Systematic Review and Meta-Analysis of Relative Risk and Aggravating or Attenuating Factors by Correll et al. (2022) (7), with 90 citations per year. The second most cited article was the 2010 study The 2009 Schizophrenia PORT Psychopharmacological Treatment Recommendations and Summary Statements by Buchanan et al. (8), published in Schizophrenia Bulletin, with 675 citations.

Additionally, the third most cited article was the 2011 study A Nationwide Cohort Study of Oral and Depot Antipsychotics After First Hospitalization for Schizophrenia by Tiihonen et al. (9), published in The American Journal of Psychiatry, with 499 citations.

The three most contributing authors, as evidenced by the number of their publications in the top 100, are John M. Kane (n=14), Christoph U. Correll (n=11), and Mariëlle Eerdekens (n=7). An evaluation of the top five countries reveals that approximately 60 publications originated from the United States of America (USA), 23 from Germany, 19 from the United Kingdom, 14 from Belgium, and 12 from Spain. A visualization of the co-authorship map of the authors is provided in Figure 1.

The initial 100 articles span a period from 1998 to the present, and the two most recent ones were published in 2022. Two peaks were observed in 2010 and 2013, with the highest number of publications occurring in these two years. This appears to be due to the significant and increasing interest in LAIs since 1985, especially after the introduction of second-generation antipsychotics in the 2000s (3). The total number of publications and citations in the top 100 cited articles by year is shown in Figure 2. Of the top 100 cited articles, 68 were original research articles, 30 were review articles, and two were editorial material. The most frequently used trending keywords among these studies were "schizophrenia, long-acting injectable, antipsychotics, relapse, psychosis, paliperidone palmitate, adherence, atypical antipsychotics." A map of the co-occurrence of author keywords extracted from the top 100 cited articles is presented in Figure 3.

The Journal of Clinical Psychiatry contributed the greatest number of articles to the top 100 most cited articles, with 20 articles, followed by The British Journal of Psychiatry and Schizophrenia Research, which contributed eight and seven articles, respectively. Of the publications in the top 100, 75 are included in both the Science Citation Index Expanded (SCI-E)

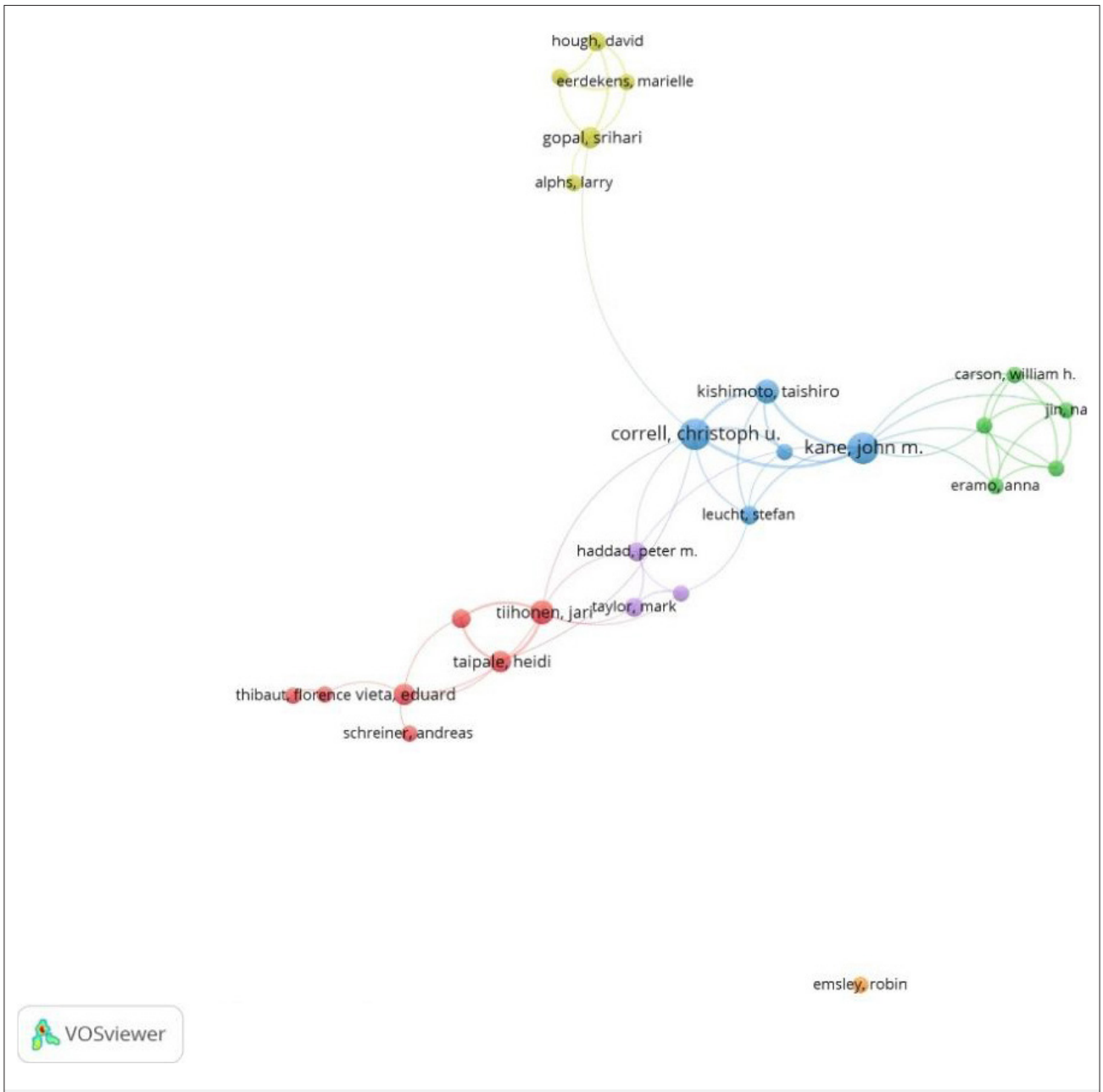

Figure 1. Co-authorship map of authors.

and the Social Science Citation Index (SSCI), 23 are included only in SCI-E, one is included only in SSCI, and one is included in the Emerging Sources Citation Index (ESCI).

DISCUSSION

While the number of citations an article receives does not directly determine its value, it can provide a historical perspective on its place in the scientific field and allow for analysis of its impact. In this study, we employed bibliometric analysis in conjunction with network visualization to identify the top 100 most influential papers in the field of LAIA based on global citation frequency.

The advent of LAIAs represents a revolutionary improvement in treatment adherence, patient comfort, and healthcare outcomes (1). It is therefore unsurprising that the results of this study demonstrate a consistent and gradual increase in the number of studies on LAIAs. The findings indicate that the USA has the highest number of publications and citations on LAIAs, followed by the United Kingdom and Germany among European countries. It may

