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The Perceived Ability to Cope with Trauma Scale: A Russian-Language Adaptation

«Шкала воспринимаемой способности справиться с травмой»: русскоязычная адаптация

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Original research

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ABSTRACT

BACKGROUND: The “Perceived Ability to Cope with Trauma Scale” (PACT) is designed to assess individuals’ perceptions of their ability to use various coping strategies when facing potentially traumatic events. These include focusing on the cognitive processing of the trauma (the “Trauma Focus” subscale) and overcoming the trauma (the “Forward Focus” subscale). The key advantages of the PACT scale include an emphasis on perceived self-competence, the absence of the “flexibility/rigidity” dichotomy, and moderate correlations with distress that confirm discriminative validity.

AIM: To adapt the PACT scale for the Russian population and conduct a psychometric assessment of its Russian-language version.

METHODS: The adaptation procedure included direct and reverse translations of the PACT scale and expert assessment of their quality. To validate the adapted version of the PACT questionnaire, a survey was conducted involving adults who had experienced at least one potentially traumatic event (with assessment according to the Life Events Checklist for DSM-5). The sample was made up of civilians and employees of emergency services (firemen, rescue workers, physicians, psychologists). The psychometric assessment included a check of the factor structure, assessment of sex, age, occupation, and post-traumatic status invariance, as well as assessment of internal consistency and test-retest reliability. The International Trauma Questionnaire and Depression Anxiety and Stress Scale-21 were used to test convergent validity.

RESULTS: A psychometric assessment of the adapted version of the PACT scale was conducted with 1,054 respondents (56% male) with a mean age of 37.2 (standard deviation 9.54) years. Confirmatory factor analysis confirmed the two-factor structure of the scale, complete invariance by age and partial invariance by sex, occupation, and post-traumatic status. The reliability coefficients (Cronbach’s α and McDonald’s ω) showed good values for the “Trauma Focus” subscale (ω=0.810, α=0.806) and the “Forward Focus” subscale (ω=0.896, α=0.893). The test-retest reliability was partially confirmed. The convergent validity of the adapted version of the PACT scale was confirmed: symptoms of distress and post-traumatic stress were negatively correlated with the score on the “Forward Focus” subscale and positively correlated with the “Trauma Focus” score.

CONCLUSION: The Russian-language version of the PACT scale is valid, reliable, and can be used to assess the perceived ability to cope with trauma for research or counseling purposes.

АННОТАЦИЯ

ВВЕДЕНИЕ: «Шкала воспринимаемой способности справиться с травмой» (The Perceived Ability to Cope with Trauma Scale, PACT) разработана для оценки представлений о собственной способности использовать различные стратегии совладания при столкновении с потенциально травмирующими событиями. К ним относятся концентрация на когнитивной обработке травмы (субшкала «Фокус на травме») и преодоление травмы (субшкала «Фокус на будущем»). Шкала PACT обладает такими ключевыми преимуществами, как акцент на воспринимаемой субъективной компетентности, отсутствие дихотомии «гибкость — ригидность», умеренные корреляции с дистрессом, подтверждающие дискриминативную валидность.

ЦЕЛЬ: Адаптировать для российской популяции шкалу PACT и провести психометрическую оценку ее русскоязычной версии.

МЕТОДЫ: Процедура адаптации предполагала прямой и обратный переводы шкалы PACT и экспертную оценку их качества. С целью валидации адаптированной версии опросника PACT проведено исследование с участием взрослых лиц с опытом как минимум одного потенциально травмирующего события (оценка по чек-листу жизненных событий LEC-5). Выборку составили гражданские лица и сотрудники служб экстренного реагирования (пожарные, спасатели, врачи, психологи). Психометрическая оценка включала проверку факторной структуры, оценку инвариантности по полу, возрасту, профессиональной принадлежности и посттравматическому статусу, а также оценку внутренней согласованности и тест-ретестовой надежности. Для проверки конвергентной валидности использовались «Международный опросник травмы» (ITQ) и «Шкала депрессии, тревоги и стресса — 21» (DASS-21).

РЕЗУЛЬТАТЫ: Психометрическая оценка адаптированной версии шкалы PACT проведена при участии 1054 респондентов (56% мужчины), средний возраст — 37,2 (стандартное отклонение 9,54) года. Конфирматорный факторный анализ подтвердил двухфакторную структуру шкалы, полную инвариантность по возрасту и частичную по полу, профессиональной деятельности и посттравматическому статусу. Коэффициенты надежности α Кронбаха и ω Макдоналда показали хорошие значения для субшкалы «Фокус на травме» (ω=0,810, α=0,806) и субшкала «Фокус на будущем» (ω=0,896, α=0,893). Тест-ретестовая надежность подтвердилась частично. Подтверждена конвергентная валидность адаптированной версии шкалы PACT: установлена отрицательная корреляция оценки по субшкале «Фокус на будущем» и положительная — по субшкале «Фокус на травме» с симптомами дистресса и посттравматического стресса.

ЗАКЛЮЧЕНИЕ: Русскоязычная версия шкалы PACT валидна, надежна и может использоваться для оценки воспринимаемой способности справиться с травмой в исследовательских или консультативных целях.

Keywords: *traumatic stress; post-traumatic stress disorder; forward focus; trauma focus; flexibility; psychometric assessment; reliability; validity; factor structure*
Ключевые слова: *травматический стресс; посттравматическое стрессовое расстройство; фокус на будущем; фокус на травме; гибкость; психометрическая оценка; надежность; валидность; факторная структура*

INTRODUCTION

Potentially traumatic events are an integral part of the human experience and a serious challenge for the individual. Cohort studies examining the adaptation process after experiencing potentially traumatic events have shown that more than 10% of people experience one or more delayed effects over time, such as depression (16%), generalized anxiety disorder (11%), psychoactive substance abuse (10%), and post-traumatic stress disorder (PTSD) (10%), agoraphobia (10%), social phobia (7%), panic disorder (6%), and obsessive-compulsive disorder (4%) [1]. The ability to cope [2] and psychological flexibility [3] are often considered to be the basic mechanisms of resilience, that is, the complete absence of functional disorders or some dysfunction at a stable minimum level.

Flexibility in coping with a traumatic experience involves the use of two seemingly opposite strategies. The first is the cognitive processing of the trauma, the way the person views, interprets, and integrates the traumatic experience into their system of beliefs about themselves, other people, and the world in general [4]. It involves establishing an emotional contact with the traumatic event through the acceptance and integration of experiences, rather than their displacement or negation. The second strategy is aimed at restoring the usual life and involves moving forward, involvement in the present, setting new goals, and forming positive expectations about the future [5]. The ability to use each strategy in a flexible, harmonious way organized in accordance with the changing circumstances of different situations is key to the effectiveness of an individual's stress-coping behavior [6].

A meta-analytical review on coping flexibility and psychological adaptation discusses psychodiagnostic tools for measuring coping flexibility in some detail [7]. The competitive advantages of the "Perceived Ability to Cope with Trauma Scale" (PACT) developed by a group of scientists led by G.A. Bonanno in 2011 make it stand out from all other tools [6]. While other tools are more focused on measuring actual behavioral manifestations, the PACT scale is considered to be a subjective, phenomenological measure of the ability to cope with difficulties [7]. In other words, unlike tools that assess the application of specific coping strategies, PACT focuses on a subjective assessment of coping ability, switching flexibly between strategies whose effectiveness depends on the context and circumstances of the situation. Whereas other tools contrast flexibility and rigidity as poles of the same scale, PACT avoids this dichotomy and the resulting methodological complexity. The PACT scale also demonstrates predictable moderate associations with psychological distress, which confirms its discriminative validity, resolving the issue of excessive multicollinearity with other tools [7].

The PACT scale includes a measurement of two cognitive types of processing of a potentially traumatic event: "Trauma Focus" (TF) and "Forward Focus" (FF). "Trauma Focus" describes the ability to temporarily withdraw from daily routine and social obligations, an attempt to fully focus on the memories, details, and emotions associated with the event, cognitive processing of the experience and reducing its emotional intensity. In turn, "Forward Focus" describes the presence of active and future-oriented strategies in an individual: the ability to be distracted, to remain calm and optimistic, to focus on current goals and plans, to find a reason to be happy and to take care of others. Both strategies for handling potentially traumatic experiences are combined into a single parameter ("Flexibility"), since the ability to use each strategy is key to the effectiveness of an individual stress coping behavior [6].

The original version of the PACT scale was prepared in English and then translated into Hebrew and validated with the participation of 315 students (65% female, mean age 26.1 years, SD=3.3) of The Hebrew University (Jerusalem) with a potentially high degree of trauma due to a terrorist threat [6]. After that, the English version was tested on 106 American college students (65% women, mean age 21.02 years, SD=0.47) [6, 8]. As a result, convergent and discriminative validity, psychometric stability, and sufficient consistency of estimates in both samples were confirmed. In addition to English [6] and Hebrew [6], the PACT scale has been translated into Chinese [9], Korean [10], Italian [11], European Portuguese [12], and Turkish [13]. The two-factor structure of the PACT scale was confirmed for all versions of the questionnaire, including the Chinese [9] and the Korean [10] ones, despite the specific cultural context. In the Italian version, the structure was also two-factor, but the number of items was reduced from 20 to 14 [11]. In all adaptations, internal consistency (Cronbach's α and McDonald's ω) was good or acceptable, indicating that the PACT scale was reliable. However, explicit verification of the convergent validity of the PACT scale by checking the relationship with other scales evaluating a similar construct was not performed because of its complexity. The authors of the original version of the questionnaire and all its adaptations used a different approach to evaluating validity — they correlated empirical data with theoretically expected external correlations. Symptoms of PTSD [6, 10, 13], depression and general psychological distress [9, 10, 12], emotional regulation strategies and ego-resiliency [6, 13], health-related quality of life and self-efficacy [12], as well as the attachment style, optimism, social desirability, neuroticism, and strength of character [6] were used as external validity metrics. The external validity of the PACT scale was confirmed in each of the mentioned studies. To the best of our knowledge, no adaptation of the PACT scale for the Russian-speaking population has been carried out to date. However, notably, the results of our preliminary analysis of the PACT scale were presented earlier as part of A.V. Gordeeva's final qualification work [14].

The aim of this survey is to adapt the PACT scale for the Russian population and conduct a psychometric assessment of its Russian-language version.

Study hypotheses:

- H1: The Russian version of the PACT scale retains the two-factor structure of the original version;
- H2: The symptoms of PTSD as measured using the International Trauma Questionnaire (ITQ), and symptoms of anxiety, depression, stress, and general psychological distress as measured using the Depression Anxiety and Stress Scale-21 (DASS-21), are negatively correlated with the score on the "Forward Focus" subscale and positively correlated with the "Trauma Focus" score.

METHODS

Scale characteristics

The PACT scale consists of 20 statements grouped into two subscales [6]: "Trauma Focus" and "Forward Focus" (see Appendix 1 in the Supplementary). The "Trauma Focus" subscale includes 8 items and is designed to assess cognitive processing of potentially traumatic experiences (items TF6 and TF20); deliberate reduction in social interactions and withdrawal from communication (items TF7 and TF10); focus on processing the traumatic material, analysis of the event, its meaning and details (items TF12 and TF19); revision of goals, plans and obligations (items TF11); and awareness of current reality (items TF14) [6]. The "Forward Focus" subscale consists of 12 items and, conversely, reflects the maintenance of a daily routine and focus on current goals and plans (items FF1 and FF4); the frequency of interaction with other people, including for the sake of comfort, care, and support (items FF2 and FF16); an optimistic view of the future (items FF3 and FF17); the ability to get distracted from negative and anxious thoughts (items FF5 and FF13); the ability to enjoy current events (items FF8 and FF15); the desire to reduce mental pain (items FF9); and calmness (item FF18) [6].

The assessment for each item in the original version of the PACT is carried out using a 7-point Likert scale. However, in agreement with the author of the questionnaire (B.G.A.), we used an even 8-point scale with a relative zero and a range from 0 to 7, where 0 is "not at all capable" and 7 is "fully capable". The original markers (anchors) of the PACT scale, "not at all capable" to "fully capable", were retained. Even high-dimensional scales provide a number of advantages: the absence of an ambiguous, non-interpretable mean [15], greater accuracy of measurement due to greater variability of responses [15], and the possibility of considering the resulting series of values as an interval, rather than an ordinal variable [16].

Based on the total scores on the "Trauma Focus" and "Forward Focus" subscales, the integral "Flexibility" score was calculated (see Appendix 1 in the Supplementary).

Scale Russian translation and adaptation

Permission to adapt the PACT scale into Russian was obtained from one of the authors (B.G.A.) of the original version of the questionnaire. When translating, we followed the recommendations of the International Test Commission (ITC) for adapting the tests [17]. The direct translation of the name of the scale, instruction, test items, Likert assessment scale, and PACT scales from English to Russian was performed by the Russian-speaking author (Sh.T.A.), an English-speaking expert in the field of psychometry and the psychology of traumatic stress. The translation was independently evaluated by two bilinguals: a psychologist with an Oxford PhD (Yu.D.V.) and a professional translator, a linguist (S.A.G.). Any disagreement of the experts with the presented translation, as well as comments, clarifications, and remarks, were discussed by the author (Sh.T.A.) and the experts until a consensus was reached. After that, the author (Sh.T.A.) performed the reverse translation, and two experts, English teachers who were not involved in the direct translation, checked the linguistic equivalence of the original version and the reverse translation. As a result, the instruction, the Likert assessment scale, and the names of the subscales represent an almost literal translation from English, while Russia's cultural context has affected the content of some items (see Appendix 2 in the Supplementary). The most significant difference from the literal translation is item FF18: "*Keep myself serious and calm*", which we have translated as "*I remain calm despite my depressing thoughts*". The proposed translation increased the discriminative sound of the Russian wording by adding the contrast with "and" translated as "despite". There is also no mention of "depressing thoughts" in the original. The phrase "*despite my depressing thoughts*" was added by the authors of the adaptation as a causal factor for the need to maintain calm. The FF18 test item is included in the "Forward Focus" subscale, which aims to measure the ability to remain optimistic and calm, rather than the level of self-discipline and self-control mentioned in the "*Keep myself serious and calm*" item in Russian. The possibility of using such a translation and its supposedly higher accuracy was additionally agreed with the author of the original PACT scale (B.G.A.). Both versions of the translation were empirically tested (a detailed report can be found in Appendix 2 in the Supplementary) — the statement "*I remain calm despite my depressing thoughts*" was mentioned first in the questionnaire, and 20 PACT statements were presented after it, including FF18 in the translation "*Keep myself serious and calm*". The final version of the translation was tested in a small (about 15 people) group of participants. After making sure that the statements were clear, unambiguous, and understandable, data collection was started.

Sample characteristics

The survey used two samples: a main sample and a test retest sample. We formed the main sample in accordance with the purpose of the PACT, to assess the resources for overcoming traumatic stress, therefore we formed two subsamples in advance. The first subsample included primary victims of potentially traumatic events, i.e., ordinary civilian adults, including those with clinically manifest stress-related disorders and/or high levels of distress. The second subsample represented employees of the emergency services (firemen, rescue workers, physicians, and paramedics of emergency medical care, emergency psychologists, etc.), whose work is associated with a risk to life and constant contact with other people's suffering. The small test retest sample consisted of random adult respondents who completed the questionnaire twice with an interval of 3–4 weeks.

The main sample size was determined on the basis of the accepted reccommendations for psychometric studies, according to which the minimum permissible number of participants for conducting confirmatory factor analysis is 200 [18]. To ensure sufficient statistical power and check for invariance in terms of sex, age, occupation, and post-traumatic status, it was decided to recruit about 1,000 participants, thus ensuring the presence of at least 200 respondents in each of the groups under consideration. To calculate the test retest sample size, we were guided by the correlation between the test and retest at the level of 0.3, the significance level α=0.05, and the required power 1-β=0.8 (the analysis was performed in G*Power 3.1.9.7 developed in Germany). The minimum required sample size was 84 subjects, but the target size was increased to 93 subjects taking into account a possible 10% proportion of incomplete data.

Survey administration

Data collection from the main sample was conducted from December 2023 to October 2024, and in the test retest sample — from September to October 2024. All participants completed an electronic questionnaire prepared and posted on the data collection portal "Anketolog"[1], developed in Russia. To avoid the effect of the testing setup, questionnaires were named neutrally: "Occupational and life cases" (main sample) and "Life as it is" (test retest sample).

To obtain data from the widest possible range of respondents in the main sample, we used the convenience sampling and snowball sampling method. Emergency personnel were recruited through negotiations with the heads of divisions about placing a link to the survey in corporate chats. However, in most cases, a personal visit to the organizations was required. A link to the survey was also posted on social networks. Data collection was carried out not only in major metropolitan areas, but also in the Moscow region, Kursk, Orenburg, Tuapse, Novomoskovsk, etc. For enrollment in the test retest sample, the link to the survey was placed in a social network. Potential participants were informed about the two stages of the survey and asked to leave their contact details. Three weeks later, we sent a reminder to repeat the survey.

Participation in the main sample and test retest sample was voluntary and did not involve any remuneration.

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[1] Available from: https://anketolog.ru

Respondents could skip a specific question, or they could refuse participation and leave the survey at any time. Motivation was based on three points: contributing to science, helping the investigator, and obtaining knowledge about self. At the end of the questionnaire, the participant received an automatically generated report with the results and a short interpretation.

Eligibility criteria

The inclusion, non-inclusion, and exclusion criteria were the same for the main sample and the test retest sample.

Inclusion criteria were as follows: ≥18 years, Russian as the native language, at least one potentially traumatic event (meeting the DSM-5 criteria for a traumatic event, i.e., choosing at least one event in the Life Events Checklist for DSM-5 (LEC-5) in one of 4 categories: "It happened to me personally", "I witnessed it happen to someone else", "I learned about it happening", "I was exposed to it as part of my job").

Non-inclusion criteria were as follows: aged <18 years, Russian is not the native language.

Exclusion criteria: choosing the "It doesn't apply to me" response option for all events in the LEC-5 questionnaire, at least one statement missing on the PACT scale.

Relevance of the sample: The combination of sub-samples of primary victims, including clinical cases, and emergency personnel provides a diverse sample to test the factor structure and invariance of the Russian-language adaptation of the PACT scale. The geographic distribution increases the cultural representativeness of the sample.

Psychometric tools

The questionnaire was uniform for all participants in the survey and, in addition to psychodiagnostic self-reporting tools, included several socio-demographic questions: sex, age, and a series of questions about occupation. Questions about family status and socio-economic status were not asked, as they do not have a significant impact on PTSD [19].

Assessment of potentially traumatic experiences

The LEC-5 for DSM-5, translated in Russian by N.V. Tarabrina et al. [20] was proposed to assess the frequency and intensity of traumatic experiences; it takes into account all life experiences starting from childhood and includes a list of 17 potentially traumatic events (e.g., "Fire or explosion", "Sexual assault"), in respect of which the survey participants had to choose one of the following answers: "It happened to me personally", "I witnessed it happen to someone else personally", "I learned about it happening", "I was exposed to it as part of my job", and "It doesn't apply to me". Given that omissions were allowed when filling out the questionnaire, we modified the answers, removing the option "I'm not sure if it fits". Additionally, to emphasize that the event was witnessed personally rather than learned about through the media, the answer "I witnessed it happen to someone else" was replaced with "I witnessed it happen to someone else personally".