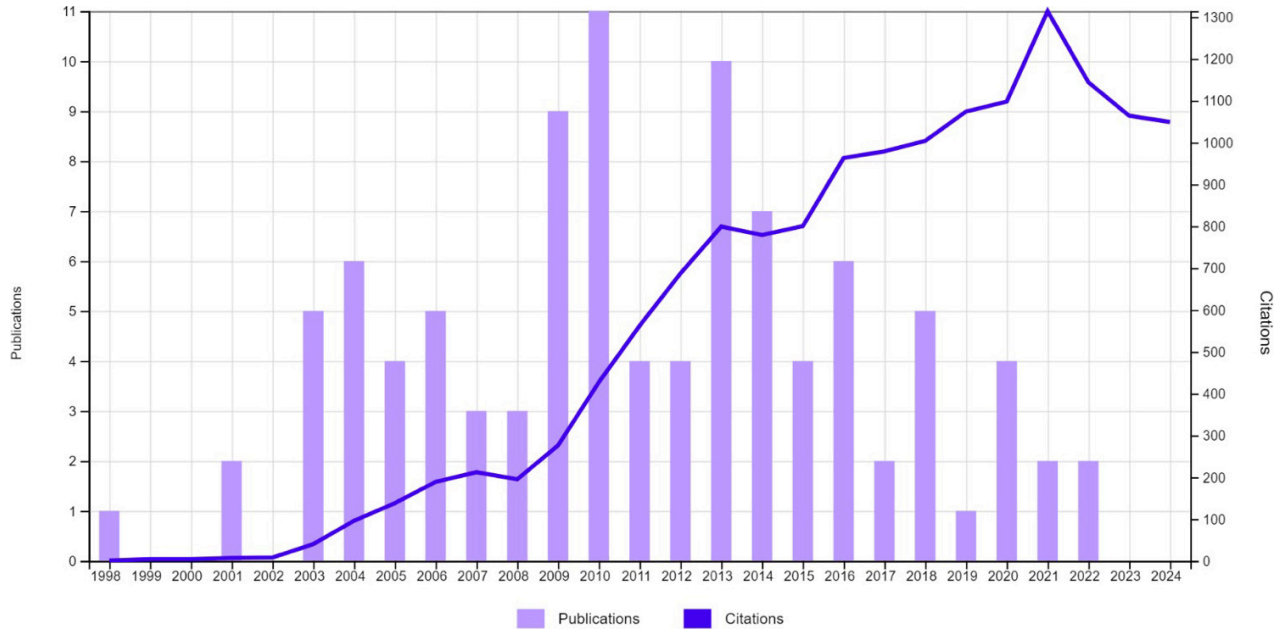

Figure 2. Total number of publications and citations by year for the top 100 cited articles.

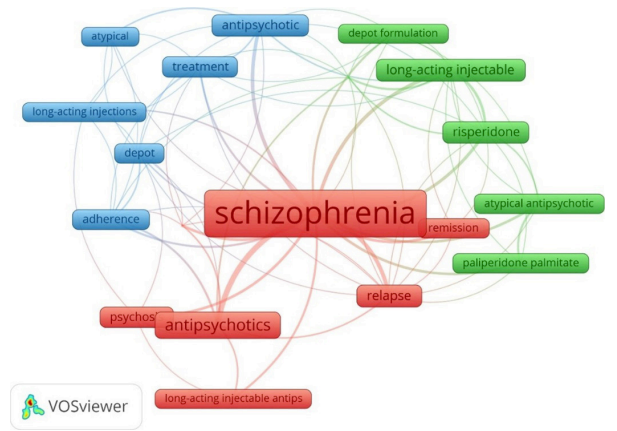

Figure 3. Map of co-occurrence of author keywords.

therefore be assumed that these countries exert the greatest influence and engage in the most extensive cooperation on this issue on a global scale (5). Results from analyses conducted in Italy, Singapore, and Indonesia on atypical antipsychotics and schizophrenia similarly indicate that the countries contributing the most to the literature align with those identified in our study (10–12). This can be attributed to the fact that the USA and European countries have robust pharmaceutical industries, such as Janssen Pharmaceutica (risperidone LAI and paliperidone LAI) and Lundbeck/Otsuka Pharmaceutical (aripiprazole LAI), which play a key role in the advancement of LAIAs. It can also be explained by the fact that the governments of the USA and European countries allocate some of the highest budgets for scientific research and provide substantial support to scientists, both academically and financially (13).

The Journal of Clinical Psychiatry and Schizophrenia Bulletin, two of the three journals that contributed the most to the top 100 in our study, have also retained leading positions in other studies on antipsychotics and schizophrenia (10–12). The observation that three of the initial 14 authors who contributed the most to the top 100 most cited articles are women corroborates the findings of the study on gender inequality in researchers conducted by Vijayakumar et al. (14) in 2023 in the field of schizophrenia. It may be necessary to implement measures to promote gender equality in academic publishing, particularly in the field of psychiatry, to foster a more inclusive scientific community.

The observation that John M. Kane, the author with the highest number of publications in the top 100, is also among the most frequently cited authors in two analyses on schizophrenia may indicate that the author is a prominent and leading figure in the field of schizophrenia and psychopharmacology (3, 15).

The keywords "schizophrenia, long-acting injectable, antipsychotics, relapse, psychosis, paliperidone palmitate, adherence, atypical antipsychotics" identified in our study suggest that LAIAs may be preferred for relapse prevention and improving treatment adherence in severe mental disorders such as schizophrenia or bipolar disorder.

In terms of the limitations of this study, it should be noted that the literature database used was solely the WoS Core Collection. It is possible that information from other databases, such as PubMed, may have been omitted. Secondly, although older publications are more likely to receive a greater number of citations, it is encouraging to note that many newer studies also appear in the top 100 in our study. We attempted to address this potential disadvantage by including annual citation rates. Lastly, it is possible that some studies may have been overlooked if they did not include the search term "long-acting injectable antipsychotics," as this term was used to search the database.

This analysis can enable researchers and clinicians to gain insight into the most recent and influential work in this field, particularly in identifying potential avenues for future academic research.

Ethical Approval: The Pamukkale University Non-interventional Clinical Research Ethics Committee granted approval for this study (date: 12.11.2024, number: 19).

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Contribution Categories		Author Initials
Category 1	Concept/Design	S.B.T., D.A., A.N.I.K.
	Data acquisition	D.A.
	Data analysis/Interpretation	S.B.T., D.A., A.N.I.K.
Category 2	Drafting manuscript	S.B.T.
	Critical revision of manuscript	S.B.T., D.A., A.N.I.K.
Category 3	Final approval and accountability	S.B.T., D.A., A.N.I.K.
Other	Technical or material support	S.B.
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Appendix 1: Top 50 cited articles

Rank	Article Title	Journal	Year	Total citations	Annual citations
1	International Consensus Study of Antipsychotic Dosing	American Journal of Psychiatry	2010	1044	69.6
2	The 2009 Schizophrenia PORT Psychopharmacological Treatment Recommendations and Summary Statements	Schizophrenia Bulletin	2010	675	45
3	A Nationwide Cohort Study of Oral and Depot Antipsychotics After First Hospitalization for Schizophrenia	American Journal of Psychiatry	2011	499	35.64
4	Canadian Network for Mood and Anxiety Treatments (CANMAT) and International Society for Bipolar Disorders (ISBD) collaborative update of CANMAT guidelines for the management of patients with bipolar disorder: update 2009	Bipolar Disorders	2009	455	28.44
5	Long-Acting Injectable Versus Oral Antipsychotics in Schizophrenia: A Systematic Review and Meta-Analysis of Mirror-image Studies	Journal of Clinical Psychiatry	2013	364	30.33
6	Non-adherence to medication in patients with psychotic disorders: epidemiology, contributing factors and management strategies	World Psychiatry	2013	359	29.92
7	The nature of relapse in schizophrenia	BMC Psychiatry	2013	318	26.50
8	World Federation of Societies of Biological Psychiatry (WFSBP) Guidelines for Biological Treatment of Schizophrenia, Part 2: Update 2012 on the long-term treatment of schizophrenia and management of antipsychotic-induced side effects	World Journal of Biological Psychiatry	2013	307	25.58
9	Long-Acting Injectable vs Oral Antipsychotics for Relapse Prevention in Schizophrenia: A Meta-Analysis of Randomized Trials	Schizophrenia Bulletin	2014	285	25.91
10	The World Federation of Societies of Biological Psychiatry (WFSBP) Guidelines for the Biological Treatment of Bipolar Disorders: Update 2012 on the long-term treatment of bipolar disorder	World Journal of Biological Psychiatry	2013	284	23.67
11	The Use of Long-Acting Injectable Antipsychotics in Schizophrenia: Evaluating the Evidence	Journal of Clinical Psychiatry	2016	283	31.44
12	Expert consensus guideline series - Optimizing pharmacologic treatment of psychotic disorders - introduction: Methods, commentary, and summary	Journal of Clinical Psychiatry	2003	278	12.64
13	Mortality in people with schizophrenia: a systematic review and meta-analysis of relative risk and aggravating or attenuating factors	World Psychiatry	2022	270	90
14	Guidelines for depot antipsychotic treatment in schizophrenia	European Neuropsychopharmacology	1998	264	9.78
15	The Effects of Novel and Newly Approved Antipsychotics on Serum Prolactin Levels: A Comprehensive Review	CNS Drugs	2014	260	23.64
16	Systematic meta-review of depot antipsychotic drugs for people with schizophrenia	British Journal of Psychiatry	2001	238	9.92
17	The role of long-acting injectable antipsychotics in schizophrenia: a critical appraisal	Therapeutic Advances in Psychopharmacology	2014	220	20
18	Paliperidone palmitate maintenance treatment in delaying the time-to-relapse in patients with schizophrenia: A randomized, double-blind, placebo-controlled study	Schizophrenia Research	2010	213	14.2
19	Long-acting injectable versus oral antipsychotics for the maintenance treatment of schizophrenia: a systematic review and comparative meta-analysis of randomised, cohort, and pre-post studies	Lancet Psychiatry	2021	193	48.25