In this survey, we assessed convergent validity via an approach similar to that used for language adaptations: we check for expected correlations with PTSD symptoms and complex PTSD (CPTSD), as well as measures of depression, anxiety, stress, and general psychological distress.

International Trauma Questionnaire

The International Trauma Questionnaire (ITQ) [21], adapted into Russian by M.A. Padun et al. [22], is designed to assess PTSD and CPTSD symptoms[2] according to the diagnostic criteria of the International Classification of Diseases, 11th revision (ICD-11). It consists of 18 test items defining 2 factors of the second order ("PTSD" and "Disturbances in self organization") and 6 factors of the first order (for PTSD, these are two test items for "Re-experiencing", "Avoidance", and "Sense of threat"; for "Disturbances in self organization" — two test items for "Affective dysregulation", "Negative self-concept" and "Disturbances in relationships"). The factors of "PTSD" and "Disturbances in self organization" form 4 combinations: no PTSD ("PTSD–", "Disturbances in self organization–"), PTSD ("PTSD+", "Disturbances in self organization–"), Disturbances in self organization ("PTSD–", "Disturbances in self organization+") and CPTSD ("PTSD+", "Disturbances in self organization+") [22]. The ITQ uses a 5-point Likert scale, where 0 is "not at all", 1 is "a little bit", 2 is "moderately", 3 is "quite a bit", 4 is "extremely". A respondent was considered to meet the "PTSD+" diagnostic criteria if all of

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[2] Two translations of the "Complex posttraumatic stress disorder" nosological entity have been established in Russian: complex PTSD and complicated PTSD. "Complicated PTSD" is the name of the disorder recorded on the Russian-language page of the ICD-11 [23] and in the printed version of the official translation of the ICD-11 [24]. In the Russian professional community, the name "complex PTSD" and the abbreviation CPTSD are more common. Since the authors also use the abbreviation CPTSD in the ITQ, we chose this version of the term so as not to mislead our readers.

the following conditions were met: “Re-experiencing 1” ≥2 or “Re-experiencing 2” ≥2, “Avoidance 1” ≥2 or “Avoidance 2” ≥2, “Sense of threat 1” ≥2 or “Sense of threat 2” ≥2, the impact of these issues on social life ≥2, or work/productivity ≥2, or other important areas ≥2. A respondent was considered to meet the criteria of “Disturbances in self organization+” if all of the following conditions were met: “Affective dysregulation 1” ≥2 or “Affective dysregulation 2” ≥2, “Negative self-concept 1” ≥2 or “Negative self-concept 2” ≥2, “Disturbances in relationships 1” ≥2 or “Disturbances in relationships 2” ≥2, the impact of these issues on social life ≥2, or work/productivity ≥2, or other important areas ≥2 [22]. The Cronbach’s α coefficients for the ITQ: “PTSD”=0.82, “Re-experiencing”=0.65, “Avoidance”=0.78, “Sense of threat”=0.80, “Disturbances in self organization”=0.90, “Affective dysregulation”=0.76, “Negative self-concept”=0.93, “Disturbances in relationships”=0.82, and “CPTSD”=0.89 [22].

Depression Anxiety and Stress Scale

The Depression Anxiety and Stress Scale-21 (DASS-21) [25] adapted into Russian by A.A. Zolotareva [26] is intended to assess psychological distress. The scale consists of 21 items and has a bifactor structure, which allows to determine the indicators of depression, anxiety, and stress, comorbidities reflecting general psychopathology (the eponymous subscales include 7 items each), as well as a general indicator of psychological distress. The questionnaire uses a 4-point Likert scale, where 0 is “never”, 1 is “rarely”, 2 is “often”, and 3 is “almost always”. The Depression, Anxiety, and Stress sub-scores range from 0 (low level) to 21 (very high level). The psychological distress score ranges from 0 (low level) to 63 (very high level). The DASS-21 demonstrates validity and reliability. Cronbach’s α coefficients for depression, anxiety, and stress are 0.90, 0.85, and 0.91, respectively, and 0.95 for psychological distress [26].

Statistical analysis

The conducted statistical analysis included 7 stages. All stages except the fifth were performed in the main sample; the fifth stage was performed in the test retest sample.

In the first stage, the missing values were processed: identification and removal of questionnaires with missing values using the listwise deletion method were performed. Omissions in variables such as sex, age, occupation, and post-traumatic status were only taken into account when the relevant analysis was performed (for details, see “Handling omissions” in the “Results” section). After that, the distribution of the test items and subscales of the PACT questionnaire (TF, FF, “Flexibility”) was tested for normality: skewness and kurtosis were assessed, the permissible range was ±1 [27]. Afterwards, descriptive statistics were calculated; in the case of quantitative variables, these included the arithmetic mean and standard deviation (SD).

The second stage was devoted to the analysis of the factor structure of the adapted version of the PACT scale. Confirmatory factor analysis (CFA) was used to verify the correspondence between the expected two-factor structure of the scale and the collected empirical data. The analysis of CFA results included an assessment of standardized estimates and model fit indexes. Standardized estimates of >0.40 [28] were considered good, indicating an adequate relationship between the observed variable and the latent factor (in this case, FF and TF). Fit indexes of the model were assessed as good with Comparative Fit Index (CFI) values >0.90, Tucker-Lewis Index (TLI) values >0.90, Root Mean Square Error of Approximation (RMSEA) values <0.08 with a 90% confidence interval (CI) <0.10, and Standardized Root Mean Square Residual (SRMR) values <0.08 [28]. Additionally, modification indexes were analyzed to identify potential ways to improve the quality of the model. In accordance with established practice [28], only modifications with indexes higher than 10 were considered. Moreover, the decision to introduce error covariances into the model was made on the basis of theoretical justification: the semantic similarity of the test items and the order of presentation [28]. To maintain the theoretical validity of the model, error covariances were allowed strictly between test items within a single subscale (TF or FF). Caution was exercised when adding error covariances to avoid the risk of overfitting the model.

The third stage included a multi-group confirmatory factor analysis (MGCFA) to assess the equivalence of the construct in different groups by testing three levels of measurement invariance: configural or structural invariance (checking the equivalence of the model structure); metric invariance (checking the equality of estimates); scalar invariance (equality of the mean values of the test items) [28]. Groups were formed based on sex (male/female), age (<40 years or ≥40 years), occupation (emergency personnel/other), presence or absence of one of the disorders specifically related to stress (absence/presence of PTSD, Disturbances in self organization or CPTSD) — in other words, post-traumatic status. Post-traumatic status was determined in accordance with the criteria presented in the ITQ adaptation [22]. The CFA models were compared by the change in the fit indexes: ΔCFI≤0.01, ΔSRMR≤0.01, ΔRMSEA≤0.01 [29]. Changes in the Bayesian information criterion (BIC) and Akaike information criterion (AIC) were also compared: the lower the test value relative to others, the better the model.

At the fourth stage, the internal reliability (consistency) of the Russian-language adaptation of the PACT scale was assessed separately for the "Forward Focus" and "Trauma Focus" subscales. Macdonald's ω coefficient was calculated directly for reliability assessment, and Cronbach's α was calculated for reference purposes and for comparison with the reliability indicators of other adaptations. Acceptable internal reliability is indicated by ω or α values ≥0.7, and good reliability by values ≥0.8 [16].

The fifth stage was supposed to test the robustness of the result over time — test-retest reliability (tested in the test retest sample). A correlation analysis of the values of two measurements performed with an interval of 3–4 weeks was carried out. Pearson's correlation coefficient was calculated. Taking into account the characteristic of the measured construct — the perceived capacity for coping, which reflects a belief rather than a stable personality trait, the interpretation used the following guidelines adopted in scientific practice: r=0.50–0.75 was interpreted as indicating moderate reliability of results over time, and r=0.75–0.90 as values indicating good stability [30].

At the sixth stage, normative values were calculated based on the mean value and standard deviation on the "Forward Focus" and "Trauma Focus" subscales [16]. The significance of differences was analyzed using Student's t-test for independent samples. The size of the effect was additionally determined by Cohen's d coefficient (d≈0.2 was interpreted as a small effect size, ≈0.5 as an average one, and ≈0.8 or higher as a large effect size) [18].

At the seventh stage, the convergent validity of the adapted version of the PACT scale was tested by assessing the correlation with the ITQ and DASS-21 scores. Values of Pearson's correlation coefficients (r) in the ranges of 0.10–0.29, 0.30–0.49, and ≥0.50 were considered to indicate weak, medium, and strong associations, respectively [18].

Data description and calculation of correlation coefficients and Cronbach's α values were carried out using the Jamovi statistical software package, version 2.6 (Jamovi Project, Australia). To build CFA models and calculate the invariance, we used the R package, version 4.4; the lavaan packages, version 0.6–17; semTools, version 0.5–6; semPlot, version 1.1.6[3].

Ethical considerations

The survey was approved by the commission on ethical evaluation of empirical research projects of the Department of Psychology, Faculty of Social Sciences of the HSE University (Moscow, Russia) Minutes No. 6 dated June 28, 2024. All study participants, regardless of the format of participation (offline or online) and the sample (main and retest), provided informed voluntary consent to participate in the study beforehand. In the electronic questionnaire, information about the survey was placed on the start page and the consent was confirmed by clicking the "Start" button.

The main survey was completely anonymous: data were collected without specifying names, contact information or other personal identifiers. During the offline survey, psychologists did not record any other data either.

The test retest sample data included contact data, which were deleted immediately after the completion of data collection, and the questionnaires were depersonalized.

Access to source data, including non-blinded data, was reserved for the Principal Investigator only (Sh.T.A.). All other members of the team worked with anonymized data sets.

RESULTS

Respondent characteristics

Handling of missing data

The sampling process is shown in Figure 1. The original PACT data set included 1,086 questionnaires, 32 (2.95%) of which were deleted because of missing values. The final sample included 1,054 subjects. To conduct a multi-group CFA, the following variables were additionally taken into account: sex (missing *n*=3; 0.28%), age (missing *n*=30; 2.85%), occupation (missing *n*=3; 0.28%), post-traumatic status (missing *n*=18; 1.71%). Questionnaires with missing values for these variables were excluded linewise during the corresponding analyses. The minimum sample size was 1,024 observations.

Sample characteristics

The total sample included 1,054 subjects aged 18 to 70 years (56% male, mean age 37.2 years, SD=9.54). All questionnaire items permitted missing responses, except for the variables of sex, age, profession, and post-traumatic

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[3] Available from: https://cran.r-project.org

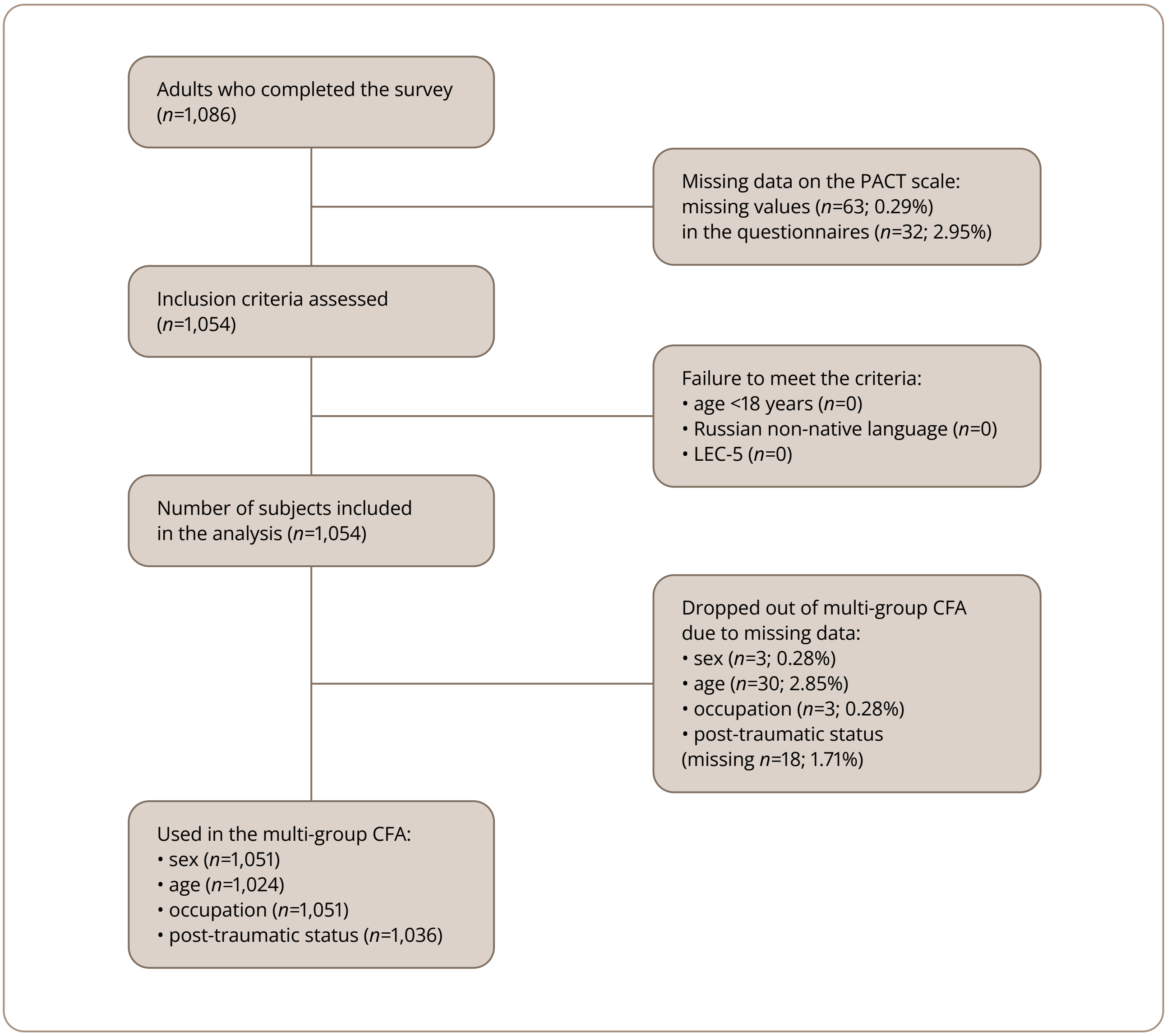

Figure 1. Flow of survey participants: exclusions, final sample, analysis sample.

Note: CFA — confirmatory factor analysis; LEC-5 — Life Events Checklist for DSM-5; PACT — the Perceived Ability to Cope with Trauma Scale.

Source: Shmarina et al., 2025.

status. Consequently, the number of participants included in specific analyses varied, totaling 1,051, 1,024, 1,051, and 1,036 respectively.

The first subsample (*n*=479; 45.5%) included respondents who were ordinary civil adults (55.6% women, mean age 38.7 years, SD=8.94). Respondents with clinically pronounced manifestations of the effects of traumatic stress and undergoing treatment in the general psychiatric department of the Mental-health clinic No. 1 named after N.A. Alexeev, (56 men, mean age 34.0 years, SD=8.8; reason for hospitalization: psychiatric examination and expert evaluation; the potentially traumatic event was somehow related to participation in the special military operation) were assigned to groups according to the answers to the questions of the socio-demographic questionnaire.

The second subsample (*n*=572; 54.5%) included respondents who were current employees of the emergency services (56.1% men, mean age 35.9 years, SD=9.85): fire and rescue workers (96.6% men, *n*=379, mean age 35.5 years, SD=9.37), physicians and paramedics of emergency medical care (67.4% women, *n*=95, mean age 37.4 years, SD=12.2), emergency psychologists (87.7% women, *n*=65, mean age 34.6 years, SD=8.14), and other specialists (68.2% male, *n*=33, mean age 39.8 years, SD=10.1). The last

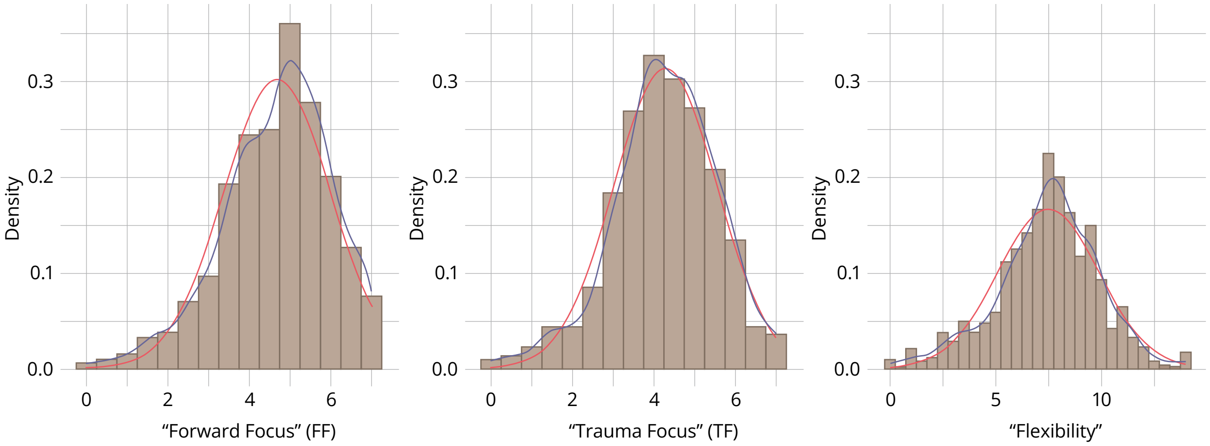

Figure 2. Density of distribution of total scores on the scales of the adapted version of the Perceived Ability to Cope with Trauma scale: "Forward Focus" (min 0, max 7), "Trauma Focus" (min 0, max 7), "Flexibility" (min 0, max 14).

Note: Each histogram shows: red line — a curve of the theoretical normal distribution with sample parameters (mean and standard deviation); blue line — a curve of the empirical estimate of the density of the data distribution, plotted on the basis of the actual data.

Source: Shmarina et al., 2025.

group included radio operators and dispatchers of a fire central communication station, fire truck drivers, gas and smoke protection service masters, investigators, emergency personnel, police officers, as well as a specialist in civil defense and emergency protection, an employee of an organization's security service, and an employee of a housing and utilities emergency service for whom exposure to potentially traumatic events is an integral part of daily work.

The retest sample included 119 people aged 21 to 60 years (56.3% women, mean age 38.7 years, SD=7.58).

Assessment of the perceived ability to cope with trauma

The distribution of perceived ability to cope with trauma scores on the PACT scales was close to normal (skewness and kurtosis <±1) (Table 1). In the visual analysis of histograms, a slight negative skewness is manifested by a slight shift of the graph dome to the right (Figure 2) — the participants more often chose the values of the upper pole and tended to choose the score of 7, "fully capable". This means that the PACT scale, namely the "Forward Focus", "Trauma Focus", and "Flexibility" subscales, is more sensitive at the lower end of the range, while at the upper end its differentiating ability decreases. A slight negative kurtosis indicates the absence of a pronounced dome in the distribution of test item scores, that is, the scores of respondents are distributed more evenly throughout the range of values, rather than concentrated near the mean (see Table 1, Figure 1).

Factor structure and invariance of the PACT scale

The tested two-factor model showed poor correspondence with the empirical data (Table 2; Model 1). To improve the fitness of the model, the modification indexes were analyzed (modifications with indexes higher than 65 were taken into account) and 7 item error covariances were added, which were presumably due to the semantic similarity of the items, as well as the order in which they appeared in the questionnaire: FF2 and FF16 ("Comfort other people" and "Focus my attention on or care for the needs of other people"), FF3 and FF17 ("Look for a silver lining" and "Remind myself that things will get better"), FF4 and FF18 ("Stay focused on my current goals and plans" and "I remain calm despite my depressing thoughts"), FF5 and FF13 ("Find activities to help me keep the event off my mind" and "Distract myself to keep from thinking about the event"), TF6 and TF12 ("Let myself fully experience some of the painful emotions linked with the event" and "Reflect on the meaning of the event"), FF8 and FF15 ("I would be able to laugh" and "Enjoy something that I would normally find funny or amusing"), TF10 and TF11 ("Reduce my normal social obligations" and

Table 1. Scores on the subscales of the adapted version of the Perceived Ability to Cope with Trauma scale (*n*=1,086)

Item	Mean	Skewness	Kurtosis
FF1	4.81 (1.98)	-0.78	-0.25
FF2	4.65 (2.01)	-0.71	-0.34
FF3	4.59 (2.12)	-0.70	-0.50
FF4	5.02 (1.74)	-0.86	0.23
FF5	4.92 (1.82)	-0.80	0.01
TF6	4.59 (1.92)	-0.52	-0.53
TF7	4.51 (2.10)	-0.59	-0.60
FF8	4.05 (2.15)	-0.38	-0.85
FF9	4.82 (1.85)	-0.73	-0.10
TF10	3.70 (1.97)	-0.17	-0.73
TF11	3.24 (2.00)	0.06	-0.78
TF12	5.13 (1.66)	-0.89	0.51
FF13	4.87 (1.78)	-0.81	0.16
TF14	4.32 (2.03)	-0.49	-0.60
FF15	4.26 (2.13)	-0.49	-0.78
FF16	4.46 (1.92)	-0.54	-0.44
FF17	4.92 (1.90)	-0.79	-0.17
FF18	4.73 (1.85)	-0.72	-0.16
TF19	4.73 (1.94)	-0.63	-0.37
TF20	4.02 (1.92)	-0.28	-0.67
FF (general)	4.67 (1.32)	-0.61	0.37
TF (general)	4.27 (1.27)	-0.43	0.41
”Flexibility”	7.47 (2.40)	-0.34	0.44

Note: FF — “Forward Focus”; TF — “Trauma Focus”.

Table 2. Fit indexes of the confirmatory factor models of the adapted version of the Perceived Ability to Cope with Trauma scale

Models	χ^2	df	CFI	TLI	RMSEA (90% CI)	SRMR	AIC
Model 1: two-factor	2,332.797*	169	0.753	0.723	0.110 (0.106–0.114)	0.086	81,120
Model 2: two-factor model with covariances	944.650*	162	0.911	0.895	0.068 (0.064–0.072)	0.070	79,746

Note: AIC — Akaike Information Criterion; CFI — Comparative Fit Index; RMSEA — Root Mean Square Error of Approximation with 90% confidence interval (CI); SRMR — Standardized Root Mean Square Residual; TLI — Tucker–Lewis Index. * χ^2 statistically significant at $p<0.001$.

“Alter my daily routine”) (see Table 2; Model 2). In terms of accepted quality criteria, the resulting Model 2 with covariances demonstrated good fit indexes.

All test items (except TF11) had good estimates (Figure 3), ranging from 0.47 (FF8 and FF16) to 0.79 (TF19).

Measurement invariance was studied depending on sex (men, *n*=590; women, *n*=461), age (young adults, 18–39 years, *n*=639; adults, 40–70 years, *n*=385), occupation (emergency personnel, *n*=572; specialists of other professions, *n*=479), and post-traumatic status (subgroup with a probable absence of PTSD, *n*=712; subgroup of individuals likely to suffer from PTSD, *n*=100, or disturbances in self organization, *n*=103, or CPTSD, *n*=121).

Sex invariance

The original two-factor structure of the PACT scale was comparable in groups of participants of different sexes. The fit indexes showed good correspondence to the data

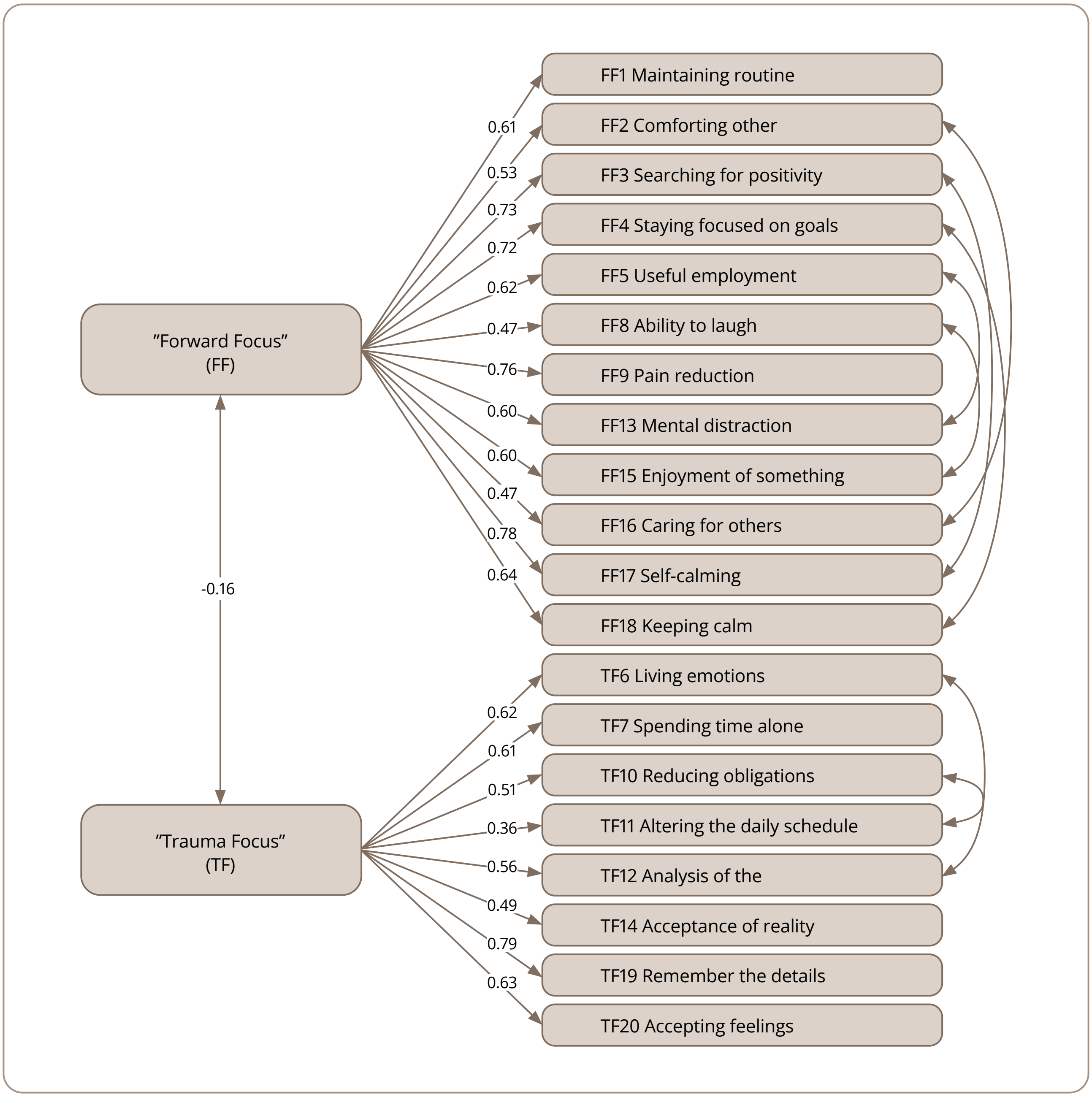

Figure 3. Two-factor model of the adapted version of the Perceived Ability to Cope with Trauma scale (confirmatory factor analysis, standardized estimates).

Source: Shmarina et al., 2025.

both in the male group (χ^2=666, df=162; CFI=0.904, TLI=0.888, RMSEA=0.073, 90% CI (0.067–0.078), SRMR=0.079; AIC=43,927) and in the female group (χ^2=512, df=162; CFI=0.904, TLI=0.887, RMSEA=0.069, 90% CI (0.062–0.075), SRMR=0.071; AIC=35,444). The configural model (equivalence of the factor structure) constructed for the two groups combined also corresponded well to the empirical data (Table 3). The quality of the metric model (equivalence of estimates) decreased, but remained at the threshold of acceptable values. However, the scalar model (equivalence of mean values) showed a significant decrease in the model quality (ΔCFI=-0.017) (see Table 3).

Age invariance

The fit indexes showed good correspondence to the data in the group of persons under 40 years of age (χ^2=658, df=162;

Table 3. Invariance in terms of sex, age, occupation, and post-traumatic status (two-factor model with covariances)

Model	χ^2 (df)	χ^2/df	CFI	TLI	SRMR	RMSEA	BIC	ΔCFI	ΔSRMR	ΔRMSEA
Sex (males: 590, females: 461)										
Configural	1,177.277 (324)	3.63	0.904	0.887	0.076	0.071 (0.066–0.075)	79,928	–	–	–
Metric	1,269.046 (342)	3.71	0.896	0.884	0.082	0.072 (0.068–0.076)	79,894	-0.008	0.006	0.001
Scalar	1,427.839 (360)	3.97	0.880	0.873	0.085	0.075 (0.071–0.079)	79,928	-0.016	0.003	0.003
Age (<40 years: 639, ≥40 years: 385)										
Configural	1,158.216 (324)	3.57	0.902	0.885	0.071	0.071 (0.067–0.075)	78,277	–	–	–
Metric	1,167.419 (342)	3.41	0.903	0.892	0.071	0.069 (0.064–0.073)	78,162	0.001	0	-0.002
Scalar	1,246.076 (360)	3.46	0.896	0.890	0.074	0.069 (0.065–0.074)	78,162	-0.007	0.003	0
Type of occupation (EP: 572, specialists of other professions: 479)										
Configural	1,161.269 (324)	3.58	0.902	0.885	0.073	0.070 (0.066–0.075)	79,602	–	–	–
Metric	1,275.021 (342)	3.73	0.891	0.879	0.081	0.072 (0.068–0.076)	79,590	-0.011	0.008	0.002
Scalar	1,423.250 (360)	3.95	0.876	0.869	0.084	0.075 (0.071–0.079)	79,613	-0.015	0.003	0.003
Post-traumatic status (no PTSD: 712, PTSD / Disturbances in self organization / CPTSD: 324)										
Configural	1,104.851 (324)	3.41	0.902	0.885	0.069	0.068 (0.064–0.073)	78,712	–	–	–
Metric	1,149.764 (342)	3.36	0.898	0.887	0.072	0.068 (0.063–0.072)	78,632	-0.004	0.003	0
Scalar	1,262.288 (360)	3.51	0.886	0.878	0.075	0.070 (0.065–0.074)	78,620	-0.012	0.003	0.002

Note: BIC — Bayesian Information Criterion; CFI — Comparative Fit Index; CPTSD complex post-traumatic stress disorder; EP — Emergency Personnel; PTSD — post-traumatic stress disorder; RMSEA — Root Mean Square Error of Approximation with 90% confidence interval (CI); SRMR — Standardized Root Mean Square Residual; TLI — Tucker–Lewis Index. *χ^2 statistically significant at *p*<0.001.

CFI=0.907, TLI=0.891; RMSEA=0.069, 90% CI (0.064–0.075), SRMR=0.075; AIC=48,637) and satisfactory correspondence to the data in the group of persons aged ≥40 years (χ^2=501, df=162; CFI=0.894, TLI=0.876, RMSEA=0.074, 90% CI (0.066–0.081), SRMR=0.064; AIC=29,090). The configural model corresponded well to the empirical data (see Table 3). The metric and scalar models also maintained good quality and did not show a significant decrease in data correspondence (ΔCFI=-0.007) (see Table 3).

Occupation invariance

The fit indexes showed good correspondence to the data in the group of emergency personnel (χ^2=641, df=162; CFI=0.908, TLI=0.892, RMSEA=0.072, 90% CI (0.066–0.078), SRMR=0.078; AIC=41,875) and satisfactory correspondence to the data in the group of persons of other professions (χ^2=521, df=162; CFI=0.894, TLI=0.875, RMSEA=0.068, 90% CI (0.062–0.075), SRMR=0.068; AIC=37,167). The configural model also corresponded well to the data (see Table 3). The quality of the metric model decreased, but its parameters remained within acceptable values, whereas the quality of the scalar model decreased significantly (ΔCFI=-0.017) (see Table 3).

Post-traumatic status invariance

The fit indexes showed good correspondence to the data both in the group of individuals without signs of PTSD (χ^2=694, df=162; CFI=0.900, TLI=0.883, RMSEA=0.068, 90% CI (0.063–0.073), SRMR=0.069; AIC=53,481) and in the group with PTSD/Disturbances in self organization/CPTSD (χ^2=411, df=162; CFI=0.906, TLI=0.890, RMSEA=0.069, 90% CI (0.061–0.077), SRMR=0.06; AIC=7,387). The configural model corresponded well to the empirical data (see Table 3). The quality of the metric model decreased slightly, whereas the quality of the scalar model decreased significantly (ΔCFI=-0.012) (see Table 3).

Test norms of the Perceived Ability to Cope with Trauma scale

Table 4 shows the test norms for the Russian version of the PACT scale. At the same time, the test norms were determined separately for groups of different sex, age, occupation, and post-traumatic status (see Table 4), as this was required by the differences in estimates on the PACT scale. In particular, men demonstrate a statistically significantly more pronounced “Forward

Table 4. Test norms of the adapted version of the Perceived Ability to Cope with Trauma scale for different groups

Norm	"Forward Focus"	"Trauma Focus"	"Flexibility"
General (*n*=1,054)	4.68 (1.32)	4.28 (1.27)	7.49 (2.39)
Men (*n*=590)	4.82 (1.29)	4.09 (1.30)	7.42 (2.44)
Women (*n*=461)	4.50 (1.33)	4.52 (1.18)	7.58 (2.33)
Emergency personnel (*n*=572)	5.03 (1.22)	4.01 (1.34)	7.51 (2.50)
Other occupation (*n*=479)	4.26 (1.31)	4.59 (1.10)	7.46 (2.26)
Absence of PTSD (*n*=712)	4.97 (1.15)	4.05 (1.29)	7.52 (2.37)
Presence of PTSD* (*n*=324)	4.05 (1.42)	4.78 (1.08)	7.43 (2.45)

Note: The test norms are presented as the arithmetic mean (standard deviation). *PTSD (post-traumatic stress disorder), Disturbances in self organization or CPTSD (complex post-traumatic stress disorder).

Table 5. Convergent validity of the adapted version of the Perceived Ability to Cope with Trauma scale

Tools	"Forward Focus"	"Trauma Focus"	"Flexibility"
International Trauma Questionnaire (ITQ)			
PTSD	-0.27*	0.29*	0.04
Re-experiencing	-0.23*	0.23*	0.02
Avoidance	-0.22*	0.24*	0.05
Sense of threat	-0.25*	0.29*	0.04
Disturbances in self organization	-0.49*	0.41*	-0.03
Affective dysregulation	-0.44*	0.41*	0.02
Negative self-concept	-0.42*	0.32*	-0.07
Disturbances in relationships	-0.45*	0.38*	-0.04
CPTSD	-0.44*	0.40*	0.00
Depression Anxiety and Stress Scale (DASS-21)			
General psychological distress	-0.40*	0.36*	-0.01
Depression	-0.42*	0.33*	-0.05
Anxiety	-0.32*	0.30*	0.00
Stress	-0.36*	0.35*	0.02

Note: CPTSD — complex post-traumatic stress disorder; PTSD — post-traumatic stress disorder. *$p<0.001$.

Focus" than women (t=3.95, *p*=0.001, d=0.25) and a less pronounced "Trauma Focus" (t=−5.63, *p*=0.001, d=−0.35). A similar trend is observed for emergency personnel and the non-PTSD group, who, compared with other survey participants, also have a significantly higher "Forward Focus" (t=−9.78, *p*=0.001, d=−0,61; t=11.08, *p*=0.001, d=0.74, respectively) and a significantly lower "Trauma Focus" (t=7.60, *p*=0.001, d=0.47; t=−8.89, *p*=0.001, d=−0.59, respectively). The magnitude of the difference (d) between men and women was relatively small, whereas the magnitude of the difference between emergency personnel and representatives of other professions, as well as between the group without PTSD and the group with PTSD / Disturbances in self organization / CPTSD, was more significant.

Internal reliability

In the general group of survey participants, the "Forward Focus" subscale showed very good internal reliability (ω=0.896; α=0.893). The estimated internal reliability of the "Trauma Focus" subscale was somewhat lower, but it was also determined to be good (ω=0.810; α=0.806). Removal of individual items did not lead to an increase in reliability indicators.

Test-retest reliability

The analysis of test-retest reliability was performed with the participation of 119 respondents (56% women, mean age 38.7 (SD=7.58) years), who were retested approximately 4 weeks after the first survey using the adapted PACT scale. The correlation between the baseline and subsequent values of the perceived ability to cope with trauma indicated moderate stability of results over time (for the "Forward Focus" subscale: r=0.74, *p*<0.001; for the "Trauma Focus" subscale: r=0.62, *p*<0.001).

Convergent validity

The components of the adapted version of the PACT scale showed a relatively high correlation with post-traumatic symptoms according to self-reports. All indicators of post-traumatic symptoms, from "General psychological distress" and "Depression" of the DASS-21 scale to "Affective dysregulation" and "Disturbances in self organization" of the ITQ questionnaire, were moderately negatively correlated with the scores on the "Forward Focus" subscale and moderately positively correlated with the scores on the "Trauma Focus" subscale. The correlations of "Flexibility" with ITQ and DASS-21 scores were statistically insignificant (Table 5; for descriptive statistics see Table S1 in the Supplementary).

DISCUSSION

The reported survey was focused on Russian-language adaptation and psychometric verification of the PACT scale. The hypothesis of a two-factor structure of the adapted version of the PACT scale corresponding to that of the original version of the scale [6] and versions in other languages [9–13] was confirmed. The second hypothesis about the validity of the adapted version of the PACT scale was also confirmed, and, therefore, the Russian version of the PACT scale can be considered a valid and reliable tool for assessing the perceived ability to cope with trauma.