Appendix 1 (cont): Top 50 cited articles

Rank	Article Title	Journal	Year	Total citations	Annual citations
20	Antipsychotics and mortality in a nationwide cohort of 29,823 patients with schizophrenia	Schizophrenia Research	2018	191	27.29
21	Antipsychotic-induced Dopamine Supersensitivity Psychosis: Pharmacology, Criteria, and Therapy	Psychotherapy and Psychosomatics	2017	178	22.25
22	Partial compliance and patient consequences in schizophrenia: Our patients can do better	Journal of Clinical Psychiatry	2003	173	7.86
23	Clozapine use in patients with schizophrenia and the risk of diabetes, hyperlipidemia, and hypertension - A claims-based approach	Archives of General Psychiatry	2001	151	6.29
24	Efficacy and Effectiveness of Depot Versus Oral Antipsychotics in Schizophrenia: Synthesizing Results Across Different Research Designs	Journal of Clinical Psychiatry	2013	150	12.5
25	Guidelines for the use and management of long-acting injectable antipsychotics in serious mental illness	BMC Psychiatry	2013	146	12.17
26	Paliperidone palmitate, a potential long-acting treatment for patients with schizophrenia. Results of a randomized, double-blind, placebo-controlled efficacy and safety study	International Journal of Neuropsychopharmacology	2010	144	9.60
27	Dose-Response Meta-Analysis of Antipsychotic Drugs for Acute Schizophrenia	American Journal of Psychiatry	2020	140	28
28	Attitudes of psychiatrists toward antipsychotic depot medication	Journal of Clinical Psychiatry	2006	133	7
29	The concepts of remission and recovery in schizophrenia	Pharmacopsychiatry	2006	132	6.95
30	World Federation of Societies of Biological Psychiatry (WFSBP) guidelines for biological treatment of schizophrenia, part 2: Long-term treatment of schizophrenia	World Journal of Biological Psychiatry	2006	129	6.79
31	Partial compliance in schizophrenia and the impact on patient outcomes	Psychiatry Research	2008	127	7.47
32	The case for long-acting antipsychotic agents in the post-CATIE era	Acta Psychiatrica Scandinavica	2007	127	7.06
33	Efficacy and Safety of Paliperidone Palmitate 3-Month Formulation for Patients with Schizophrenia: A Randomized, Multicenter, Double-Blind, Noninferiority Study	İnternational Journal of Neuropsychopharmacology	2016	126	14
34	Comparison of the effects of different routes of antipsychotic administration on pharmacokinetics and pharmacodynamics	Journal of Clinical Psychiatry	2003	125	5.68
35	Comparative Effectiveness of Antipsychotic Drugs for Rehospitalization in Schizophrenia-A Nationwide Study With 20-Year Follow-up	Schizophrenia Bulletin	2018	123	17.57
36	Long-term outcomes in patients with schizophrenia treated with risperidone long-acting injection or oral antipsychotics in Spain: Results from the electronic Schizophrenia Treatment Adherence Registry (e-STAR)	European Psychiatry	2009	122	7.63
37	Relapse and rehospitalization: Comparing oral and depot antipsychotics	Journal of Clinical Psychiatry	2003	120	5.45
38	Real-World Outcomes of Paliperidone Palmitate Compared to Daily Oral Antipsychotic Therapy in Schizophrenia: A Randomized, Open-Label, Review Board-Blinded 15-Month Study	Journal of Clinical Psychiatry	2015	119	11.90
39	Attitudes towards long-acting depot antipsychotics: A survey of patients, relatives and psychiatrists	Psychiatry Research	2010	119	7.93
40	Risperidone Long-Acting Injectable Monotherapy in the Maintenance Treatment of Bipolar I Disorder	Biological Psychiatry	2010	116	7.73

Appendix 1 (cont): Top 50 cited articles

Rank	Article Title	Journal	Year	Total citations	Annual citations
41	Tardive dyskinesia in the era of typical and atypical antipsychotics. Part 1: Pathophysiology and mechanisms of induction	Canadian Journal of Psychiatry	2005	115	5.75
42	Paliperidone palmitate versus oral antipsychotics in recently diagnosed schizophrenia	Schizophrenia Research	2015	114	11.40
43	Aripiprazole once-monthly for treatment of schizophrenia: double-blind, randomised, non-inferiority study	British Journal of Psychiatry	2014	113	10.27
44	Effect of Long-Acting Injectable Antipsychotics vs Usual Care on Time to First Hospitalization in Early-Phase Schizophrenia: A Randomized Clinical Trial	Jama Psychiatry	2020	112	22.40
45	An 8-week, double-blind, randomized, placebo-controlled study of olanzapine long-acting injection in acutely ill patients with schizophrenia	Journal of Clinical Psychiatry	2008	112	6.59
46	Remission in schizophrenia: Results from a 1-year study of long-acting risperidone injection	Schizophrenia Research	2005	108	5.40
47	Efficacy and safety of direct transition to risperidone long-acting injectable in patients treated with various antipsychotic therapies	International Clinical Psychopharmacology	2005	108	5.40
48	Safety and tolerability of long-acting injectable versus oral antipsychotics: A meta-analysis of randomized controlled studies comparing the same antipsychotics	Schizophrenia Research	2016	107	11.89
49	The clinical course of schizophrenia in women and men-a nation-wide cohort study	Npj Schizophrenia	2020	104	20.80
50	Medication nonadherence in bipolar disorder: a narrative review	Therapeutic Advances in Psychopharmacology	2018	104	14.86

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LETTER TO THE EDITOR

Donepezil-induced manic episodes in two patients with different types of dementia

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Dear Editor,

The efficacy of acetylcholinesterase inhibitors (AChEIs) in managing the cognitive and neuropsychiatric symptoms of Alzheimer's disease (AD) is well documented (1). While it is acknowledged that these medications can potentially induce psychiatric adverse effects, the prevalence of mood disturbances remains documented only in case reports (2). Given the established correlation between acetylcholine and depression, AChEIs are not expected to cause mania (3).

Two cases of donepezil-induced manic episodes in patients diagnosed with different types of dementia are presented. One of the cases represents the oldest patient documented to date, while the other is the only patient reported with Lewy body dementia (LBD).