To the best of our knowledge, this is the first time that the invariance of PACT scale scores was tested in terms of sex, age, occupation, and post-traumatic status. Earlier, the original article tested and confirmed the invariance of the PACT scale for two cultures: the Americans and the Israelis [6]. We demonstrated that scores on the "Forward Focus" subscale were higher in male emergency personnel and non-PTSD responders, whereas scores on the "Trauma Focus" subscale were higher in female non-emergency personnel and those with PTSD symptoms. Our findings are new, and the conclusion that there are differences in the scores on the "Forward Focus" and "Trauma Focus" subscales depending on the sex, occupation, and post-traumatic status remains to be further explored. At present, the mean values of the "Forward Focus" and "Trauma Focus" subscales should be interpreted with caution.

The estimate of the TF11 test item was 0.36, however, we decided to keep this item for three reasons: first and foremost, removing it did not lead to an improvement in the Model 1 or Model 2 fit indexes; second, keeping the test items would ensure comparability of our results with data obtained in other countries; and third, reducing the PACT scale would inevitably decrease its variability, which could potentially affect the structure of relationships with other psychological variables.

The PACT scale demonstrates a two-factor structure, confirming hypothesis 1, but has an incomplete invariance, allowing comparison of scores in different age groups, but not depending on the sex, occupation or post-traumatic status (see Table 4).

Thus, the convergent validity of the PACT scale is confirmed by moderate correlations at |r|>0.40 with the ITQ subscales "Disturbances in self organization" and "CPTSD" (see Table 5). The obtained results are relevant, correspond to the expected ones, and confirm hypothesis 2.

This survey had the following limitations. First, as with any self-reporting tool, biased responses may be received from survey participants using the PACT scale. In our survey, we did not take special measures to account for possible artefacts. Second, it is possible that despite the clarifications introduced by the original authors into the instruction, the PACT scale does not measure the true coping ability, but only one's own personal beliefs or established cognitive assessments of the coping ability. Third, the data obtained do not have predictive validity, since they are the result of a cross-sectional rather than a cohort study. In turn, the determination of predictive validity may be useful in assessing the risk of negative consequences of traumatic stress and psychopathology. A cohort survey allows for the assessment of the short-, medium-, and long-term effectiveness of each of the strategies assessed using the PACT scale. For example, in the first long-term survey, high scores on the "Trauma Focus" subscale in the early period (approximately 3 months) after marital loss were not associated with immediate deterioration, but predicted a high risk of psychopathology in the longer term (approximately 14 and/or 25 months) [31]. At the same time, high scores on the “Forward Focus” subscale were associated with significantly more favorable indicators of adaptation at all stages of observation [31].

We also note that a synthesis of existing theoretical knowledge and accumulated empirical experience with the use of the PACT scale is required for a general conclusion about the effectiveness of each strategy in the context of both time and different potentially traumatic events. For example, in our survey, the “Trauma Focus” strategy did not show any benefits and, on the contrary, was associated with psychological distress and the negative consequences of traumatic stress. At the same time, knowledge of the benefits of thinking about the traumatic event is postulated not only by the authors of the PACT scale, but also by other researchers within various conceptions. In particular, in a paper on “good” and “bad” reflection [32] or an article on the benefits of deliberate and obsessive thinking immediately after the event in order to find meaning [33].

We believe that the classical assessment of the convergent validity of the PACT scale by checking correlations with other tools that evaluate a similar construct, such as the recently developed personalized index of psychological flexibility, will be useful [3].

CONCLUSION

A psychometric analysis of the Russian-language version of the PACT scale revealed a two-factor structure that allows for the assessment of the scores on the “Forward Focus” and “Trauma Focus” subscales. The PACT scale is fully invariant with respect to the age of the respondents and partially invariant with respect to sex, occupation, and post-traumatic status, which demonstrates the universality of the scale. The internal consistency of the PACT estimated with McDonald’s ω and Cronbach’s α showed good values for the “Forward Focus” and “Trauma Focus” subscales. The test-retest reliability of the “Forward Focus” and “Trauma Focus” subscales confirmed moderate stability of results over time. Moderate and expected correlations between the PACT parameters and the ITQ and DASS-21 parameters confirm the convergent validity of the PACT scale in the Russian version.

Potential target audience of the PACT: adults (18 years and older) who are native Russian speakers, have experienced a potentially traumatic event of varying intensity, with or without PTSD, disturbances in self organization, CPSD, anxiety, or depression, who are able to benefit from an assessment of their perceived ability to cope with trauma.

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Supplementary data
Supplementary material to this article can be found in the online version:
Appendix 1: 10.17816/CP15628-145678
Appendix 2: 10.17816/CP15628-145676
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Comparative Visual Perception Patterns in Autism Spectrum Disorder and Mild Intellectual Disability: A Cross-Sectional Study

Сравнительные паттерны зрительного восприятия при расстройстве аутистического спектра и легкой степени умственной отсталости: поперечное исследование

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Original research

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ABSTRACT

BACKGROUND: Visual perception plays a crucial role in cognitive and behavioral development. Individuals with autism spectrum disorder (ASD) and mild intellectual disability (ID) exhibit distinct patterns of visual processing that influence their learning and interaction with the environment.

AIM: This study aims to compare the visual perception abilities of children with ASD and those with mild ID.

METHODS: This study employed an experimental comparative design. The Bender Visual-Motor Gestalt Test was administered to assess visual-motor integration, perceptual organization, and spatial processing abilities. It was scored based on standard qualitative and quantitative criteria. Group comparisons were conducted using descriptive statistics and cross-group performance patterns.

RESULTS: A total of 15 children (8 with ASD and 7 with mild ID), aged between 7 to 12 years, participated in the study. Children with ASD demonstrated superior spatial organization and attention to local details, whereas children with mild ID demonstrated significant difficulties in perceptual coherence, spatial alignment, and motor coordination.

CONCLUSION: The study highlights the importance of developing tailored intervention strategies that address the distinct perceptual processing styles associated with ASD and mild ID. However, limitations such as a lack of detailed diagnostic criteria, absence of symptom severity differentiation, and failure to control for developmental age must be considered when interpreting the findings. Future research should aim to overcome these limitations by including standardized diagnostic measures, creating a larger and more diverse sample, and involving additional assessment tools for a more comprehensive analysis.

АННОТАЦИЯ

ВВЕДЕНИЕ: Зрительное восприятие играет важнейшую роль в развитии когнитивных и поведенческих функций. У людей с расстройствами аутистического спектра (РАС) и легкой степенью умственной отсталости (УО) отмечаются различные паттерны обработки зрительной информации, которые влияют на их обучение и взаимодействие с окружающей средой.

ЦЕЛЬ: Целью настоящего исследования является сравнение способностей к зрительному восприятию у детей с РАС и детей с легкой степенью УО.

МЕТОДЫ: Исследование имело экспериментальный сравнительный дизайн. Для оценки зрительно-моторной интеграции, перцептивной организации и способности к пространственной обработке проводили зрительно-моторный гештальт-тест Бендер. Он подразумевал оценку в баллах по стандартным качественным и количественным критериям. Группы сравнивали с использованием описательной статистики и межгрупповых паттернов выполнения теста.

РЕЗУЛЬТАТЫ: В исследовании приняли участие 15 детей (8 детей с РАС и 7 детей с легкой степенью УО) в возрасте от 7 до 12 лет. У детей с РАС отмечались лучшие пространственная организация и внимание к локальным деталям, в то время как у детей с легкой степенью УО наблюдались значительные трудности в восприятии, пространственном расположении и координации движений.

ЗАКЛЮЧЕНИЕ: Исследование подчеркивает важность разработки индивидуальных стратегий вмешательства, направленных на различные стили перцептивной обработки, связанные с РАС и легкой степенью УО. Однако при интерпретации полученных результатов следует учитывать такие ограничения, как отсутствие подробных диагностических критериев, отсутствие дифференциации тяжести симптомов и отсутствие контроля возраста развития. Дальнейшие исследования должны быть направлены на преодоление этих ограничений путем включения стандартизированных диагностических мер, более крупной и разнообразной выборки, а также дополнительных инструментов оценки для более полного анализа.

Keywords: *visual perception; autism spectrum disorder; intellectual disability; Bender-Gestalt test; visual-motor integration*
Ключевые слова: *зрительное восприятие; расстройство аутистического спектра; умственная отсталость; Бендер-тест; зрительно-моторная интеграция*

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by difficulty in social communication and interaction, along with restricted and repetitive patterns of behavior, interests, or activities. These features often include atypical sensory responses, such as hypersensitivity or hyposensitivity to environmental stimuli[1]. Intellectual disability (ID), another neurodevelopmental disorder, is defined by significantly impaired intellectual functioning (IQ[2]<70) and deficits in at least two areas of adaptive behavior that affect daily life[3,4] [1]. ID is frequently reported as a common, co-occurring condition in individuals with ASD. The co-occurrence rate of ASD and ID was estimated to be as high as 69% in the 1980s [2]; however, with refined diagnostic criteria, this figure has dropped to approximately 30% [3]. The overlap between these two conditions complicates both diagnosis and intervention planning. A study conducted in 2016 identified ID (75.83%) and epilepsy (72.50%) as the primary comorbidities associated with ASD [4]. Although ASD and ID can co-occur, they are distinct conditions. A diagnosis of ASD typically meets the criteria outlined in the Diagnostic and Statistical Manual of Mental

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[1] National Health Service England. Enhanced SECURE STAIRS team: COVID-19 guide — Autism Spectrum Condition (ASC) [Internet]. Redditch: NHS; 2020 [cited 2025 June 5]. Available from: https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/04/C0447-autism-spectrum-condition-guidance-june-2020.pdf

[2] IQ stands for Intelligence Quotient. It is a score derived from standardized tests designed to measure a person's cognitive abilities, in relation to the average performance of others in the same age group. Average IQ is set at 100. Most people (about 68%) score between 85 and 115.

[3] Rosa's Law: A Rule by the Education Departament. Federal Register [Internet]. 2017[cited 2025 June 12];82(113):31910–31913. Available from: https://www.federalregister.gov/documents/2017/07/11/2017-14343/rosas-law

[4] Ansberry C. Erasing a Hurtful Label From the Books: Decades-long quest by disabilities advocates finally persuades state, federal governments to end official use of retarded. The Wall Street Journal [Internet]. 2010[cited 2025 June 12];4(1):1–23. Available from: http://www.wsj.com/articles/SB10001424052748704865104575588273153838564

Disorders, Fifth Edition (DSM-5), which emphasizes deficit in social communication and restricted behaviors [5]. ID, on the other hand, is diagnosed based on standardized IQ assessments and measures of adaptive behavior [6]. Given the substantial variation in cognitive ability among individuals with ASD, it is crucial for studies comparing ASD and ID to clearly determine whether participants exhibit overlapping or distinct cognitive pattern.

Visual perception, the ability to interpret and organize visual stimuli, is fundamental to learning and everyday ability to function[5]. While, typically, developing children fine-tune their visual perception skills as they grow, children with neurodevelopmental disorders often show delays or impairment in this domain [7]. The prevalence of visual impairment in the general population is estimated to stand at 0.5–2%, but it is at least 8.5 times higher in individuals with ID [8]. Moreover, children with ASD are significantly more likely to display ocular comorbidities, with studies reporting higher rates of strabismus (22–57%), amblyopia (19–31%), optic neuropathy (4%), and nystagmus (3%) [9, 10]. These conditions suggest that the visual deficits in ASD and ID may stem from both neurological and ophthalmological factors.

Gestalt psychology provides a framework for understanding how individuals holistically process visual information [11]. The Gestalt Principles of Perceptual Organization describe how people tend to group visual elements into structured patterns rather than process them as isolated occurrences[6]. These principles — including similarity, continuation, closure, proximity, figure/ground distinction, symmetry, and common region — are critical in higher order visual processing and may be diminished in individuals with neurodevelopmental disorders. Prior research indicates that children with ID often exhibit a fragmented and inconsistent perception of visual stimuli, making it difficult for them to identify key features, recognize relationships between objects, and interpret complex visual scenes [12, 13]. These difficulties are exacerbated when the visual input is novel or contains multiple elements, as individuals with ID tend to focus on isolated details rather than the overall encounter [14–16]. Additionally, physiological incongruities in the visual system of children with ID can lead to problems with spatial orientation, depth perception, and contrast sensitivity [17, 18]. Children with ASD, on the other hand, often exhibit abnormalities in visual exploration, fixation patterns, and spatial perception [19, 20]. These issues can interfere with social interactions, as individuals with ASD may struggle to interpret facial expressions, track moving objects, or disengage attention when necessary [21]. Additional studies have identified deficits in visual orientation [22], continuous visual exploration [23], and spatial perception [24, 25], which may contribute to difficulties in reading, handwriting, and overall spatial awareness [26].

Visual perception is recognized as a fundamental sensory function essential for learning [27], and deficit in this domain can have far-reaching consequences for both academic performance and daily functioning. Evidence from neuroimaging studies suggests that individuals with ASD process visual stimuli differently at the basic level of visual-perceptual processing, contributing to atypical patterns of perception and interaction [28]. Nonetheless, some individuals with ASD demonstrate certain strengths in processing visual details and artistic expression. Research shows that individuals with ASD may excel in local visual processing but struggle with global integration. According to the Weak Central Coherence theory, individuals with ASD tend to focus on details rather than discern holistic patterns [29–31]. While this perceptual peculiarity can be welcome when dealing with tasks requiring detailed recognition, it may hinder real-world ability to adapt, such as when interpreting facial expressions or navigating complex visual scenes [32, 33]. Children with ID also face challenges with visual perception, particularly with visual-motor coordination, spatial awareness, and pattern recognition [34–37]. Based on the Information processing model (IPM), these challenges stem from limited cognitive resources, which impair one's ability to process and integrate visual stimuli efficiently [38, 39]. Overall, these findings highlight the complexity and many facets of visual perception in individuals with ASD and ID, underscoring the importance of advancing our understanding of the distinct perceptual profiles within these two populations.

In light of previous findings, this study aimed to compare the visual perception abilities of children with ASD and those with mild ID. In particular, the study aimed to compare visual-motor integration (the coordination of visual

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[5] Blakeley S, De Luca H. Understand the meaning of visual perception in psychology [Internet]. 2023[cited 2025 June 12]. Available from: https://study.com

[6] Soegaard M. The Law of Similarity — Gestalt Principles (Part 1) [Internet]. Aarhus: Interaction Design Foundation; 2022 [cited 2025 June 12]. Available from: https://www.interaction-design.org/literature/article/the-law-of-similarity-gestalt-principles-1

perception and motor control), perceptual organization (the ability to structure visual input into coherent patterns), and spatial processing (the capacity to understand spatial relationships between objects) between children with ASD and those with mild ID.

METHODS

Study design

A comparative experimental study design was employed for the purposes of this study. The study involved administering standardized visual-motor and perceptual assessments, followed by a statistical comparison of the performances between the two groups.

Setting

The study was conducted in an educational and clinical setting at School No. 4 in Yekaterinburg, Russia, between October 2023 and June 2024.

Participants

Participants were selected based on the following inclusion criteria: (1) a formal diagnosis of ASD or mild ID documented by school or clinical professionals, (2) an age range between seven and 12 years, (3) enrollment in specialized education programs, and (4) parental or guardian consent for participation. Children with dual diagnoses (e.g., both ASD and mild ID), unverified diagnoses, or significant motor impairments affecting test completion were excluded.

Sampling strategy

A purposive sampling strategy was carefully adopted and subsequently implemented in several steps. Firstly, participants were identified from one special education school and two centers located in Yekaterinburg that specifically served children with ASD or mild ID. Secondly, the inclusion criteria listed above were applied to screen potential participants. Thirdly, the exclusion criteria were used to eliminate ineligible participants. Finally, participants who met all the criteria were selected for inclusion in the study.

Recruitment

School psychologists and special-need teachers referred students based on an existing clinical or educational diagnosis of ASD or mild ID. The teachers and coaches completed a detailed interview form for each child, drawing on their own knowledge, as well we the child's diagnostic and admission records from the centers and school reports. The examiner maintained direct contact with the coaches, while communication with the child's parents was channeled through the coaches. The parents also completed a questionnaire focused on the child's personal background and family health history, including factors such as birth complications and a family history of mental illness.

Procedure

At the beginning of the study, the parents or legal guardians were provided with an information sheet and a written consent form acquainting participants with the purposes of the study and highlighting that participation was anonymous and all the provided information was going to be kept confidential. After securing informed consent from the parents (or legal guardians), each child was assessed individually in a quiet, distraction-free room within the school grounds. The researcher explained the task using age-appropriate language to ensure understanding and comfort. Testing sessions lasted approximately 15 to 20 minutes, during which the children were encouraged to do their best without external rewards or penalties. All assessments were conducted by the same trained researcher using a standardized administration protocol. Observations about behavior during the test were recorded alongside score results to enhance interpretation.

The primary instrument used for the assessment was the Bender Visual-Motor Gestalt Test, First Edition (Bender-Gestalt Test) [40]. The test is designed for children aged three years and older and is used to assess visual-motor performance, visual-perceptual skills, and to screen for developmental delays, neurological deficits, and emotional disorders [40, 41]. Research has shown a significant correlation between children's ability to copy geometric figures and their intellectual capabilities, including non-verbal intelligence, as well as the likelihood of learning difficulties such as dyslexia and dysgraphia [42]. These qualities make the Bender-Gestalt Test a valuable tool for child psychologists.

Each child was instructed to copy nine geometric figures (see Figure S1 in the Supplementary), presented one at a time, onto a blank paper using a pencil. The task did not involve reading or writing, but instead focused on accuracy, alignment, integration, and the structure of the copied forms. The test results were used to derive measures of

Table 1. Study variables

Variables	Values
Outcomes (dependent variables)	1. Visual-motor integration 2. Perceptual organization 3. Spatial processing abilities
Exposures (independent variables)	1. ASD 2. Mild ID
Predictors	1. Age 2. Cognitive functioning level (based on clinical and teacher-reported information about ASD or mild ID)
Effect modifiers	1. Attention and focus (differences in attention regulation between the ASD and mild ID groups may affect performance outcomes) 2. Previous experience with visual tasks (some children may have had exposure to visual-motor training, influencing test performance)

Note: ASD — autism spectrum disorder; ID — intellectual disability.

visual-motor integration (the coordination of visual input and motor control), perceptual organization (the ability to form structured visual patterns), and spatial processing (the understanding of spatial relationships among components). The study variables are summarized in Table 1.

Statistical analysis

The Bender-Gestalt Test was scored using a combination of qualitative and quantitative criteria. Common error types such as rotations, omissions, distortions, and integration issues were noted. The Mann–Whitney U test, a non-parametric statistical method, was used to compare the two groups (ASD and mild ID) on measures of visual-motor integration, spatial processing, and perceptual organization. This test was selected due to the small sample size and the non-normal distribution of scores, as it is more robust against outliers and violations of normality. For each variable, the Mann–Whitney U test and the corresponding p-value (*p*) were calculated to determine whether the differences between the two groups were statistically significant. All the tests were conducted using a two-tailed significance level of $\alpha=0.05$. A *p*-value below 0.05 was considered statistically significant. Descriptive statistics for non-normally distributed continuous variables were reported as a median and interquartile range (IQR). The IQR is defined as the range between the first quartile (25th percentile) and the third quartile (75th percentile), representing the middle 50% of the data. All statistical analyses were performed using IBM SPSS Statistics. The study's independent and dependent variables are summarized in Table 1.