Case 1 – A 95-year-old female patient was admitted to our outpatient clinic with a recent diagnosis of AD. The patient exhibited symptoms including euphoric mood, hyperactivity, pressured speech, hypersexuality, insomnia, agitation, violent behavior, and new-onset alcohol consumption. This symptomatology began six weeks after the administration of 5 mg/day donepezil. Escitalopram, which she had been taking at 10 mg/day for years, was stopped, and olanzapine 5 mg/day was initiated immediately by her psychiatrist at the fourth week after symptom onset. Two weeks later, she was admitted to the neurology clinic due to worsening symptoms. Donepezil was suspected to have induced her new symptoms and was discontinued immediately. Her symptoms fully remitted within six weeks. Her past medical history included bipolar I disorder, which had been in full remission for a significant period with valproic acid 1 g/day, aripiprazole 5 mg/day, and escitalopram 10 mg/day. Aripiprazole was discontinued three years ago, and valproic acid was stopped 21 months ago by her psychiatrist. There was no family history of psychiatric disorders.

Case 2 – A 66-year-old male with a diagnosis of LBD was admitted to our outpatient clinic with elevated mood, increased visual hallucinations, delusions, behavioral disorganization, pressured speech, hypersexuality, insomnia, agitation, and increased preoccupation with poetry writing. His medication regimen comprised the following daily doses for approximately one year: donepezil (5 mg), memantine (28 mg), pramipexole (1.5 mg), and rasagiline (1 mg). One and a half months earlier, the dosage of pramipexole had been reduced and then discontinued due to visual hallucinations, which diminished by more than 50%, while motor symptoms remained stable. After discontinuation of pramipexole, aripiprazole 5 mg/day was initiated, resulting in a further decrease in hallucinations. Two weeks later, the donepezil dosage was increased to 10 mg/day, and two days afterward the patient exhibited symptoms consistent with mania, which progressively worsened. The donepezil dosage was then reduced to 5 mg/day, resulting in gradual improvement that became fully apparent within a few days, without any need for additional treatment of the symptoms. His medical

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history included hypertension, with no reported personal or familial psychiatric disorders.

The thought processes of both patients were conducive to flight of ideas and occasional loosening of associations, with content marked by grandiose ideation. Montreal Cognitive Assessment scores were 14 and 12 out of 30 on admission, respectively. Physical examination and detailed laboratory investigations did not reveal any abnormalities. Delirium was excluded based on clinical symptoms. No fluctuations were observed. The Young Mania Rating Scale scores of the patients were 46 and 40, respectively. As both patients scored 8 on the Naranjo Adverse Drug Reaction Probability Scale, the symptoms were evaluated as "probable" in terms of drug relation. The mood of both individuals has remained stable, with no recurrence of manic symptoms for one year of follow-up. Written informed consents were obtained from the patients' relatives.

Donepezil-induced mania was first reported by Benazzi in 1998 (4). The temporal relationship between the initiation of donepezil, the onset of manic symptoms, and the subsequent improvement of symptoms when donepezil is ceased or discontinued points to the possible mood-elevating properties of donepezil. The cholinergic-adrenergic hypothesis posits that increased acetylcholine is associated with depressive symptoms (1). It is conceivable that the initiation of donepezil therapy may have triggered a shift in the acetylcholine-serotonin balance toward serotonin dominance, culminating in a recurrence of hypomania. The findings and observations presented here suggest that neurotransmitter balance plays a critical role and supports the hypothesis that donepezil is the primary precipitating agent.

Of the 12 previously documented patients, who exhibited a range of cognitive impairment types and degrees and were between 50 and 81 years of age, nine were receiving donepezil treatment, and seven had mood disorders (4, 5). The time to manic episode exhibited variability, ranging from three days to three weeks after initiation or dose escalation of donepezil. Resolution of symptoms was observed within two weeks of cessation or discontinuation of the AChEI, either spontaneously or following treatment with an antipsychotic agent (4, 5).

It has been reported that bipolar disorder may be encountered in advanced age, particularly in the context of a neurodegenerative process, and may be aggravated by AChEIs. The condition is most commonly seen in cases of frontotemporal dementia, is the second most common in vascular dementia, and is least common in AD (6–8).

The presence of drug-induced mania should be considered in cases where there is a temporal correlation between the initiation of donepezil treatment and the onset of a new manic episode or following a dose increase. AChEIs must be used with caution in patients with a documented history of mood disorders, particularly bipolar I disorder.

Informed Consent: Written informed consents were obtained from the patients' relatives for the publication of anonymized case details.

Conflict of Interest: The author declares no conflict of interests.

Financial Disclosure: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data Availability Statement: Medical information about the patients can be shared anonymously upon formal request.

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LETTER TO THE EDITOR

Monozygotic twins diagnosed with selective mutism

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Dear Editor,

Selective Mutism (SM) is a disorder that typically manifests in early childhood and is characterized by the inability to speak in certain social situations where verbal communication is required. Its prevalence varies between 0.03% and 1% (1). Among the etiological factors, the literature refers to various influences such as genetic factors like CNTNAP2 gene polymorphism, overprotective and controlling parenting styles, immigrant status, and impairments in language development. Studies of children diagnosed with SM have observed behavioral patterns such as inhibited temperament and excessive avoidance, which are also considered potentially learned within the family context (2). Compared to other psychiatric disorders in childhood and adolescence, selective mutism is underdiagnosed and remains insufficiently studied. As a result, uncertainties surrounding its etiology and difficulties regarding its treatment persist. Although various heterogeneous factors, primarily "anxiety," particularly social anxiety (3), have been implicated in the etiology of SM, further studies are necessary to identify the underlying causes and to develop effective treatments.

The 7-year-old monozygotic twin sisters were brought to our polyclinic by their mother, who requested an evaluation for the children due to difficulties with "talking to strangers." This was their first visit. Prior to starting school, the twins spent most of their time at home, primarily playing with each other. They did not exhibit any social communication issues with family members at home. However, they had minimal interaction with individuals outside of their immediate family. When they began first grade, they were unable to attend school due to the Coronavirus Disease 2019 (COVID-19) pandemic, and their education continued online. Consequently, their teacher was unable to assess their progress. Upon transitioning to second grade, their teacher noticed that the twins showed signs of delayed literacy development compared to their peers, did not speak in the classroom, used minimal gestures for communication, and did not participate in any social interactions. The delay was evident in their homework as well. Following the family interview, it was understood that the twins had difficulty adapting to online classes during their first year of primary school. The twins' "shyness" condition persisted for six months.

During the psychiatric examination, the children showed no effective communication. They did not respond to questions posed to them but maintained eye contact. However, they did not use gestures or facial expressions. Their psychomotor activity was normal, and no stereotypy was observed. Their affect was inhibited and anxious. Their mental capacity assessment was suboptimal because of difficulties with talking but was roughly appropriate for their age group. Subsequently, the Wechsler Intelligence Scale for Children (WISC) was administered to assess the twins' cognitive abilities. Their WISC results could not be evaluated, as they refused to speak during the

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exam. Since it was not possible to administer cognitive tests to the twins, the Goodenough-Harris Draw-A-Person Test was conducted. The twins demonstrated normal performance for their age group. Therefore, intellectual disability was not considered to be a primary concern in these children.

The twins were born via cesarean section at the 30th gestational week, and both required a one-month stay in the neonatal intensive care unit because of respiratory distress. Their developmental milestones were reported as normal. The twins began walking at 14 months, produced their first words at 15 months, and started constructing sentences at 24 months. Their primary caregiver during childhood was their mother. No stressful life events were identified in the past. Medical examinations revealed no pathologies, and they had no additional medical conditions. There was no psychiatric diagnosis in the family history, though the mother's timid behavior was notably evident during the examination. When the mother was asked to elaborate on her own history, she described lifelong difficulty with speaking in public and feeling shy, but she had never sought psychiatric care. The mother described herself as a "self-sacrificing mother." She only thought of her daughters' well-being and hurried to meet their every need. In contrast, the father's attitude toward the twins was described as cold and distant. He came home late from work, had minimal interaction with his daughters and wife, and when he did interact, it was generally to "punish" the twins for their bad actions.

As a treatment option, although cognitive behavioral therapy (CBT)-based play therapy was initially recommended due to the twins' limited verbal communication, psychotherapy could not be initiated because of the family's economic and social disadvantages. Instead, pharmacological treatment with fluoxetine was commenced, and the dose was gradually increased up to 30 mg/day. To evaluate the effectiveness of the treatment, the Clinical Global Impression (CGI) scale was used, and the severity score prior to treatment was assessed as CGI-S: 6. At the first follow-up visit one month later, assessment revealed that difficulties in verbal communication in settings outside the home persisted, classroom participation remained limited, and the CGI-S score was still 6. Therefore, the fluoxetine dose was increased to 20 mg/day. At the second follow-up, partial improvement was observed; the twins had begun to initiate communication with peers, although difficulties in interacting with adults remained. The assessments were CGI-S: 4 and CGI-I: 3. In response, the fluoxetine dose was increased to 30 mg/day. However, no marked improvement was observed (CGI-S: 4, CGI-I: 3). No medication-related side effects were reported during the course of treatment.

Both genetic and environmental factors are implicated in the etiology of selective mutism. The clustering of SM and other anxiety disorders within families of individuals diagnosed with SM, along with the absence of SM in all individuals sharing the same environment, underscores the significance of genetic influences. In the presented case, the fact that both monozygotic twins—who share an identical genetic pool—were diagnosed with SM, along with the presence of anxiety traits in the mother, further supports the genetic theory. However, the role of environmental factors must not be overlooked.

Various theoretical models have been proposed to explain the etiology of SM, including psychodynamic models, behavioral models, and family systems theories. According to the behavioral model, the refusal to speak seen in SM is interpreted as a learned strategy employed to manipulate the environment in response to specific social triggers. As a result of this learning, behavioral inhibition and a freeze response associated with sympathetic nervous system activation may be observed (4). In the present case, the father's distant and punitive demeanor toward the children may have led to the development of mutism as a defensive mechanism aimed at avoiding punishment. However, the absence of mutism at home and the lack of avoidance behaviors weaken the applicability of this explanation in the current case.

According to the family systems model, another explanatory framework, the development and persistence of the disorder are influenced by an overly enmeshed and "neurotic" relationship—typically between the child and the mother. In this model, parents often display an excessive need to control their children, coupled with dependency and ambivalence. Consequently, children may develop intense, unhealthy attachments characterized by over-dependence, fear and distrust of the external world, fear of strangers, language and assimilation difficulties, and refusal to speak (4). In this case, the mother's anxious temperament, her sense of duty to instantly meet her children's needs, and her possible self-image as a "self-sacrificing mother"—which may provide secondary gain—support the relevance of this model. Furthermore, the close and undifferentiated relationship between the twins, their dependence on each other for social interaction, and their isolation from the outside world—which increased during the COVID-19 pandemic—may have played a role in the

development and continuation of their symptoms within the framework of this model.

A recent study suggests that positive (i.e., authoritative) parenting may be associated with a reduced risk for SM in children with high levels of anxiety and oppositionality. However, negative parenting was associated with SM only in children who exhibited fewer externalizing and internalizing behaviors (5). This finding further supports the family systems model.

Due to the strong genetic similarity of monozygotic twins, combined with environmental factors, it is possible for this disorder to manifest in both siblings. However, further research is needed to clarify the exact etiology.

Selective mutism is a rare psychiatric disorder that typically manifests in early childhood. Due to its early onset, pharmacological treatment is often avoided. Consequently, a treatment algorithm supported by robust evidence has yet to be established. A systematic review aimed to evaluate the existing studies up to that date but highlighted the limited number of available studies as a major constraint. The same review compared CBT, pharmacological treatment, and combination therapies, concluding that CBT was more effective than psychopharmacological agents. However, it was noted that the predominance of younger patients in the sample might have led to pharmacological agents being reserved for more severe cases, potentially biasing the results. Among psychopharmacological agents, fluoxetine was the most frequently used and was shown to be well tolerated (6). In a 12-week randomized controlled trial comparing fluoxetine (mean maximum dose of 21.4 mg) with placebo in 15 children, both groups showed improvement in selective mutism symptoms over the course of the study. The treatment group exhibited relatively greater improvement based on parent ratings, although no significant differences were observed in clinician or teacher ratings (7).

Treating monozygotic twins diagnosed with SM may present unique challenges due to their close social bond. Monozygotic twins inherently struggle with separating from one another and establishing individual identities. This challenge is often exacerbated by the inability of parents and society to distinguish between them as separate individuals. Studies suggest that the inability of twins to develop individual identities may lead to developmental delays, with mutual mirroring contributing to their isolation as a unit, which in turn hinders their language and intellectual development (8).

In the treatment of the twin cases we presented, it may be beneficial to increase stimulation by providing individualized time with the children and their family. Additionally, exposing the twins to environments where they can interact with their peers and socialize with strangers may be advantageous. It is also crucial to assess and treat the mother or father for any active psychopathology (e.g., the possibility of social anxiety disorder in the mother). This approach will not only improve mother-child communication but also help the mother recognize and adopt a more positive social role model. Lastly, continued psychotherapeutic and psychopharmacological treatment for the twins could potentially contribute to a faster recovery.

In this case, only the CGI scale was used for patient follow-up. The limited availability of validated assessment tools specific to SM in Turkish clinical practice represents a significant limitation in diagnosis and monitoring.

This case illustrates how shared genetics, enmeshed sibling relationships, and parental psychopathology may contribute to selective mutism. Further research is needed to refine treatment strategies for such complex presentations.

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LETTER TO THE EDITOR

Drug-induced stuttering associated with venlafaxine-olanzapine combination: A rare pharmacodynamic interaction

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Dear Editor,

Stuttering is a speech disorder characterized by disruptions in fluency and timing due to the repetition of sounds, syllables, or words. Although it is generally a developmental condition, it can also occur due to neurological or psychogenic causes, or as a rare adverse drug reaction (ADR) associated with various pharmacological agents. Stuttering has been particularly associated with hyperactivity of the dopaminergic system. Therefore, certain drugs such as antidepressants, antiepileptics, antipsychotics, and psychostimulants may contribute to the development of stuttering or trigger this condition (1–4). Among these, atypical antipsychotics and serotonin-norepinephrine reuptake inhibitors (SNRIs) have occasionally been linked to speech disturbances (3). We present a rare case of drug-induced stuttering following the combination of venlafaxine and olanzapine.

A 35-year-old male was admitted to our psychiatric unit after an acute suicide attempt. He was conscious, oriented, and cooperative, with a depressed affect and thought content dominated by family and marital stressors. No psychotic symptoms were observed, though passive suicidal and homicidal ideations were noted. Routine investigations, including bloodwork, inflammatory markers, urine toxicology, and cranial/cervical computed tomography (CT) imaging, were unremarkable. Psychodynamic evaluation revealed low stress tolerance and impaired impulse control. A diagnosis of major depressive disorder was made (5). Depressive symptoms had started approximately one month earlier, and this was the patient's second depressive episode.

Venlafaxine 37.5 mg/day was initiated and increased to 75 mg/day on day 3. Olanzapine 5 mg/day was added the same day. On the seventh day of combination therapy, the patient developed stuttering symptoms characterized by difficulty initiating speech, sound repetition, and anxiety. The patient had no personal or family history of stuttering, and there was no history of attention-deficit/hyperactivity disorder (ADHD) or tic disorders. The possibility of psychogenic stuttering was excluded based on detailed psychiatric and neurological evaluations. Neurological examination and vital signs were unremarkable. Given a suspected ADR, venlafaxine was discontinued. Further tests, including electroencephalography (EEG), cranial CT, diffusion magnetic resonance imaging (MRI), and magnetic resonance (MR) angiography, were all normal. Ear, nose, and throat (ENT) consultation showed normal findings. The Naranjo ADR Probability Scale score was 6 (probable ADR). As symptoms persisted, olanzapine was discontinued on day 16. By day 23 (seven days after stopping olanzapine), speech returned to normal. Mirtazapine 15 mg/day was initiated as an alternative.