Ethical considerations

No formal ethical approval from a recognized ethics board was secured. Informed consent was obtained from every parent or legal guardian of the participants, and assent was secured from the children using age-appropriate language. All the personal data collected was anonymized in order to protect participant confidentiality.

RESULTS

A total of 15 children (eight with ASD and seven with mild ID) aged seven to 12 years, were included in the study. The study explored group differences between children with ASD and those with mild ID in three key areas: visual-motor integration, perceptual organization, and spatial processing. Descriptive statistics and statistical comparisons are presented below.

Visual-motor integration

Visual-motor integration was assessed using the General Trends (GT) score from the Bender-Gestalt Test, which aggregates performance across all 9 geometric figures. According to the scoring framework (Appendix 1 in the Supplementary), higher scores indicate greater visual-motor disintegration, perceptual distortion, and developmental lag. Children with ASD had a wide range of scores (32 to 124; median=55.0, IQR=34.0), reflecting considerable heterogeneity in visual-perceptual functioning: from severely impaired to near-typical levels. This vast range likely reflects the diverse cognitive and neurological profiles characteristic of ASD. In contrast, the mild ID group showed a narrower and consistently higher score range (73 to 98; median=83.0, IQR=19.0), indicating more uniform deficit in the visual-motor and spatial domains (Table 2).

The statistical analysis using the Mann–Whitney U test revealed a significant group difference (U=10.0, *p*=0.0186), with the ASD group generally outperforming the mild ID group in visual-motor tasks. The recurring errors among children with ASD included rotations and omissions, particularly in complex geometric figures such as figures 6–8, consistent with an individual facing challenges in holistic integration. The mild ID group more frequently exhibited distortions and figure integration issues across all items, suggesting deeper difficulties in coordinating visual input with motor execution.

Table 2. Total scores in the visual-motor domain of the Bender-Gestalt Test

No	Age	Scores	Group	Normal range
1	7	74	Mild ID	33–41
2	8	95	Mild ID	25–32
3	8	76	Mild ID	25–32
4	8	95	Mild ID	25–32
5	8	98	Mild ID	25–32
6	8	77	Mild ID	25–32
7	9	83	Mild ID	20–28
8	9	73	Mild ID	20–28
9	9	42	ASD	20–28
10	10	55	ASD	18–26
11	11	76	ASD	15–25
12	11	48	ASD	15–25
13	11	18	ASD	15–25
14	12	124	ASD	15–25
15	12	32	ASD	15–25

Note: ASD — autism spectrum disorder; ID — intellectual disability.

Table 3. *p*-values for each figure

Geometric figure	Median (mild ID)	Median (ASD)	*p*-value	U	Significance
1	5.0	2.0	0.08	16.0	No
2	8.0	4.0	0.02	11.0	Yes
3	11.0	6.0	0.24	22.0	No
4	9.0	7.0	0.04	13.0	Yes
5	10.0	5.0	0.02	10.0	Yes
6	10.0	4.0	0.04	12.0	Yes
7	12.0	6.0	0.03	11.0	Yes
8	10.0	5.0	0.01	6.0	Yes
A	8.0	4.0	0.05	15.0	Yes (borderline)

Note: ASD — autism spectrum disorder; ID — intellectual disability; U — the Mann–Whitney U test.

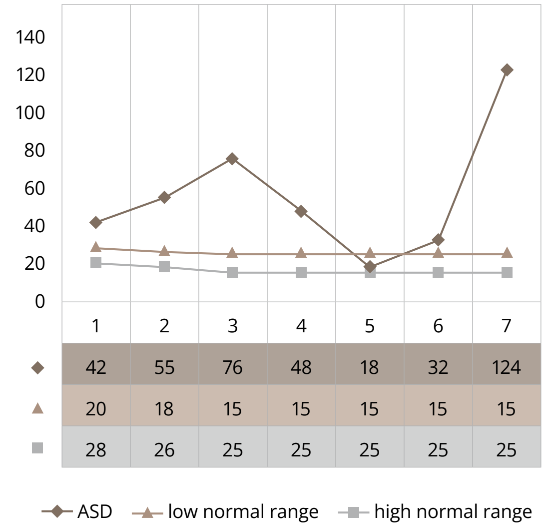

Figure 1. Comparison of autism spectrum disorder group scores to normal range extremes.

Note: ASD — autism spectrum disorder.
Source: Khamenehei, Tokarskaya, 2025.

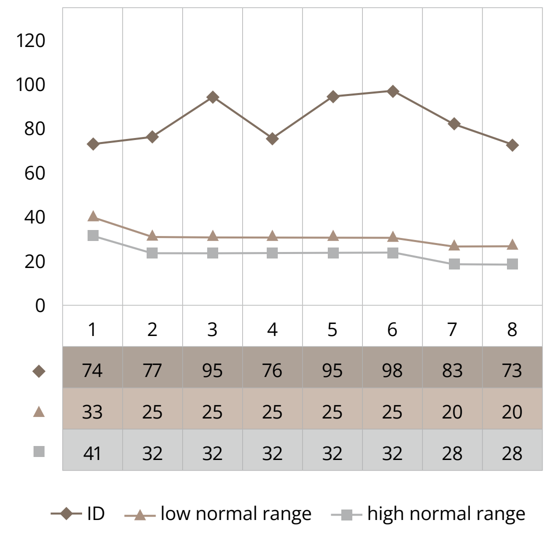

Figure 2. Comparison of mild intellectual disability group scores to normal range extremes.

Note: ID — intellectual disability.
Source: Khamenehei, Tokarskaya, 2025.

To further assess these differences, each of the 9 Bender-Gestalt geometric figures was analyzed individually. The results showed that 7 out of 9 figures demonstrated statistically significant group differences, favoring better visual-motor performance in the ASD group (Table 3). This figure-level analysis reinforces the overall pattern: while both groups performed below normative developmental expectations, their error types and the variability of their performance suggest distinct underlying cognitive processing mechanisms. Figures 1 and 2, along with Table 2, illustrate these patterns in comparison to age-specific normative ranges (e.g., 25–32 for age 8, 20–28 for age 9).

In summary, the results indicate that children with ASD and those with mild ID differ in their visual-motor performance, with the ASD group showing a wider range of performances compared to the mild ID group.

Perceptual organization

Perceptual organization, which reflects the ability to structure visual input into coherent forms [43], was evaluated using scores from the geometric figures 1–4, which emphasize pattern recognition and figure-ground distinction. The ASD group had a median score of 36.0 (IQR=38.25, range from 18 to 76), indicating a variety of performances, with some children excelling in detail-oriented tasks but struggling with overall pattern integration. The mild ID group had a higher median score of 83.0 (IQR=19.0, range from 73 to 95), suggesting a more uniform but impaired ability to perform (Table 4). The Mann-Whitney U test indicated a significant group difference: U=89.0, *p*=0.021. The qualitative analysis revealed that children with ASD often produce accurate reproductions of individual elements but fail to maintain geometric figure coherence (e.g., misaligned segments in figure 3). The mild ID group showed frequent omissions and distortions, particularly in figures 1 and 2, indicating that these participants experienced in recognizing and organizing visual patterns.

Spatial processing

Spatial processing, assessing one's understanding of spatial relationships, was evaluated using the scores from figures 5–8 and A, which involve complex spatial alignments and rotations. The ASD group had a median score of 37.0 (IQR=26.50, range from 18 to 124), reflecting strengths in local spatial detail but difficulties with global spatial integration. The mild ID group had a median score of 43.0 (IQR=35.25), indicating consistent weakness in this area (Table 4). The Mann-Whitney U test confirmed a significant difference: U=91.0, *p*=0.037. Children with ASD showed errors such as rotations in figures 5 and A, suggesting challenges in mental rotation and spatial orientation. The mild ID group exhibited frequent spatial misalignments and oversimplifications, particularly in figures 6–8, reflecting limited spatial awareness.

Table 4 summarizes the median scores, IQRs, and statistical comparisons for all domains. The ASD group demonstrated greater variability and strengths in local processing, particularly in visual-motor integration and perceptual organization, but struggled with holistic integration. The mild ID group showed more consistent deficit across all domains, with pronounced challenges in spatial alignment and perceptual coherence.

Table 4. Summary of the results

Variable	Group	Median score	IQR	U	*p*
Visual-motor integration	ASD	55.0	34.0	10.0	0.0186
	Mild ID	83.0	19.0	-	-
Perceptual organization	ASD	36.0	38.25	89.0	0.021
	Mild ID	45.0	38.00	-	-
Spatial processing	ASD	37.0	26.50	91.0	0.037
	Mild ID	43.0	35.25	-	-

Note: Median and interquartile range (IQR) values reflect Bender-Gestalt Test. Normative ranges vary by age (see Appendix 1 in the Supplementary). ASD — autism spectrum disorder; ID — intellectual disability; IQR — interquartile range; U — the Mann–Whitney U test.

DISCUSSION

This study compared visual perception abilities in children with ASD and mild ID using the Bender-Gestalt Test, focusing on visual-motor integration, perceptual organization, and spatial processing. Children with ASD showed a wide range of performances in visual-motor integration, reflecting a wider range of performances, from severe to near-typical function. These participants demonstrated strength in local detail reproduction but struggled with holistic integration. In contrast, the mild ID group showed more a consistent deficit marked by general distortions and poor coordination. In perceptual organization, participants with ASD were able to reproduce individual features accurately but had difficulty forming coherent patterns, while those in the mild ID group produced more frequent omissions and disorganized forms. Group differences were statistically significant (*p*=0.021). In spatial processing, ASD children exhibited variable performances and specific errors like mental rotations, whereas the mild ID group showed consistent spatial misalignments and oversimplifications (*p*=0.037). Overall, ASD children produced a greater variety of performances and showed strength in local processing, while ID children showed a more uniform and global pattern of impairments. Below, we discuss the strengths and limitations of this work, attempt to fit the study's results within existing literature, and outline the implications for future research and practice.

This study offers several notable strengths. First, it focuses on a direct comparison of visual-perceptual processing in children with ASD and mild ID, two populations that are often studied separately. By employing the Bender-Gestalt Test within a controlled school setting, the research provides standardized, ecologically valid insights into visual-motor and spatial functioning. Additionally, the inclusion of a narrow and developmentally comparable age bracket (7 to 12 years) increases the internal integrity of the findings. Finally, the combination of teacher-reported diagnoses with observational data enhances the practical relevance of the results for educators and school psychologists.

This study has several limitations that should be considered when interpreting the findings. First, the sample size was small (*n*=15), which reduces the statistical weight and increases the risk of both Type I errors (false positives due to multiple comparisons) and Type II errors (failure to capture meaningful differences). The limited sample also affects the ability to generalize the results and raises concerns about the robustness of the statistical conclusions. Additionally, ties within small datasets can further reduce the effectiveness of non-parametric tests such as the Mann–Whitney U test. Second, the study lacked clearly defined diagnostic criteria for ASD and mild ID. The diagnoses were based on school records and teacher reports, without formal confirmation using diagnostic tools such as the DSM-5 or standardized IQ assessments. This introduces the potential for misclassification and reduces the reliability of group comparisons. Moreover, the study did not clarify whether any of the participants in the ASD group also had comorbid mild ID, despite estimates that roughly 30% of individuals with ASD met the criteria for mild ID. The severity of autistic symptoms and degree of intellectual impairment were also not reported, which could have influenced test performance. Third, the study relied solely on the Bender-Gestalt Test to assess visual perception. While useful for identifying visual-motor integration issues, this test alone may not fully capture the breadth of perceptual processing differences. Future research should include a broader battery of visual-perceptual assessment tools, such as computerized tracking or scanning tasks, to ensure a more comprehensive profile. Fourth, the absence of a typically developing control group limits the interpretive framework of the findings. Without a neurotypical baseline, it is difficult to contextualize the deviations observed in the ASD and mild ID groups relative to typical development. Finally, the research was conducted in the setting of a single school, which may limit the cultural and educational value of the findings to other populations.

The observed differences in visual perception between children with ASD and mild ID align with and extend upon existing research on neurodevelopmental profiles. While both groups experience visual-perceptual challenges, the nature and underlying mechanisms of these difficulties differ significantly, as supported by prior theoretical and empirical findings.

Consistent with the Weak Central Coherence theory [32], the children with ASD in this study demonstrated a marked tendency toward local detail processing, often at the expense of global integration. This cognitive pattern, previously documented in tasks requiring figure reconstruction and perceptual grouping, has been shown to contribute to enhanced performance in certain domains such as mathematics, coding, or artistic reproduction [44]. Our findings support this, as the ASD children showed high accuracy in reproducing individual features — especially in simpler figures (e.g., figures 1–3) — but struggled to integrate those details into complex forms, resulting in misalignments, rotations, and omissions (e.g., figures 6–8). This aligns with Zhou et al.'s eye-tracking data, which suggests that ASD children selectively fixate on salient visual features, enhancing detail orientation but impairing broader spatial integration [44].

In contrast, the children with mild ID exhibited a more uniform and globally impaired visual performance. The narrower score range and frequent distortions observed across all the figure types reflect broader visual-motor coordination challenges. These results echo findings from Boot et al. [44], who associated visual-motor challenges in this population with lower IQ and broad neurocognitive deficits. Memisevic and Djordjevic further attributed spatial and visual integration issues in ID to diffuse neural inefficiencies [45], consistent with Castaldi et al., who highlighted general developmental delays as a hallmark of visual-spatial deficits in ID [46].

Importantly, the perceptual patterns observed in ASD — marked by heightened attention to visual detail but poor pattern integration — are well-supported by empirical work. For instance, Samson et al. demonstrated that children with ASD exhibit superior performance in visual search tasks, particularly for complex or high-contrast stimuli [47]. Similarly, Chung and Son reported that ASD individuals show enhanced sensitivity to visual features such as color and edge contrast, though they may struggle to organize these elements into coherent wholes [28]. These findings support the gap seen in our data between accuracy in reproducing isolated parts of figures and difficulty in producing integrated patterns.

The spatial orientation challenges noted in both groups can also be contextualized within prior work. Chung and Son found that ASD-related spatial difficulties often stem from limitations in mental rotation and depth perception, rather than general spatial unawareness [28]. In contrast, the spatial errors in children with mild ID appear more aligned with developmental immaturity and generalized attention deficits. Zhou et al. further emphasized the passive visual processing typical in ID, where key secondary visual cues may be overlooked due to limited engagement with the visual environment [44]. Neurologically, these differences are underpinned by distinct pathways. Atypical connectivity patterns in ASD — particularly between the visual, parietal, and frontal regions — are thought to support intense local processing but may disrupt global integration [48, 49]. Meanwhile, in ID, impairment in visual-motor and spatial tasks likely reflect broader disruptions across multiple brain systems, rather than localized anomalies [45, 46].

However, these conditions are not entirely discrete. As Baio et al. noted, roughly one-third of children diagnosed with ASD may also meet the criteria for ID [3]. This overlap may explain the broad range of performances observed within the ASD group in our study, with some children displaying near-typical visual-motor abilities and others showing severe impairment. By contrast, the mild ID group showed consistency in low performance, reinforcing the interpretation of generalized developmental delay [8].

These findings reinforce the distinctions between cognitive and perceptual functioning: children with ASD exhibit enhanced ability for local processing, sensitivity to contrast and detail, and reduced integration of visual information into global patterns [29, 44, 50], whereas children with mild ID often struggle with attention span, filtering relevant visual input, spatial reasoning, and visual memory [28]. The neurological basis for these differences likely varies: ASD is frequently associated with atypical connectivity [48, 49], while ID is linked to more generalized neurodevelopmental impairments [8, 44–46, 51, 52].

Finally, although ASD and ID are diagnostically distinct, recent research highlights overlapping genetic and behavioral characteristics that can complicate differential diagnosis and help explain the shared perceptual deficits [44, 53]. These findings underscore the importance of nuanced assessment and tailored intervention strategies that consider both the shared and unique features of these neurodevelopmental profiles.

The results in this study have practical significance for both educational and clinical applications. The distinct visual-perceptual profiles identified in children with ASD and those with mild ID underscore the importance of individualized approaches in both assessment and intervention. For children with ASD, whose strengths lie in local detail processing but experience challenges with global integration, educational programs may benefit from leveraging their visual discrimination skills in areas such as mathematics, design, and structured problem-solving. At the same time, therapeutic interventions should aim to advance global processing and visual-motor planning to enhance everyday functioning ability. For children with ID, who demonstrated more generalized visual-perceptual impairment, structured and repetitive training targeting basic spatial cognition, attention to salient features, and visual-motor coordination may be particularly beneficial.

This study also highlights key considerations for future research. Larger and more diverse samples are essential to increasing statistical relevance and allow for greater ability to generalize across neurodevelopmental populations. The inclusion of typically developing control groups would enable a clearer interpretation of perceptual deviations and provide developmental baselines. Additionally, future work should strive to apply formal diagnostic assessments, such as the Autism Diagnostic Observation Schedule (ADOS-2)[7] and standardized IQ measures to reduce diagnostic ambiguity and clarify the potential impact of comorbid conditions. Expanding the assessment tools beyond the Bender-Gestalt Test — such as incorporating computerized visual tracking, eye-movement analysis, or neuroimaging — would offer deeper insight into the cognitive and neurological mechanisms that underlie visual-perceptual processing in these groups.

In educational and psychological practice, these findings emphasize the necessity of adapting evaluation tools and intervention strategies to the distinct needs of children with ASD and mild ID. Developing neurodiversity-informed assessment frameworks and tailoring visual tasks to each

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[7] Loftus Y. Autism vs Intellectual Disability: Similarites and Differences. Autism Parenting Magazine [Internet]. 2025[cited 2025 June 12]. Available from: https://www.autismparentingmagazine.com/autism-vs-intellectual-disability

group's cognitive profile will enhance both diagnostic accuracy and the effectiveness of learning supports. As research continues to illuminate the perceptual and cognitive mechanisms specific to ASD and mild ID, more refined, individualized, and inclusive practices can be developed to promote optimal learning and developmental outcomes.

CONCLUSION

This study found significant differences in visual perception between children with ASD and those with mild ID. Children with ASD showed greater variability and stronger performance in visual-motor integration, but they also struggled with holistic organization. In contrast, children with ID exhibited more consistent deficits, including spatial misalignment, figure distortions, and rotation errors — indicating broader limitations in visual-perceptual processing. These findings should be considered in light of the study's limitations, including the small sample size, reliance on a single assessment tool, and lack of a neurotypical control group, all of which limit generalizability and interpretive depth. Despite these limitations, these results highlight the distinct perceptual processing profiles of children with ASD and those with ID, underscoring the need for tailored assessment and intervention strategies in educational and clinical settings. Future research with larger, more diverse samples and multi-method assessment approaches is essential if we want to expand our understanding of how neurodevelopmental differences shape visual perception.