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The neurobiology of drug-induced stuttering is not fully understood. Hypothesized mechanisms include dopaminergic overactivity, reduced gamma-aminobutyric acid (GABAergic) inhibition, anticholinergic effects, and serotonergic dysregulation (1). While olanzapine has been implicated in inducing stuttering (4, 6), it has also been reported as beneficial in rare cases (7). This paradox may reflect individual differences in dopaminergic-cholinergic balance (3).

In our case, stuttering followed venlafaxine dose escalation and olanzapine initiation. Venlafaxine enhances serotonergic tone and may indirectly affect dopamine pathways. Olanzapine acts on dopamine and serotonin receptors and has anticholinergic properties (1, 3). Their combination may result in a pharmacodynamic interaction impairing speech fluency. Some reviews also suggest that serotonergic agents may influence basal ganglia circuits involved in speech (1). Serotonergic drugs disrupt the balance of dopamine and glutamate in the basal ganglia, impairing motor control. This disruption can interrupt the flow of speech and cause stuttering (3).

Only one prior case describes a similar phenomenon (6): stuttering began four days after olanzapine (10 mg/day) was added to ongoing venlafaxine (150 mg/day), resolving two days after stopping olanzapine. In our case, stuttering began on day 10 and resolved seven days after stopping olanzapine, despite venlafaxine already being withdrawn. These cases support a potential interaction between venlafaxine and olanzapine in the pathogenesis of stuttering.

Following symptom resolution, mirtazapine was initiated at 15 mg/day and increased to 30 mg/day on day 3. At the one-month follow-up, the dose was increased to 45 mg/day due to residual depressive symptoms, resulting in clinical improvement. Mirtazapine has not been associated with stuttering and was well tolerated. Written informed consent was obtained from the patient for the publication of this case report.

In conclusion, clinicians should consider ADRs in new-onset stuttering, especially when multiple psychotropics are used. Focusing on the rare occurrence of stuttering induced by the combination of olanzapine and venlafaxine, this case emphasizes the importance of close patient monitoring and step-by-step treatment planning to manage unexpected side effects efficiently. Early recognition may prevent unnecessary neurological evaluations and guide treatment adjustments.

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LETTER TO THE EDITOR

When psychiatric symptoms are left unaddressed: Wernicke encephalopathy after sleeve gastrectomy

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Dear Editor,

Wernicke encephalopathy (WE) is a neuropsychiatric condition most commonly resulting from thiamine (vitamin B1) deficiency, often associated with chronic alcohol use. It is characterized by a clinical triad of altered mental status, ophthalmoplegia, and ataxia (1). If not promptly recognized and adequately treated, WE carries a high risk of progression to more severe and irreversible conditions such as Korsakoff syndrome, which is marked by memory impairment and confabulation (2). The reported prevalence of WE is 0.04–0.13% in clinical settings and 0.8–2.8% in autopsy studies, suggesting that the disorder is considerably underdiagnosed (3). In recent years, the increasing number of bariatric surgical procedures has been accompanied by a notable rise in WE cases (4). Postoperative factors such as insufficient dietary intake, inadequate supplementation of thiamine and magnesium, reduced absorption from the gastric and duodenal mucosa, persistent vomiting, and rapid weight loss are recognized contributors to the development of WE (3, 4). In this context, a thorough psychosocial evaluation is of critical importance, as unmanaged or masked affective symptoms in the preoperative period may exacerbate metabolic, somatic, and psychiatric complications in the postoperative course (5).

In the present case, a 26-year-old woman developed Wernicke encephalopathy one month after undergoing sleeve gastrectomy, during a period in which she was coping with bereavement through suppression. This case underscores the importance of thorough psychosocial assessment prior to bariatric surgery. She had a history of generalized anxiety disorder and major depressive disorder, with symptoms well controlled on sertraline 100 mg/day, lamotrigine 50 mg/day, and lorazepam 1 mg/day. Since childhood, the patient had experienced bullying and social stigmatization due to her overweight status, and her physical appearance had frequently been a source of mockery in social settings. During her postgraduate education, she continued to be subjected to humiliating and stigmatizing behaviors from peers, which further reinforced her perception that bariatric surgery had become an inevitable decision. Despite the loss of her grandmother, who had raised her and to whom she was deeply attached, the patient remained determined to proceed with the operation. The patient discontinued all psychiatric medications, believing they would interfere with the operation, and concealed her psychiatric history from the surgical team. The immediate postoperative course was uneventful; however, upon transitioning to solid foods, she developed nausea, vomiting, and epigastric pain. Proton pump inhibitors prescribed

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for these symptoms caused diffuse papulopustular skin eruptions. Unable to tolerate the medication and failing to establish effective communication with her medical team, she subsisted for nearly one month solely on fruit juice and milk, believing she could manage her symptoms independently. Over time, the nausea and vomiting were accompanied by excessive sleepiness, difficulty comprehending speech, restlessness, dizziness, gait instability, and lower limb weakness. She presented to the emergency department in a lethargic state. On initial evaluation, her temperature was 36.7°C, heart rate 140 bpm, blood pressure 140/70 mmHg, respiratory rate 18/min, and oxygen saturation 97%. She was lethargic with a Glasgow Coma Scale score of 13 (Eye opening [E]: 4, Motor response [M]: 5, Verbal response [V]: 4). Skin turgor was decreased, and capillary refill time was prolonged (>2 seconds). Neurological examination revealed right lateral gaze restriction, binocular diplopia, horizontal nystagmus, proximal muscle weakness, and ataxia. Self-care was markedly reduced, and her mood was anxious and distressed. A diagnosis of WE was established, and she was started on intravenous thiamine 200 mg three times daily. Within three days of supplementation, all neurological symptoms showed a dramatic improvement. The patient was discharged with a revised vitamin supplementation regimen, a tailored dietary plan, and scheduled supportive psychotherapy.

In this case, thiamine deficiency secondary to impaired gastrointestinal absorption, persistent vomiting, and malnutrition precipitated WE. A systematic review of 36 studies has demonstrated that maladaptive eating behaviors, anxiety, and depressive symptoms increase the likelihood of postoperative complications and treatment failure after bariatric surgery (5). The National Institute for Health and Clinical Excellence (NICE) recommends that all candidates for bariatric surgery receive multidisciplinary psychological support in both the preoperative and postoperative periods (6). In the present case, unresolved preoperative psychiatric symptoms, together with maladaptive coping mechanisms, may have facilitated or increased vulnerability to the development of WE. Understanding the dynamic factors underlying the patient's insufficient pursuit of treatment, despite significant somatic symptoms, is of particular importance. The patient had a history of significant allergic predisposition and an atopic immune profile, including recurrent emergency visits for allergic rhinitis and asthma, as well as two previous head-neck surgeries in childhood. She reported longstanding avoidance of hospitals due to these experiences and frequent stigmatization related to her obesity. Following surgery, proton pump inhibitors prescribed for epigastric complaints resulted in drug eruptions, and because she was unable to communicate effectively with the surgical team located in another city, she avoided seeking further medical advice. This pattern illustrates how psychosocial factors, particularly avoidance related to social stigma and maladaptive cognitions, interacted with her somatic symptoms and contributed to the development of WE.

Patients who may conceal symptoms or present themselves as healthier than they are "*out of concern that their condition might delay surgery*" require targeted interventions. For individuals with obesity, bariatric surgery can be reinterpreted not merely as a medical procedure but as a form of "*liberation*," "*freedom*," or "*rebirth*" following years overshadowed by body image difficulties and weight-related stigma (7). In such cases, psychodynamic processes should be explored with particular care. When any psychiatric disorder or risk factor likely to impair postoperative adjustment mechanisms is identified during the preoperative evaluation, the implementation of a multidisciplinary psychosocial intervention program, one that is cost-effective, of adequate duration, and acceptable to the patient, is essential.