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The Psychological Impact of COVID-19 Lockdown on Children and Adolescents in Tunisia: A Cross-Sectional Study

Оценка психологического воздействия изоляции в период пандемии COVID-19 на детей и подростков в Тунисе: поперечное исследование

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Original research

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ABSTRACT

BACKGROUND: During the COVID-19 pandemic, Tunisia implemented a national lockdown between March and May 2020. This disrupted daily life and limited access to essential services. The restrictions significantly reduced social interactions and outdoor activities for children and adolescents, raising concerns about the psychological impact on this population.

AIM: To assess the psychological impact of the COVID-19 lockdown on children and adolescents in Tunisia.

METHODS: A cross-sectional study using a telephone survey was conducted among 514 Tunisian households in August 2020. We included parents of children aged five to 15 years. The collected data included sociodemographic characteristics, general information, and details on the establishment of routines and adaptive containment measures. A 26-item questionnaire was developed to assess anxiety and emotional and behavioral symptoms. Data were analyzed using descriptive statistics and chi-square tests.

RESULTS: Parents reported depressive symptoms, anxiety symptoms and behavioral manifestations in 38.7%, 69.8% and 61.9% of their children, respectively. Among children, female sex was associated with significantly greater levels of depressive symptoms, sleep disturbances, and eating disturbances (p=0.002, p=0.034 and p=0.011, respectively). Children who had somatic chronic illnesses or whose parents had such conditions reported significantly greater levels of somatic complaints (p=0.037). Those whose fathers continued to work during the lockdown had a more positive attitude toward the COVID-19 pandemic (p=0.027). Children with anxiety symptoms had more positive attitudes towards the COVID-19 pandemic (p=0.002); however, those with depressive symptoms did not (p=0.19).

CONCLUSION: The COVID-19 lockdown had a substantial psycho-logical impact on children and adolescents in Tunisia, as indicated by high rates of anxiety, depression, and behavioural disturbances. These findings may contribute to the formulation of evidence-based recommendations aimed at safeguarding the mental health of children and adolescents in future pandemic scenarios, thereby minimizing adverse psychological outcomes.

АННОТАЦИЯ

ВВЕДЕНИЕ: Пандемия COVID-19 привела к введению общенациональной изоляции во многих странах, в том числе в Тунисе, где она действовала с марта по май 2020 г. Это нарушило повседневную жизнь и затруднило доступ к социально значимым услугам. Ограничения, введенные в этот период, значительно сократили социальное взаимодействие и возможности активного отдыха детей и подростков, что вызвало опасения по поводу психологического воздействия на эту популяцию.

ЦЕЛЬ: Оценить психологическое воздействие изоляции, введенной в связи с пандемией COVID-19, на детей и подростков в Тунисе.

МЕТОДЫ: В период с 10 по 24 августа 2020 года было проведено поперечное исследование, в ходе которого по телефону опросили 514 тунисских домохозяйств. В исследование были включены родители детей в возрасте от 5 до 15 лет. Собранные данные включали социально-демографические характеристики, общую информацию, а также сведения о внедрении распорядка дня и об адаптивных карантинных мероприятиях. Для оценки симптомов тревоги, эмоциональных и поведенческих симптомов был разработан опросник, состоящий из 26 пунктов. Анализ взаимосвязей между симптомами у детей и социально-демографическими факторами проводился с использованием описательных аналитических методов и критерия хи-квадрат.

РЕЗУЛЬТАТЫ: Родители сообщали о наличии у своих детей депрессивной симптоматики (38,7%), симптомов тревоги (69,8%) и поведенческих симптомов (61,9%). Среди девочек наблюдался значительно более высокий уровень депрессивной симптоматики, нарушений сна и расстройств пищевого поведения (p=0,002, p=0,034 и p=0,011 соответственно). У детей с хроническими соматическими заболеваниями, и детей, имеющих родителей, которые страдали этими заболеваниями, отмечался достоверно более высокий уровень жалоб на соматическое состояние (p=0,037). Дети, отцы которых продолжали работать во время изоляции, чаще демонстрировали позитивное отношение к пандемии COVID-19 (p=0,027). Позитивный настрой также чаще встречался среди детей с симптомами тревоги (p=0,002), тогда как у детей с депрессивной симптоматикой такой связи не наблюдалось (p=0,19).

ЗАКЛЮЧЕНИЕ: Изоляция оказала существенное психологическое воздействие на детей и подростков в Тунисе, которое выражалось высокой частотой тревоги, депрессии и поведенческих нарушений. Эти результаты могут способствовать разработке научно обоснованных рекомендаций, направленных на защиту психического здоровья детей и подростков в сценариях будущих пандемий.

Keywords: *COVID-19 pandemic; lockdown; psychological impact; children and adolescents; Tunisia*
Ключевые слова: *пандемия COVID-19; изоляция; психологическое воздействие; дети и подростки; Тунис*

INTRODUCTION

COVID-19, also known as coronavirus disease 2019, is a contagious respiratory illness caused by the novel virus SARS-CoV-2[1]. The World Health Organization officially declared COVID-19 a pandemic on March 11, 2020 [1]. In response to the pandemic, the Tunisian government implemented a national lockdown from March to May 2020, which caused significant disruptions and major changes in the daily lives of families, enforced social distancing, and implemented restrictive measures [2]. By the end of the first year, the Ministry of Health reported over 144,796 confirmed cases and 4,896 deaths, with the fatality rate fluctuating between 2.5% and 3% during the early months [3]. The COVID-19 pandemic has had a significant effect on the mental health of both adults and children [4]. Children and adolescents, in particular, experienced several negative

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[1] World Health Organization. Naming the coronavirus disease (COVID-19) and the virus that causes it [Internet]. Geneva: WHO; 2020 [cited 2025 June 5]. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it

consequences due to restrictions in their usual activities, and they often faced separation from important figures such as peers, teachers and extended family members. In addition, uncertainty about the future, overcrowding, parental anxiety, fear of infection and economic consequences may further impact the mental health of children and adolescents [5].

The psychological impact of the COVID-19 pandemic lockdown on children and adolescents has been well documented in the scientific literature. Most of the studies used an indirect data collection method and were conducted mainly among parents with internet access [4]. A systematic review published in August 2021 aimed to review the impact of COVID-19 pandemic lockdown measures on the mental health of children and adolescents [4]. It included 61 articles with 54,999 children and adolescents (aged ≤19 years) and reported anxiety and depression as the most common outcomes, with reported symptom prevalence rates ranging between 1.8% and 49.5% for anxiety and between 2.2% and 63.8% for depression [4]. Several studies conducted in China, the UK, Canada, the USA, Turkey, and India have also shown significant increases in symptoms of depression, anxiety [4, 5], post-traumatic stress disorder, and fear among children and adolescents during lockdown compared with pre-lockdown levels [6–12].

In Tunisia, the definitions of children and adolescents generally align with international standards but are also shaped by local legal and policy frameworks; children are typically defined as individuals under 18 years of age, which is consistent with the United Nations Convention on the Rights of the Child (UNCRC)[2], to which Tunisia is a signatory, whereas adolescents are recognized as those aged approximately 10–19 years, reflecting the World Health Organization (WHO) classification[3]. To our knowledge, only a few studies have examined the initial impact of the COVID-19 pandemic on this young population within Tunisia [13]. An online study of 138 Tunisian parents conducted shortly after the implementation of curfew and lockdown measures revealed significant psychological effects on both parents and children as COVID-19 spread [13]. However, the small sample size was not representative of Tunisian households. Another study assessed the psychological profiles of 538 parents (464 mothers, 74 fathers) with children and adolescents under 18 years of age and used online surveys to measure anxiety and burnout levels [14]. This study highlighted the negative psychological impact of social isolation; however, its findings were limited by the use of a self-selected and targeted sample [14]. Importantly, the majority of studies were online-based surveys; thus, they were limited to those who had access to a smartphone device, meaning that the results are not generalizable to the whole population.

Understanding the mental health outcomes of children and adolescents within different cultural contexts and low-resource settings, such as Tunisia, is essential for providing appropriate support to both them and their families in the context of the COVID-19 pandemic [15]. This knowledge can also inform recommendations for mental health professionals and stakeholders. Therefore, the aim of the current study was to assess the psychological impact of the COVID-19 lockdown on children and adolescents in Tunisia. In particular, we sought to evaluate symptoms of anxiety and depression, as well as changes in daily routines and adaptive containment measures, among this population during the lockdown.

METHODS

Study design

We conducted a cross-sectional study using a telephone survey among Tunisian households between the 10th and 24th of August, 2020.

Data collection methods

Sampling method

A controlled quota sampling method was used on the basis of five selection criteria: geographical origin, sex, age, urban or rural residence, and socioeconomic status. The quotas were established proportionally, on the basis of the 2014 population census data[4], to ensure that the sample accurately reflected the distribution of these variables within the Tunisian population. Additionally, stratified sampling and weighting techniques were used to control for these variables and to achieve a representative sample.

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[2] The United Nations Convention on the Rights of the Child [Internet]. London: UNISEF; 1989 [cited 2025 June 5]. Available from: https://www.unicef.org.uk/wp-content/uploads/2016/08/unicef-convention-rights-child-uncrc.pdf

[3] World Health Organization. Adolescents: health risks and solutions. Geneva: WHO; 2020 [cited 2025 June 5]. Available from: https://web.archive.org/web/20200411122817/https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions

[4] National Institute of Statistics. [Statistical Yearbook of Tunisia, 2017–2021] [Internet]. Tunis: INS; 2021 [cited 2025 June 5]. French, Arabian. Available from: https://www.ins.tn/sites/default/files-ftp3/files/publication/pdf/annuaire-2021avec%20lien_3.pdf

Sample size

Our study is part of a larger national research project that assessed the impact of the COVID-19 pandemic on parents' mental health and family functioning. The original study was conducted on a representative sample of 1,003 Tunisian households from all 24 governorates. From this larger sample, a final subsample of 514 participants was drawn while maintaining the proportional distribution across the control variables described above. The sample size was calculated on the basis of a 95% confidence level and a margin of error of ±5%, which aligns with standard practices in social science research.

Eligibility criteria

Participants were eligible for inclusion if they were parents of one child aged between five and 15 years and if they had completed the questionnaire in full. Participants were excluded if they had more than one child or if their responses to the questionnaire were incomplete.

Survey administration

The data were collected via computer-assisted telephone interviewing (CATI), and the households were selected in four stages via telephone exchange codes for landlines and operator differentiator numbers for mobile phones:

- *Stage 1.* The data used included two-digit area codes for landline numbers, each uniquely identifying a specific geographic region, as well as two-digit prefixes indicating different mobile operators.
- *Stage 2.* On the basis of this information, the system generated a telephone file. The entire file was divided into lists and entered into the CATI system one by one during the fieldwork period. Since cell phones are not linked to any geographic location, the numbers were generated on the basis of the mobile operators' identities.
- *Stage 3.* The CATI system dials the exchanges and numbers randomly selected in the Stage 2. The interviewers had no discretion over which number to call, and no new numbers were used unless the first batch was exhausted.
- *Stage 4.* During the fieldwork, the interviewers first determined whether the telephone number in the landline sample belonged to a household. If not, the CATI system automatically dials the next randomly selected telephone number. For the mobile sample, only respondents' eligibility was checked.

The participants who were reached received information about the study and were asked to give their oral consent to participate, with the understanding that they could withdraw at any time without providing any justification. A 20- to 30-minute questionnaire was then completed by experienced interviewers who had received specialized training from child psychiatrists.

The parents were asked to report their sociodemographic and general characteristics, including age, sex, number of children, socioeconomic status, educational level, and sex. A few short questions were included to explore changes in family dynamics and parents' employment status related to the lockdown.

Additionally, a self-developed 26-item questionnaire (see Table S1 in the Supplementary), which is based on the criteria of the Diagnostic and Statistical Manual of mental disorders, fifth edition (DSM-5) was developed for this study to assess the following symptoms: depressive symptoms (items 1 to 3), anxiety symptoms (items 4 to 9), behavioral manifestations (items 10, 11, 13, 14 and 15), positive attitudes towards the COVID-19 pandemic (item 16), attention disorders (item 12), sleep disturbances (items 19 to 21), eating disturbances (item 22), sphincter disorders (item 23), somatic disorders (items 17 and 18), problematic use of the internet (items 24 to 26). The answers to these items were collected via a 4-point Likert scale: "Never", "Sometimes", "Often" or "Always". The items were considered positive if the parents' answer was "Often" or "Always". Symptoms were judged to be present if the answer to one of the corresponding items was "Often" or "Always", except for problematic use of the internet, where the answer to all the items had to be "Often" or "Always".

Two focus groups with six parents in each group were carried out in July 2020 to assess the relevance of the items and topics explored. A preliminary survey among 20 people was carried out to adjust the parents' questionnaire. Following this preliminary phase, no changes were made to the questionnaire.

Statistical analysis

The analysis was carried out via SPSS software on Windows. Frequencies and percentages were used to present descriptive data. Chi-square tests were used to assess relationships between reported child symptoms and sociodemographic factors. The significance level was set at 0.05.

Ethical considerations

Ethical approval was obtained on May 18, 2020, from Mongi Slim Hospital (No. 11/2020), the affiliation of the Child and Adolescent Psychiatry Department's researchers.

RESULTS

Respondent characteristics

The final sample consisted of 514 participants. Approximately half of the respondents (51%) were mothers, and 51.6% of the children were male. More than one-third of the parents (36.2%) were aged between 36 and 45 years and had a high school education (37%). Most respondents were married (95.7%) and lived in nuclear families (91.2%). Almost two-thirds of the households (76.9%) belonged to the middle-income class, as defined on the basis of the 2014 population census data[5], and 74.5% lived in urban areas. Somatic chronic illnesses were reported in nearly half of the cases (49.8%), whereas 10.5% of parents reported a psychiatric history (see Table 1).

Descriptive results

Our results are organized into two main sections. First, we present findings on children's behavior during the COVID-19 lockdown, followed by an examination of its effects on family dynamics. This is followed by an analysis of the psychological impact on children and adolescents. This structured approach is designed to offer a comprehensive understanding of how the pandemic affected young individuals and their families during this period.

Children's behavior and family dynamics during the COVID-19 lockdown

Most children were perceived by their parents as having been interested in following news updates about the pandemic (74.5%). The main sources of information were TV and radio (42.8%), social media (22.5%) and mothers (22.2%). Only 3.7% of the participants reported having had a family member or a friend diagnosed with COVID-19. Approximately one quarter of fathers (23.9%) and 8.6% of mothers worked during the lockdown as they had prior to COVID-19, whereas 2.9% of fathers and 1.8% of mothers started working remotely. Owing to workplace closures, professional activity was completely suspended during the lockdown for both fathers and mothers in 45.7% and 19.3% of the cases, respectively. Changes in family dynamics were also noted in relation to lockdown. A third of the families

Table 1. Participants' sociodemographic profile (*n*=514)

Variable	*n* (%)
Sex of the respondent	
Male	252 (49%)
Female	262 (51%)
Age of the respondent (years)	
≤35	107 (20.8%)
36–45	186 (36.2%)
46–55	174 (33.9%)
≥56	47 (9.1%)
Region	
Urban	383 (74.5%)
Rural	131 (25.5%)
Socioeconomic Status (Income in Tunisian Dinar per month)	
Lower class <400	102 (19.8%)
Lower middle class (400–1,200)	284 (55.3%)
Higher middle class (1,200–3,000)	111 (21.6%)
Affluent class >3,000	17 (3.3%)
Sex of the child concerned by the study	
Female	249 (48.4%)
Male	265 (51.6%)
Age of the child concerned by the study (years)	
≤6	152 (29.6%)
>6 and ≤12	202 (39.3%)
>12	160 (31.1%)
Chronic illness in the family (parent or child)	
Yes	256 (49.8%)
No	258 (50.2%)
Having a mental health illness needed psychiatric intervention (parent or child)	
Yes	54 (10.5%)
No	460 (89.5%)
Educational status of responding parent	
Illiterate	28 (5.4%)
Primary education	150 (29.2%)
High School	190 (37%)
Undergraduate and Postgraduate	146 (28.4%)
Marital status	
Married	492 (95.7%)
Separated, divorced, widowed	22 (4.3%)
Household living	
Nuclear family	469 (91.2%)
Extended family	45 (8.8%)

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[5] National Institute of Statistics. [Statistical Yearbook of Tunisia, 2017–2021] [Internet]. Tunis: INS; 2021 [cited 2025 June 5]. French, Arabian. Available from: https://www.ins.tn/sites/default/files-ftp3/files/publication/pdf/annuaire-2021avec%20lien_3.pdf

(35%) had to endure the absence of one parent due to travel restrictions. Almost eighty percent (79.2%) of the participants reported feeling that their families had gotten closer or ended up reconciling (7.6%), whereas 7.4% of the families were separated by the end of the lockdown (Table 2).

Table 2. Children's behavior related to the COVID-19 lockdown and its impact on parents' employment and family dynamics (*n*=514)

Variable	***n* (%)**	
The child followed the information on the COVID-19?		
Yes	383 (74.5%)	
No	128 (24.9%)	
NS	3 (0.6%)	
The main source of child information about COVID-19 was		
Parents	165 (32.1%)	
Classic Media (TV, radio)	220 (42.8%)	
Social media	116 (22.5%)	
Others	11 (2.1%)	
Unknown or without response	2 (0.4%)	
A family member or friend had contracted COVID-19		
Yes	19 (3.7%)	
No	495 (96.3%)	
Parents employment status during lockdown	**Mother**	**Father**
Unemployed prior to COVID-19	341 (66.3%)	102 (19.8%)
Continued to work as prior to COVID-19	44 (8.6%)	123 (23.9%)
Working remotely	9 (1.8%)	15 (2.9%)
Work suspended during lockdown	99 (19.3%)	235 (45.7%)
Lost his job	13 (2.5%)	21 (4.1%)
NS	8 (5.2%)	18 (3.5%)
The father or mother could not join the family during the lockdown		
Yes	180 (35%)	
No	334 (65%)	
The lockdown led the family to		
Get closer	407 (79.2%)	
Reconciliation	39 (7.6%)	
Separation	38 (7.4%)	
NS	30 (5.8%)	

Note: NS — not stated.

Psychological impact of the COVID-19 lockdown on children and adolescents

The parents reported depressive symptoms, anxiety symptoms and behavioral disorders in 38.7%, 69.8% and 61.9% of the children, respectively. More than half of the parents reported sleep disturbances (57.6%), 35.4% reported eating disturbances, and 5.7% reported sphincter disorders. Attention problems in children were reported in 17.5%, and somatic complaints were reported in 14.6%. Only 11.5% of parents reported problematic use of the internet among their children. However, 54.7% of the children were perceived by their parents as having had a positive attitude toward the COVID-19 pandemic by having shown responsible and organized behavior (being ready to help, caring about their belongings, and taking care of their health) (Table 3).