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LETTER TO THE EDITOR

When daydreams get out of control: An overlooked clinical presentation

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Dear Editor,

Daydreaming is a mental activity experienced by almost everyone and often involves unconscious processes (1). However, when it occupies a significant portion of an individual's daily life, impairs functioning, interferes with fulfilling responsibilities, and leads to significant psychological distress, it is considered a clinical condition known as "maladaptive daydreaming (MD)" (2). First described in 2002, MD is not yet included in diagnostic manuals such as the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) or the International Classification of Diseases (ICD-11) (3). Although its estimated prevalence is 2.5%, MD remains underrecognized, potentially leading to poorer clinical outcomes (2).

Several factors contribute to the frequent oversight of MD in clinical settings. First, its phenomenology overlaps considerably with established psychiatric conditions such as Attention-Deficit/Hyperactivity Disorder (ADHD), depression, and dissociative disorders, often resulting in the misattribution of symptoms (4, 5). Second, the lack of formal diagnostic criteria in major nosological systems fosters uncertainty among clinicians regarding its status as a distinct disorder (3). Third, the scarcity of systematic research and validated assessment tools—especially across different languages and cultures—has limited both awareness and evidence-based treatment approaches (6). Finally, there is an ongoing debate in the literature regarding whether MD should be conceptualized as a pathological condition or as an extreme variant of normal imagination, further complicating recognition and intervention (4, 6).

In recent years, a growing number of online communities have formed, composed of individuals who seek help at mental health centers for daydreaming-related symptoms but have not received adequate responses in clinical practice. Many of these individuals reported that they had finally found a definition that matched their experiences within these communities (2). In this context, given both the frequent oversight of MD and the limited research in this area, we present this letter to contribute to the growing literature and illustrate the clinical relevance of MD through a representative case from our practice. Specifically, we aim to draw attention to the diagnostic and therapeutic challenges associated with MD, including the presence of comorbid psychiatric conditions, symptom overlap with other disorders, and persistent functional impairment despite standard outpatient treatment. Through this case, we highlight the complexities that clinicians may encounter and emphasize the need for increased awareness and further research on MD.

A 15-year-old girl presented to the child psychiatry outpatient clinic with complaints of daydreaming and self-talk. Her daydreaming reportedly began after

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her father, who had been working abroad, returned home due to the Coronavirus Disease 2019 (COVID-19) pandemic. These symptoms gradually worsened, particularly when she was with both parents during their arguments. The patient reported having a poor relationship with her father, believing that he did not love her. She also expressed that her symptoms made her feel content, as they resulted in increased attention from him. Although she was able to distinguish fantasy from reality, she stated that she felt happier in her imaginary world and preferred it over real life because of the unhappiness she experienced. She spent most of her day in her room, and her academic performance, social relationships, and self-care all significantly declined. She had recently developed urinary and fecal incontinence. She also described forgetfulness, distractibility, and difficulties in organizing tasks.

To rule out a possible organic etiology, the patient underwent evaluations in general pediatrics and pediatric neurology. No abnormalities were found on physical examination, biochemical tests, electroencephalography, or brain magnetic resonance imaging (MRI). Her birth and developmental history were unremarkable, and no psychiatric disorders were identified in her family. On a mental status examination, she was conscious and fully oriented. No perceptual or memory disturbances were observed. Attention and concentration were impaired. Her mood appeared depressed, and her affect was blunted. Insight was intact. Her intellectual functioning was clinically normal. Psychometric assessments, including both the Conners Rating Scale and the Atilla Turgay Scale, revealed elevated scores for inattention, indicating clinically significant attentional difficulties. Her total score on the Beck Depression Inventory was 24, which is consistent with moderate depressive symptoms, whereas scores on the Positive and Negative Syndrome Scale and the Dissociative Experiences Scale were within subclinical ranges, helping to rule out psychotic or dissociative disorders. The Wechsler Intelligence Scale for Children–Fourth Edition (WISC-IV) assessment revealed a full-scale IQ of 70. Despite this borderline score, the patient's day-to-day functioning appeared largely consistent with age-appropriate daily life abilities, highlighting that borderline test scores do not necessarily correspond to clinically significant impairment. She demonstrated a relatively preserved Verbal Comprehension Index (VCI=94) and Perceptual Reasoning Index (PRI=85), whereas the Working Memory Index (WMI=71) and Processing Speed Index (PSI=62) were lower. These lower scores likely reflect attentional difficulties, distractibility, and challenges in organizing and completing tasks, and may be exacerbated by daydreaming. Together, these results, combined with structured interviews and behavioral observations, supported the diagnoses of attention-deficit/hyperactivity disorder and major depressive disorder (MDD).

During follow-up, sertraline 50 mg/day and aripiprazole 5 mg/day were initiated for MDD and continued for approximately six months, leading to partial improvement in daydreaming, self-care, and depressive symptoms. However, owing to weight gain as a side effect, the patient exhibited reduced adherence, resulting in the gradual discontinuation of both medications. This limited adherence and brief treatment duration may have constrained the overall therapeutic response. Subsequently, fluoxetine 20 mg/day was initiated and continued for approximately two years, during which depressive symptoms were largely controlled, while daydreaming persisted. For ADHD, methylphenidate was started at 18 mg/day and titrated to 36 mg/day, yielding partial benefits in attention and executive functioning over the two-year period, although residual attentional difficulties persisted alongside ongoing daydreaming. Throughout follow-up, structured patient and parent interviews were conducted within the framework of cognitive-behavioral therapy (CBT) principles, allowing systematic monitoring of symptoms, functional outcomes, and treatment adherence. Despite combined pharmacological treatment and CBT-based interventions, functionally impairing daydreaming behaviors persisted, leading to admission to a day clinic for closer observation and clarification of the diagnosis. Following in-depth interviews and clinical monitoring in the day clinic, along with a review of the literature, the patient's clinical presentation was considered most consistent with MD. Written informed consent was obtained from the patient and her parents.

Maladaptive daydreaming is characterized by spending a significant portion of the day engaging in dreaming and experiencing an irresistible urge to continue doing so. Individuals often disconnect from the external world, and this condition negatively affects interpersonal relationships, academic or occupational performance, and sleep. While daydreaming typically occurs silently and internally, individuals with MD may display behaviors such as speaking, whispering, lip movements, facial expressions, or repetitive motor activities (3). In our case, the patient was aware that her fantasies were imaginary, yet was unable to control them. These symptoms, together with reduced self-care, social withdrawal, academic decline, whispering,

and physical movements during daydreaming episodes, all pointed toward a diagnosis of MD.

Maladaptive daydreaming is frequently reported to be comorbid with various psychiatric disorders, most commonly ADHD, anxiety disorders, MDD, and obsessive-compulsive disorder (7). In a study examining the comorbidity of MD and ADHD, patients described attention problems not as a primary complaint but rather as a result or secondary effect of their compulsive daydreaming behavior (8). Clinical observations suggest that MD often serves as an escape from distressing or depressive life circumstances and has a compulsive nature (7). Consistent with findings in the literature, our case also involved comorbid diagnoses of ADHD and MDD. While the patient's full-scale IQ was within the borderline range, her overall clinical functioning was largely age-appropriate, underscoring the limited predictive value of psychometric scores in isolation. More informative than the global IQ was the specific subscale pattern: strengths in verbal comprehension and perceptual reasoning contrasted with weaknesses in working memory and processing speed. These weaknesses, rather than representing global cognitive impairment, likely created a vulnerability to attentional lapses and disorganization. Importantly, MD appeared to interact with these vulnerabilities, further intensifying functional difficulties. In this way, MD may act as a maladaptive coping mechanism that magnifies subtle cognitive weaknesses and leads to disproportionate impairment in daily functioning, including academic performance and self-care.