The relationships between the psychological impact of the lockdown and the COVID-19 pandemic on children and adolescents and socioeconomic factors are presented in Table 4. Mothers reported more depressive symptoms, sleep disturbances and eating disturbances than fathers did (*p*=0.001, *p*=0.046 and *p*=0.007, respectively). Among children, female sex was associated with significantly greater levels of depressive symptoms, sleep disturbances, and eating disturbances (*p*=0.002, *p*=0.034 and *p*=0.01, respectively). Children who had somatic chronic illnesses or whose parents had such conditions reported significantly greater levels of somatic complaints (*p*=0.037). Children whose fathers continued to work during the lockdown showed a more positive attitude towards the COVID-19 pandemic (*p*=0.027). No significant association was found between parental remote work (mother or father) and child symptoms or with the adoption of a positive attitude. Children with anxiety symptoms had more positive attitudes towards the COVID-19 pandemic (*p*=0.002). However, those with depressive symptoms did not (*p*=0.19) (Table 4).

DISCUSSION

A total of 514 Tunisian households were included in the study. According to parental reports, 38.7% of children exhibited depressive symptoms, 69.8% experienced anxiety symptoms, and 61.9% demonstrated behavioural issues. Depressive symptoms, sleep disturbances, and eating disturbances were significantly more prevalent among female children (*p*=0.002, *p*=0.034, and *p*=0.011, respectively). The presence of chronic somatic illness — whether in the child or their parents — was significantly associated with a higher frequency of somatic complaints in children (*p*=0.037). Moreover, children whose fathers continued to work during the lockdown were more likely to exhibit

Table 3. Psychological impact of the COVID-19 lockdown and pandemic on children and adolescents

Symptoms	Items		Never 0 *n* (%)	Sometimes +/- *n* (%)	Often + *n* (%)	Always ++ *n* (%)	Presence of symptoms *n* (%)
Depressive symptoms	1	He/she gets quickly irritated and easily angry	245 (47.7)	140 (27.2)	74 (14.4)	55 (10.7)	199* (38.7%)
	2	He/she cries easily and at the slightest motive	316 (61.5)	116 (22.6)	39 (7.6)	43 (8.4)	
	3	Activities and plays he/she enjoyed have less positive effect on him/her	312 (60.7)	117 (22.8)	60 (11.7)	25 (4.9)	
Anxiety symptoms	4	He/she often asks and looks for information about COVID-19 (symptoms, contamination, epidemic situation...)	186 (36.2)	137 (26.7)	98 (19.1)	93 (18.1)	359* (69.8%)
	5	Shows or expresses an extreme fear of being contaminated	255 (49.6)	110 (21.4)	76 (14.8)	73 (14.2)	
	6	Shows or expresses extreme fear for his/her family (contamination, death...)	214 (41.6)	125 (24.3)	81 (15.8)	94 (18.3)	
	7	Shows or expresses an important anxiety while separated of his/her family even short	279 (54.3)	111 (21.6)	67 (13.0)	57 (11.1)	
	8	Shows or expresses an extreme fear about situations or issues whose didn't worry him/her before (being alone, fear of darkness...)	333 (64.8)	95 (18.5)	44 (8.6)	42 (8.2)	
	9	Worries more than he/she is used to from any sounds he/she hears	357 (69.5)	108 (21.0)	29 (5.6)	20 (3.9)	
Behavioral manifestations	10	He/she moves all time and doesn't stop	190 (37.0)	110 (21.4)	72 (14.0)	142 (27.6)	318* (61.9%)
	11	Worries/gets fed up quickly and has difficulty to finish any activity he/she starts	244 (47.5)	131 (25.5)	91 (17.7)	48 (9.3)	
	13	He/she argues with authority figures and actively defies or refuses to comply with requests	235 (45.7)	157 (30.5)	69 (13.4)	53 (10.3)	
	14	He/she has violent reactions (cry, fight, break...)	320 (62.3)	129 (25.1)	42 (8.2)	23 (4.5)	
	15	Has regressive behavior not adapted with his/her age (excessive spoiled attitude, uses baby talk, asks for bottle, pacifier...)	365 (71.0)	93 (18.1)	39 (7.6)	17 (3.3)	
Attention disorders	12	He/she has difficulty sustaining attention and he/she easily distracted	283 (55.1)	141 (27.4)	56 (10.9)	34 (6.6)	90* (17.5%)
Positive reaction to COVID-19	16	Shows responsible and organized behavior (ready to help, preoccupied about property, take care of health...)	128 (24.9)	105 (20.4)	113 (22.0)	168 (32.7)	281* (54.7%)
Somatic disorders	17	Complains of multiple pains (head, stomach...)	383 (74.5)	87 (16.9)	31 (6.0)	13 (2.5)	75* (14.6%)
	18	Presents fearful states with signs (such as throbbing, swallowing difficulty, shaking, sweating...)	410 (79.8)	62 (12.1)	35 (6.8)	7 (1.4)	
Sleep disturbances	19	Noticeable change in sleep schedules (delay of more than two hours when falling asleep or waking up)	184 (35.8)	106 (20.6)	110 (21.4)	114 (22.2)	296* (57.6%)
	20	Has fearing dreams	365 (71.0)	105 (20.4)	31 (6.0)	13 (2.5)	
	21	Insists on sleeping with a family member (parents, siblings) when he/she was used to sleeping alone without difficulty	301 (58.6)	78 (15.2)	48 (9.3)	87 (16.9)	
Eating disturbances	22	Noticeable increase or decrease in appetite	208 (40.5)	124 (24.1)	90 (17.5)	92 (17.9)	182* (35.4%)
Sphincter disorder	23	Has started wetting the bed again	429 (83.5)	56 (10.9)	21 (4.1)	8 (1.6)	29* (5.7%)
Problematic use of internet	24	Excessive use of electronic devices (phone, computer, tablet, electronic games)	171 (33.3)	117 (22.8)	82 (16.0)	144 (28.0)	59** (11.5%)
	25	Gets angry or refuse reducing use of electronic devices	235 (45.7)	111 (21.6)	93 (18.1)	75 (14.6)	
	26	Use of electronic devices has a negative impact on him/her (behavior, relationship, sleeping, eating)	256 (49.8)	118 (23.0)	78 (15.2)	62 (12.1)	

Note: *Symptoms were judged to be present if the answer to at least one of the corresponding items was "Often" or "Always". **Symptoms were judged to be present if the answer to all the corresponding items was "Often" or "Always".

Table 4. Relationships between the psychological impact of the COVID-19 lockdown on children and adolescents and socioeconomic factors

Variable	DS	BM	AS	PA to COVID-19	AD	SD	ED	Sph D	Sm D	PU internet
Responding parent										
Father	32.7	59.4	37.5	53.0	15.1	53.8	29.5	6.0	16.3	12.4
Mother	46.7	65.9	38.6	55.7	19.9	62.6	41.1	5.3	12.6	10.2
p	**0.001**	0.135	0.789	0.545	0.161	**0.046**	**0.007**	0.738	0.237	0.441
Rural vs Urban										
Urban	38.1	62.9	38.6	56.7	17.0	57.4	34.7	6.0	14.9	11.7
Rural	40.5	58.8	36.6	48.9	19.1	58.0	37.4	4.6	13.7	10.7
p	0.635	0.399	0.684	0.121	0.583	0.909	0.580	0.542	0.749	0.742
Sex										
Female	45.6	64.7	39.3	56.3	20.2	62.3	40.9	5.2	12.3	10.7
Male	32.1	59.2	37.0	53.1	14.9	53.1	30.2	6.1	16.8	12.2
p	**0.002**	0.198	0.597	0.453	0.110	**0.034**	**0.011**	0.641	0.149	0.594
Socioeconomic level										
<800 tnd	37.4	59.9	38.9	55.6	54.2	54.5	35.4	3.5	14.0	8.9
(800–2000) tnd	43.4	69.2	35.8	54.7	20.1	61.0	37.7	8.8	18.2	13.2
>2000 tnd	28.3	54.7	45.3	52.8	11.3	66.0	34.0	5.7	9.4	13.2
p	0.130	0.077	0.468	0.928	0.345	0.191	0.843	0.271	0.246	0.337
Having a chronic illness (parent or child)										
Yes	37.9	62.5	35.5	57.0	16.4	58.6	35.2	4.3	11.3	9.4
No	39.4	61.2	40.7	52.3	18.6	56.6	35.7	7.0	17.8	13.6
p	0.702	0.769	0.229	0.284	0.512	0.646	0.905	0.188	**0.037**	0.136
Having a Mental Health illness needed psychiatric intervention										
Yes	50.0	66.7	38.9	63.0	22.2	53.7	29.6	1.9	11.1	5.6
No	37.4	61.3	38.0	53.7	17.0	58.0	36.1	6.1	15	12.2
p	0.072	0.443	0.904	0.196	0.335	0.542	0.348	0.346	0.444	0.149
Employment status of the mother during lockdown										
Continued to work as prior to COVID-19	36.4	56.8	36.4	38.6	18.2	56.8	31.8	4.5	20.5	9.1
Working remotely	44.4	55.6	22.2	44.4	0.0	33.3	11.1	0.0	11.1	0.0
p	0.649	0.944	0.701	1.000	0.324	0.278	0.418	1.000	1.000	1.000
Employment status of the father during lockdown										
Continued to work as prior to COVID-19	41.5	61	41.5	56.9	18.7	56.1	36.6	1.6	14.6	13.0
Working remotely	33.3	66.7	26.7	26.7	6.7	53.3	26.7	13.3	6.7	6.7
p	0.545	0.669	0.269	**0.027**	0.246	0.839	0.449	0.058	0.693	0.694

Note: AD — attention disorders, AS — anxiety symptoms, BM — behavioral manifestations, DS — depressive symptoms; ED — eating disturbances, PA to COVID — positive attitude towards COVID-19 pandemic; PU internet — problematic use of internet, SD — sleep disturbances; Sph D — sphincter disorder; Sm D — somatic disorders; tnd — Tunisian Dinar. Numbers in bold indicate significant *p*-values (*p*≤0.05) obtained with *χ2 test*.

a positive attitude toward the COVID-19 pandemic (*p*=0.027). A positive attitude was also more common among children presenting with anxiety symptoms (*p*=0.002), whereas no such association was observed in those with depressive symptoms (*p*=0.19).

The COVID-19 pandemic has had a profound global impact, triggering widespread uncertainty and anxiety. During lockdown, both parents and children reported heightened fear and anxiety specifically related to the pandemic. Numerous studies have documented the adverse effects of this period on mental health. For example, research by Morgül et al. indicated that over half of caregivers in the UK reported moderate to severe psychological distress during lockdown [16]. A 2020 meta-analysis of 17 studies conducted across the general population reported a global prevalence of pandemic-related anxiety symptoms of 31.9%, and the prevalence of depressive symptoms was 33.7% on the basis of data from 14 studies [17].

Studies focusing on children and adolescents, such as the study by Luijten et al., revealed higher levels of anxiety, depression, anger, and sleep disturbances during lockdown than before the pandemic [18]. Other studies have similarly reported increases in depressive and anxiety symptoms, general stress and reduced quality of life among children and adolescents during this period, particularly associated with school closures and disruptions to their daily routines and activities [19, 20]. The stress experienced during this time may negatively affect both learning outcomes and mental health, potentially leading to anxiety, depression and other psychological disturbances [6, 7, 11].

In children and adolescents, risk factors associated with a decline in mental health during lockdown, including parental stress and female sex, have been identified. In fact, it was found that children's symptoms were positively correlated with those of their parents. A study by Spinelli et al. suggested that the impact of quarantine on children's behavioral and emotional problems is influenced by parental stress levels [21]. Our findings revealed that children with chronic physical illnesses, whether they had the illness themselves or their parents did, reported more physical complaints, as individuals with physical health conditions may experience heightened anxiety regarding their vulnerability to the virus in the context of the pandemic [21]. In the present study, depressive symptoms, sleep disturbances and eating disturbances were significantly associated with female sex, whereas anxiety symptoms were not. A systematic review reported increased levels of anxiety and depressive symptoms among girls [8]. In a study conducted by Zhou et al., females between the ages of 12–18 years reported higher rates of anxiety and depression, whereas among younger children (aged 7–12 years), girls presented significantly greater levels of fear than boys did [10].

In our study, children whose fathers continued to work during the lockdown were more likely to have a positive attitude towards the COVID-19 pandemic. Additionally, children who exhibited anxiety symptoms were more likely to have a positive attitude towards the pandemic. During the COVID-19 pandemic, children and their families were exposed to direct or indirect factors that could lead to stress and emotional disturbance [21]. The prolonged period of home confinement forced many parents to work from home, while many families faced financial insecurity due to job losses [21]. Children are worried not only about contracting the virus themselves or their parents but also about the impact on their parents' ability to work [21].

In Tunisia, to address the urgent need for support among the general population, the Ministry of Public Health launched a psychological support cell on March 30, 2020, in collaboration with the Psychological Support Unit (CAP) [22]. Accordingly, a new psychological crisis intervention model was developed, and a nationwide helpline was established. In addition to adult psychiatrists, psychologists and social services, this initiative involved child and adolescent psychiatrists and psychologists to provide psychosocial intervention to children, adolescents and parents [22]. Telephone assistance and telemedicine are examples of interventions that could support these populations, as implemented in some child and adolescent psychiatry facilities [23]. With these scientifically grounded recommendations, psychosocial interventions during pandemics will be more effective in addressing the needs of at-risk individuals. Moreover, these at-risk populations — those negatively impacted during pandemics — will be better identified. As we are not invulnerable to other pandemics, it is imperative that we prepare ourselves to handle them more effectively.

One of the strengths of this study is that, to our knowledge, it is the only study conducted on a representative sample by telephone in Tunisia. Conducting the survey via telephone offers several key advantages over online surveys. First, it allows for reaching a broader and more diverse population, including individuals who may not have reliable internet access or who are less familiar with digital technologies.

This helps ensure that the sample accurately reflects the entire population, reducing sampling bias. Second, telephone surveys tend to have higher response rates than online questionnaires do, as they involve direct interaction with trained interviewers, who can clarify questions and encourage participation. This method also enables real-time engagement and can ensure better data quality, as interviewers can follow up on ambiguous responses or clarify misunderstandings immediately.

However, the study also has several limitations. First, it was carried out three months after the lockdown, which could have introduced recall bias. Assessing participants at the peak of the outbreak might have exaggerated certain reactions that were not truly pathological. Second, reliance on parent reports for assessing psychological symptoms may have led to an underestimation of anxiety and depression, as these internalized symptoms are often unnoticed by parents. Studies have indicated that parent-reported rates of anxiety and depression tend to be lower than self-reported rates among children [20]. Third, the survey was based on a single-item measure of mental health, and the questionnaire used was not validated. Nevertheless, it was designed according to the DSM-5 criteria and was reviewed by five specialists in child and adolescent psychiatry. This limitation is not unique to our study; a systematic review of 17 articles on child and family outcomes postpandemic identified the lack of validated measurement tools as the most common quality issue in such assessments [6].

The findings of our study highlight the necessity for longitudinal research to better understand the long-term psychological effects of the COVID-19 lockdown on children and adolescents in Tunisia. Future studies should investigate evolving mental health trajectories over time and identify protective factors that mitigate adverse outcomes. Additionally, intervention-based research is needed to develop and evaluate targeted mental health support programs, including school-based counselling, family interventions, and community outreach initiatives. Practically, policymakers and healthcare providers should prioritize integrating mental health services into emergency response plans to ensure accessible psychological support for young populations during and after crises.

CONCLUSION

The results of our study indicate that the measures implemented in response to COVID-19 caused fear, emotional distress, and anxiety among children and adolescents in Tunisia. These results may inform future recommendations for interventions by social and mental health professionals during pandemics, aiming to mitigate negative psychological effects and improve support for at-risk individuals.

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Mental Health of Forcibly Displaced Persons from Nagorno-Karabakh: A Cross-Sectional Study

Психическое здоровье вынужденно перемещенных лиц из Нагорного Карабаха: поперечное исследование

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Original research

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ABSTRACT

BACKGROUND: The international community is acutely facing a global problem of refugees and forcibly displaced persons. The situation is currently escalating into a crisis, creating serious humanitarian, social, and healthcare challenges. The forced displacement of the entire Armenian population of Nagorno-Karabakh in 2023 became an emergency in Armenia and highlighted a number of societal issues, including the mental health of the displaced population. What made this migration stand out was its dual nature: on the one hand, it was a flight across national borders to a neighboring country, and on the other hand, it was a return to the historical homeland with which they share a common history, culture, language, and religion.

AIM: To evaluate the mental state of the persons forcibly displaced from Nagorno-Karabakh to Armenia and the risk factors underlying their developing anxiety and depression disorders.

METHODS: We performed statistical data processing using hierarchical regression analysis.

RESULTS: The study was conducted among 733 respondents. The majority of the forcibly displaced persons were women. Most of the refugees were married, relocated with their families, and had mainly secondary education. One in five reported a history of mental trauma. More than half of the respondents showed signs of depression and anxiety that required therapeutic intervention. These individuals exhibited significant impairments in functionality and capacity for work.

CONCLUSION: The study revealed the severity and prevalence of anxiety and depression disorders in forcibly displaced persons. Forced displacement was the key factor in the development of mental disorders in this population. Demographic characteristics, such as sex, age, and marital status, also have a significant impact.

АННОТАЦИЯ

ВВЕДЕНИЕ: Перед мировым сообществом остро стоит глобальная проблема беженцев и вынужденно перемещенных лиц. В современных условиях ситуация приобретает масштабы кризиса, порождая серьезные вызовы для гуманитарной, социальной сфер и здравоохранения. Вынужденное переселение всего армянского населения Нагорного Карабаха в 2023 г. стало чрезвычайной ситуацией в Армении и обострило для общества ряд вопросов, в том числе состояние психического здоровья переселенцев. Особенность данной миграции заключалась в ее двойственной природе: с одной стороны, это было бегство через национальные границы в соседнюю страну, а с другой — возвращение на историческую родину, с которой объединяла общая история, культура, язык, религия.

ЦЕЛЬ: Изучить психическое состояние вынужденно перемещенных лиц из Нагорного Карабаха в Армению и факторы риска, лежащие в основе формирования у них тревожных и депрессивных расстройств.

МЕТОДЫ: Проводилась статистическая обработка данных с применением иерархического регрессионного анализа.

РЕЗУЛЬТАТЫ: Исследование было проведено с участием 733 респондентов. Среди вынужденно перемещенных лиц преобладали женщины, большинство переселенцев состояли в браке и переселялись с семьей, имели в основном среднее образование. Каждый пятый отмечал в анамнезе психическую травму. Более половины респондентов проявляли признаки депрессии и тревоги, требовавшие терапевтического вмешательства. У этих лиц отмечались выраженные нарушения работоспособности и повседневного функционирования.

ЗАКЛЮЧЕНИЕ: У вынужденно переселенных лиц выявлена высокая распространенность и значительная выраженность тревожных и депрессивных расстройств. Ключевым фактором развития психических нарушений в этой группе стало вынужденное переселение. Существенное влияние также оказали демографические характеристики: пол, возраст и семейное положение.