Additionally, the onset of her daydreaming behavior coincided with the pandemic—a period of increased stress. Her symptoms intensified during times when she spent more time with her father, with whom she had a strained relationship, and when parental conflicts were more frequent. The fact that she reported feeling happy in her fantasy world suggests that her daydreaming provided secondary gains, such as escape from conflict, avoidance of responsibilities, and a means of attracting parental attention.

The differential diagnosis of MD should include ADHD, sluggish cognitive tempo (SCT), psychotic disorders, and dissociative disorders (4). In our case, the absence of core SCT features—such as mental slowness, lethargy, and physical underactivity—helped rule out SCT. The patient's intact insight and normal perceptual findings excluded a psychotic disorder. Her awareness that the imaginary characters were fictional, the absence of memory gaps, and the preservation of orientation argued against a dissociative disorder.

Maladaptive daydreaming has not yet been formally recognized as a psychiatric disorder, complicating diagnosis and treatment due to the lack of consensus (9). Although a scale developed for diagnosis—Maladaptive Daydreaming Scale—exists, Turkish validation and reliability studies have not yet been conducted (5). Individuals with MD often report that clinicians are unfamiliar with the condition, fail to provide adequate support, and that existing interventions are generally ineffective (10). In our patient, despite outpatient treatment, functional impairment persisted, leading to day clinic admission. Day clinic follow-up enabled comprehensive observation and structured interviews, which played a critical role in clarifying the diagnosis in cases where the clinical picture had previously been difficult to interpret. Moreover, reduced adherence due to medication side effects, such as weight gain, may have limited the potential therapeutic response, highlighting the challenges in managing comorbid disorders alongside MD. This case highlights that current diagnostic and treatment approaches may be insufficient for individuals with MD and that structured treatment settings such as day clinics may offer diagnostic and therapeutic benefits. CBT, motivational interviewing, and mindfulness meditation have been suggested to be potentially beneficial in the treatment of MD (11, 12). However, the implementation details and effectiveness of these methods are still supported by a limited number of studies. To date, no pharmacological treatment targeting MD has been studied.

In conclusion, MD is an underrecognized condition that is not included in current diagnostic systems but can cause significant functional impairment. Clinicians should consider MD as a potential diagnosis when excessive daydreaming leads to functional decline. Greater clinical awareness and further research on MD are essential.

Informed Consent: Written and verbal informed consent was obtained from the patient and her family.

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All figures should be submitted as separate high-quality digital files in JPEG format through the online submission system, in addition to being included at the end of the main document with their corresponding legends. Electronic images (e.g., photographs, radiographs, CT scans) must have a minimum resolution of 300 dpi to ensure print quality.

4.3.4. Author Contribution Form

This form must clearly specify the individual contributions of each author according to the ICMJE criteria. Each author should have participated in the conception, design, data acquisition, analysis, and/or interpretation, as well as in drafting or revising the manuscript and approving its final version. Authors who do not meet all authorship criteria should be listed in the acknowledgments section.

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This form confirms that the submitted manuscript is original, unpublished, and not under consideration elsewhere. It also verifies that all authors approve the submission and agree to transfer the copyright to Dusunen Adam Journal of Psychiatry and Neurological Sciences under the CC BY-NC 4.0 license. The form must be signed by all authors before publication.

4.3.6. Declaration of Interest Form

All authors must disclose any financial, institutional, or personal relationships that could be perceived as influencing the research. If no conflicts exist, this must be explicitly stated. The form also includes a section for declaring financial support or grants related to the study.

4.4. Manuscript Types

Dusunen Adam Journal of Psychiatry and Neurological Sciences accepts various types of submissions, including research articles, brief reports, systematic reviews and meta-analyses, and letters to the editor. Guest editorials are accepted by invitation only. Authors are encouraged to select the manuscript type that best represents the scope, design, and contribution of their study. The specific structure, length, and formatting requirements for each manuscript type are detailed below.

4.4.1. Research Articles

Research articles present substantial and original scientific findings within the scope of the journal. Each research article should contain an abstract, keywords, introduction, methods, results, discussion, conclusion, references, and tables or figures. The abstract and main text must follow the structured format described above. Ethics committee approval and informed consent information must be obtained and clearly stated in the manuscript.

4.4.2. Brief Reports

Brief reports follow the same general format and guidelines as research articles but focus on small-scale studies or research in early stages of development. They may include preliminary investigations with simple research designs or small sample sizes that provide initial findings and pilot data suggesting the need for further research. Ethics committee approval and informed consent information should also be obtained and clearly stated in the manuscript.

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Systematic reviews and meta-analyses should address a clearly defined, relevant, and up-to-date research question within the scope of the journal. Only manuscripts that adhere to recognized methodological standards (such as PRISMA) or registered protocols (e.g., PROSPERO) and demonstrate a systematic approach will be considered for review. Narrative, scoping, or other non-systematic reviews are not accepted. Systematic reviews and meta-analyses should include an abstract, keywords, introduction, methods, discussion, and conclusion, with additional subheadings adapted to the content as appropriate, as well as references and tables or figures.

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Letters to the Editor are considered only if they do not exceed 750 words, include no subheadings, and contain a maximum of one table or figure (or up to two figures). All letters must begin with "Dear Editor" and, if commenting on previously published articles, be submitted within one month of publication. Letters may also present small-scale research or concise discussions of timely clinical topics.
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Guest Editorials are invited opinion articles written by experts or researchers who have made significant contributions to a specific field. These articles aim to evaluate and discuss the current state of knowledge, recent developments, and emerging perspectives on topics relevant to clinical practice. Guest Editorials are accepted by invitation only and are not open to regular submission. Manuscripts should include an introduction and a conclusion, along with any additional subheadings considered appropriate by the author. Guest Editorials are not sent for external peer review; they are evaluated by the Editorial Board before publication.

Table: Manuscript types and corresponding word, abstract, reference, and table/figure

Type of manuscript	Word limit	Abstract word limit	Reference limit	Table/ figure limit (total)
Research article	3500	250 (*structured*)	50	6
Systematic reviews and meta-analyses	4000	250	No limit	10
Brief report	1500	250 (*structured*)	15	2
Letter to the editor	750	No abstract	10	1
Guest editorial	1200	No abstract	20	2

Information For Reviewers

1. GENERAL INFORMATION

Dusunen Adam Journal of Psychiatry and Neurological Sciences publishes high-quality research and scholarly work in psychiatry, neurology, clinical psychology, and neuroscience. The journal promotes interdisciplinary perspectives on mental health and brain sciences and prioritizes studies offering novel insights with clear relevance to clinical practice.

The journal accepts submissions in the following categories:

- Research articles
- Brief reports
- Systematic reviews and meta-analyses
- Letters to the editor
- Guest editorials (invited, not peer-reviewed)

The journal employs a double-blind peer review process in accordance with the Committee on Publication Ethics (COPE) and the European Association of Science Editors (EASE) guidelines.

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The journal follows a double-blind peer review process in which both authors and reviewers remain anonymous. All submissions are initially assessed by the Editor-in-Chief or Deputy Editors for scope, originality, methodological rigor, scientific quality, and ethical compliance before being sent for external review.

Authors must confirm that the manuscript has not been published or submitted elsewhere and that all listed authors have approved the submission. Manuscripts should be submitted exclusively through the journal online submission system (eJManager), while reviewers access assignments via the Reviewer Login section on the journal's website.

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- If you choose to upload an additional document, ensure that it does not contain any reviewer-identifying information.
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- Clearly identify major and minor issues, suggesting ways to strengthen the study.
- Conclude with a clear recommendation: accept, revise, or reject.
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Before submitting your review, ensure that you have considered:

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Journal of Psychiatry and Neurological Sciences

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Explanations: .....

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