Keywords: *refugees; forcibly displaced persons; mental health; depression; anxiety; risk factors*
Ключевые слова: *беженцы; вынуждено перемещенные лица; психическое здоровье; депрессия; тревога; факторы риска*

INTRODUCTION

In the third millennium, the problem of refugees and forcibly displaced persons (FDPs) has become a global crisis. Against the background of global geopolitical changes, this issue is becoming more acute and poses serious humanitarian, social, healthcare, and other problems. The changes make some people flee, others provide shelter and protection. Mass forced displacement is considered a risk factor for the development of mental disorders. Every society faces migration in one form or another. Different countries play different roles in this process, being a source of emigration or a host state or serving as transit territories [1].

The non-governmental organization Armed Conflict Location & Event Data Project, which specializes in conflict data collection, estimates that the number of conflicts has increased by 40% since 2020 and that one in six people in the world was exposed to a conflict in 2024 [2]. According to the Office of the United Nations High Commissioner for Refugees, there were 110 million FDPs in the world in mid-2023, of which 62.5 million people were internally displaced, 36.4 million people were refugees, 6.1 million people were asylum seekers, and 5.3 million were other people in need of international assistance [2]. At the same time, there is a tendency towards a further increase in the number of displaced persons, which is due to the persistence and even strengthening of factors that contribute to migration (poverty, lack of security, lack of access to basic services, armed conflicts, environmental issues, natural disasters)[1]. In Post-Soviet history, mass population movements began as a result of the uncivilized collapse of the Soviet Union in 1991 and were characterized by tense interconnections between migration and forced displacement [3, 4]. Interethnic conflicts and national liberation movements in Central Asia and the South Caucasus in the first half of the 1990s caused flows of many thousands of refugees and displaced persons (in Sumgait, Baku, Nagorno-Karabakh, Abkhazia, South Ossetia, Chechnya, Tajikistan, and Transnistria) [5]. In 2023, Armenia faced an emergency of the forced displacement of all Armenians from Nagorno-Karabakh to Armenia after almost a year of blockade and hostilities. Extreme conditions developed in Nagorno-Karabakh after the 44-day war, which resulted in the occupation of most of the territory of Nagorno-Karabakh and the entry of Russian peacekeeping forces into the region[2] [6].

Migrants can relocate within their own country or to neighboring (or other) countries [7]. In the case of the Karabakh refugees, the situation was exceptional. When

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[1] The health of refugees and migrants. 2022. Available from: https://www.who.int/ru/news-room/fact-sheets/detail/refugee-and-migrant-health

[2] Reevell P. Over 100,000 Armenians have now fled disputed enclave Nagorno-Karabakh. Available from: https://abcnews.go.com/International/93000-armenians-now-fled-disputed-enclave-nagorno-karabakh/story?id=103596275

fleeing from the hostilities, people were relocating to the current sovereign territory of Armenia, because their historical homeland had become part of another country due to the political decision of past Soviet administration. These refugees did not settle in camps (as is the case almost all over the world) but in hotels, dormitories, apartments, and houses of their compatriots. Moreover, the Armenian government take them under protection[3]. Thus, it was a flight across national borders to a neighboring country, but a country that is their historical homeland, with which they shared a common history, culture, language, and religion. The factor of resettling of FDPs and the living conditions of the new place are important for the development of mental health [8]. Pham et al. [8] noted that, taking into account factors of exposure to violence, social cohesion, unemployment, and access to basic services, FDPs in the camps had an average rate of distress symptoms that was 19% higher than in those outside the camps.

Despite reports of a high prevalence of mental health problems among refugees, estimates of specific mental disorders vary significantly across studies, owing to both methodological and contextual factors [9]. The mental health of FDPs can be affected not only by traumatic events related to war, but also by stressors caused by displacement and resulting from migration and post-migration experiences [10].

The status of a refugee or FDP has a profound impact on mental health with an increased risk of depression and anxiety disorders, psychotic disorders [11–14], suicidal tendencies [15, 16], post-traumatic stress disorder (PTSD), chronic pain sensations, sleep disorders, various mental health disorders, and somatic sensations [17–22]. In general, the so-called migrating population is heterogeneous in terms of health and vulnerability, defined by suboptimal metabolic risk factors in the country of origin (e.g., morbid obesity, dysglycemia, hypertension, and dyslipidemia), unfavorable travel conditions and resulting stress, poverty, and anxiety, as well as various consequences of acculturation and access to health services in the country of destination [22]. According to Cheung et al. [23], low- and middle-income countries often have a high level of mental disorders, but a lower prevalence of somatic distress. More than half (55%) of the respondents were considered by the authors to be at risk of developing somatic distress (PHQ-15≥6), and the prevalence of the disorder was considered to be medium (18%) or high (13%). Significant correlations (p<0.05) were observed between somatic distress and age, female sex, economic status, depression, post-traumatic stress, and multiple injuries. The risk of developing somatic distress was also significantly correlated with increased functional disability [23]. Many migrants have an increased risk of cardiovascular disease and face significant challenges in overcoming economic and health system barriers to quality healthcare [22].

People displaced due to violence and conflict face stressful factors that can increase the risk of suicide. There have been very few studies on evidence-based strategies for preventing suicide among asylum seekers and refugees. However, context-appropriate early detection and intervention can be a promising way to support people from these population groups [24, 25].

There is a high risk of somatic reactions and existential dilemmas (when belief patterns are questioned) [26, 27]. The risk of PTSD symptoms in forcibly displaced persons is associated with the precarious status of a refugee in the host country [28].

Assessment of the prevalence of mental disorders among FDPs proved to be a difficult problem, because it depends on the clinical features of the disorders and research methodology, which manifested itself in dramatic differences in data: according to different sources, the prevalence of depression varies from 2.3% [29] to 80% [30], that of PTSD from 4.4% [31] to 86% [30], and that of anxiety disorders from 20.3% [32] to 88% [30, 33]. These figures reflect a high degree of statistical heterogeneity.

A cross-sectional study of a randomly selected sample conducted by Nissen et al. [9] showed that scores above the cut-off level on the Harvard Trauma Questionnaire (HTQ) and the Hopkins Symptom Checklist-25 (HSCL-25) predicted the likelihood of PTSD (HTQ>2.06), anxiety (HSCLanxitey>1.75), and depression (HSCLdepression >1.80). Weighted estimates of the prevalence of PTSD, anxiety, and depression obtained by the authors [9] using HSCL-25 were 29.7% (25.4–34.4%), 30.1% (25.7–34.9%), and 45.2% (40.6–49.8%), respectively. The cumulative exposure to potentially traumatic experiences before or during the relocation appeared to be a clear risk factor for all outcomes, and female sex was a risk factor for anxiety and depression, although only in the adjusted analysis.

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[3] Badalyan N. Displaced persons from Nagorno-Karabakh will use the rights of refugees. Available from: https://arminfo.info/full_news.php?id=80001

According to the most recent data, the total prevalence score was 38.90% (95% confidence interval (CI): 29.63; 48.17) for anxiety disorders, 38.16% (95% CI: 32.16; 44.15) for depression, and 39.62% (95% CI: 32.87; 46.36) for PTSD [34].

Many factors affect the mental health of a refugee or FDP, with war trauma considered to be the leading and most significant one [35]. A group of English researchers studied the stress factors that determine the mental well-being of FDPs [36]. To conduct a reflexive thematic analysis, the authors used a system of four main stress factors, focusing on sources of stress, such as trauma, cultural adaptation, and relocation. The main stress factors were difficulty in accessing housing and employment, exacerbated by language barriers, separation from the family, and the ongoing war-related trauma. These stress factors are supposed to increase feelings of fear, uncertainty, sadness, numbness, disorientation, confusion, helplessness, and anxiety.

The role of adverse socio-economic conditions (lack of social support, unemployment, financial stress, poor knowledge of the language of the host country) is also significant for refugees [31, 37]. Socio-demographic factors were also described as unfavorable predictors for long-term mental health in publications by Kessler et al. [38] and Wittchen et al. [39]. The literature names another factor affecting the prevalence of mental disorders, the factor of motivation behind a refugee or a FDP: the prevalence of mental disorders in economic refugees is approximately half that in FDPs (21% vs. 40%) [18]. The susceptibility of refugees to mental disorders is also due to migration and post-migration processes and factors that can complicate the clinical presentation and changes over time in trauma-induced disorders [33, 37, 40]. Porter and Haslam [35] emphasize that the mental health of refugees and FDPs determines the socio-political context of their life. The authors observed the worst outcomes in persons living in special institutions, disadvantaged economically, displaced within their own country and repatriated to the country from which they had previously fled, or those for whom the conflict was still unresolved [35].

In response to the forced mass displacement from Nagorno-Karabakh to Armenia, this study aimed to study the mental state and risk factors for anxiety and depression disorders among the affected forcibly displaced persons.

Objectives were set based on the study aim. The study had to answer the following questions:

1. What are the social and demographic characteristics of the FDPs from Nagorno-Karabakh?
2. What is the traumatic experience of the FDPs from Nagorno-Karabakh?
3. What is the manifestation of depression and anxiety observed in FDPs?
4. How do functional impairment and personal incapacity present in the FDPs from Nagorno-Karabakh?
5. What role can socio-demographic factors and factors associated with traumatic experiences play in the manifestations of depression and anxiety?

METHODS

Study design

The study was conducted in October 2023 using the cross-sectional method with a single interview of all FDPs from Nagorno-Karabakh located in the regions of Armenia bordering Azerbaijan (Goris, Kapan, Sisian, Gegharkunik, and Ararat). The data collection was carried out shortly after the displacement prior to the government's further decision on refugees permanent accommodation in the towns and villages taking into account individuals' preferences.

Sample characteristics

The study included FDPs from Nagorno-Karabakh 18 and older without restrictions in their physical and mental status, women and men living in temporary accommodation in hotels, dormitories, hostels, sanatoriums, and boarding houses. The sample size was not limited. We sought to interview as many displaced persons as possible, in order to obtain more objective and representative results.

Measurements

The mental health of the FDPs was assessed using the Patient Health Questionnaire-9 (PHQ-9) [41] and the Generalized Anxiety Disorder-7 (GAD-7) questionnaire [42, 43]. Data related to the socio-demographic characteristics of the respondents were also collected (see Appendix 1 in the Supplementary). The socio-demographic questionnaire included the following items: age, sex, marital status, education level, relocation to Armenia with or without a family, presence and type of trauma (human losses, injuries, burns, etc.), place of (temporary) residence of the displaced persons.

The PHQ-9 questionnaire allows to determine both the presence and severity of depression [41, 44–48].

Interviewees should answer the question: "*Over the last 2 weeks, how often have you been bothered by any of the following problems?*". Each question has 4 answer options assigned a score: "not at all" (0 points), "several days" (1 point), "more than half the days" (2 points), and "nearly every day" (3 points). Scores may range from 1 to 27. "Minimal depression" corresponds to 1–4 points; "mild depression" to 5–9 points; "moderate depression" to 10–14 points; "moderately severe depression" to 15–19 points; and "severe depression" to 20–27 points (see Appendix 2 in the Supplementary). The degree of functional impairment in the FDPs was determined with the PHQ-9 questionnaire, using the answers to the question "*If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?*": "not difficult at all", "somewhat difficult", "very difficult", and "extremely difficult". The 9-item PHQ-9 questionnaire evaluates depressive symptoms based on the criteria of the American Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5) [49].

The GAD-7 questionnaire was used for the screening generalized anxiety disorder and assessing the severity of anxiety using self-reporting [42]. Interviewees should answer the question: "*Over the last 2 weeks, how often have you been bothered by any of the following problems?*". The GAD-7 anxiety score is calculated by assigning scores from 0 to 3, respectively, to the following answers: "not at all", "several days", "more than half the days", and "nearly every day". Total scores may range from 0 to 21. "Minimal" anxiety corresponds to 0–4 points; "mild" to 5–9 points; "moderate" to 10–14 points; and "severe" to 15–21 points (see Appendix 3 in the Supplementary). The degree of disability in the FDPs was determined with the GAD-7 questionnaire, using the answers to the question "*If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?*": "not difficult at all", "somewhat difficult", "very difficult", and "extremely difficult". The GAD-7 questionnaire evaluates symptoms of anxiety, which are also found in 30–50% of patients with depression [48, 50]. Initially designed to detect generalized anxiety disorder, it has proven to be an effective screening tool for panic disorder, social anxiety disorder, and PTSD [48].

GAD-7 proves itself to be an effective tool for screening for anxiety and assessing its severity in clinical practice and research [42, 45]. A meta-analysis performed by Plummer et al. [51] showed that GAD-7 is characterized by acceptable accuracy at a limit value of 8 (sensitivity 0.83, specificity 0.84 for pooling 12 samples and 5,223 subjects).

Screening for depression is far from being universal; the main depression questionnaire currently used is PHQ-9 [50]. Notably, it cannot be used to confirm a clinical diagnosis of depression [50], so we used Russian-language validated scales [52, 53].

Survey administration

The forced displacement began on September 23, 2023, after the resumption of the military conflict resumed on September 19, 2023. Almost the entire population of Nagorno-Karabakh left the region in late September and early October[4,5]. We initiated this study as early as in October 2023. A group of psychiatrists and psychologists traveled to the border regions where the displaced were accommodated to evaluate their needs and identify persons with mental health problems. The FDPs were additionally offered to take part in this study. Questionnaire interviews were conducted and the questionnaires completed with the oral consent of each subject. Unlimited time was allowed to complete the questionnaires, however, in most cases, the respondents needed 30–40 minutes to fulfill the task.

Statistical analysis

Data analysis was performed using IBM SPSS Statistics for Windows, version 21.0. Quantitative variables were described with the arithmetic mean (standard deviation).

To analyze the factors associated with mental health indicators (PHQ-9 and GAD-7 scores), a multiple linear regression analysis was performed in order to investigate the role of socio-demographic factors and factors associated with traumatic experiences in the manifestations of anxiety and depression. The regression analysis was performed with the stepwise input of variables: first, socio-demographic variables (sex, age, marital status, education level) were

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[4] One hundred thousand new residents of Armenia: how the UN helps the country cope with the burden // UN News: Global View. Human Fates, October 23, 2023. Available from: https://news.un.org/ru/story/2023/10/1446092

[5] Armenia and Azerbaijan: The UN Special Adviser on the Prevention of Genocide is "concerned about the situation in the South Caucasus" // UN News: Global View. Human Fates, October 10, 2023. Available from: https://news.un.org/ru/story/2023/10/1445647

entered into the model as the first predictor block, then displacement-related factors (being displaced with the family at this time or not and the presence of various types of trauma) were added as the second predictor block.

Multicollinearity diagnostics was performed using the calculation of the variance inflation factor (VIF), tolerance values, and the condition index [54]. All VIF values were below 1.1, which is significantly lower than the generally accepted cut point of 5. Strong multicollinearity is usually associated with VIF>10 [55]. Tolerance values exceeded 0.9, demonstrating minimal multicollinearity problems, since values below 0.2 indicate potential problems [56]. In addition, the condition index values in the full models remained below 12, indicating no serious multicollinearity problems, as values higher than 15 suggest potential problems and values higher than 30 indicate strong multicollinearity [57, 58]. These results confirm that multicollinearity was not a concern in the analyses performed.

The interpretation of the regression analysis results included the evaluation of the statistical significance of the models (F-statistics, $p<0.05$) and the proportion of the variance explained (R^2 and adjusted R^2), as well as the assessment of the additional contribution of the second block of variables (ΔR^2 and ΔF). Both non-standardized (B) and standardized (β) regression coefficients were analyzed to estimate the magnitude and direction of connections between predictors and dependent variables. All statistical tests were two-sided, with a significance level of $p<0.05$. For cases with missing data, the listwise deletion method was used, which is used in SPSS by default when performing regression analysis [54, 55].

Ethical considerations

This study was not premeditated, but was conducted in response to the emerging humanitarian situation. Due to the current crisis circumstances and the need for an urgent examination of the FDPs, we did not receive an ethics committee opinion. Respondents were provided with oral assurance about the anonymity and confidentiality of the study.

RESULTS

Respondent characteristics

None of the FDPs refused to participate in the study; 866 displaced persons agreed to answer the questions. After data processing, the final analytical sample was 733 subjects (mean age: 44.7 years; SD=17.3). The main exclusion criterion was the blank items left by a number of respondents in the main socio-demographic questions. Many questionnaires were not included in the analysis, because the participants chose the answer “other” to the questions about education and marital status without providing additional clarifying details, which made a meaningful categorization for regression analysis impossible.

Characteristics of the study sample

Table 1 presents the descriptive statistics for the parameters we selected for both the entire sample and for individual regions of the country. Respondents included 150 (20.5%) people from Goris, 115 (15.7%) from Kapan, 161 (22.0%) from Sisian, 173 (23.6%) from the Gegharkunik region, and 134 (18.3%) from Ararat, which indicates a relatively uniform distribution of the FDPs across the regions of the country. The sample in our study was predominantly female. Most of the migrants were married (n=558, 76.1%) and relocated to Armenia with their family (n=615, 85.2%). All FDPs had at least secondary education, and at most higher education. Almost every fifth migrant had a history of physical and mental trauma: death of relatives in the two Karabakh wars, injuries in the 44-day war, combined injuries, burns from an explosion and a fire at a gas station in Stepanakert, etc.

Psychometric testing

The mean depression score for the entire sample was 7.98 (SD=6.408). The severity of manifestations of depression in the entire sample and by region is presented in Table 2. This table shows that the majority (61.9%) of FDPs had depression requiring treatment. However, the nature and scope of treatment should be individualized depending on the severity of the disorder. Moreover, almost one in five persons demonstrated severe depression, which always requires psychopharmacological intervention.

The general picture of functional impairment according to the PHQ-9 in the entire sample and by region is presented in Table 3. Respondents were asked to answer the question “*If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?*”. As follows from Table 3, the existing problems caused severe functional impairment in the surveyed patients. A total of 306 (41.8%) respondents demonstrated functional impairment that caused serious problems in life.

Table 1. Socio-demographic characteristics of the forcibly displaced persons

Parameters	**Goris**		**Kapan**		**Sisian**		**Gegharkunik***		**Ararat**		**Entire sample**	
	abs.	**%**	**abs.**	**%**	**abs.**	**%**	**abs.**	**%**	**abs.**	**%**	**abs.**	**%**
Number of respondents	**150**	**20.5**	**115**	**15.7**	**161**	**22.0**	**173**	**23.6**	**134**	**18.3**	**733**	**100**
Sex												
Men	60	40.0	41	35.7	70	43.5	—	—	53	39.6	224	39.2
Women	90	60.0	74	64.3	91	56.5	—	—	81	60.4	336	60.8
Total	150	100	115	100	161	100	—	—	134	100	560	100
Marital status												
Single	22	14.7	31	26.9	38	23.6	50	28.9	34	25.4	175	23.9
Married	128	85.3	84	73.1	123	76.4	123	71.1	100	74.6	558	76.1
Total	150	100	115	100	161	100	173	100	134	100	733	100
Relocation with and/or without family												
With family	109	77.9	84	73.1	153	95.1	153	88.4	116	87.2	615	85.2
Without family	31	22.1	31	26.9	8	4.9	20	11.6	17	12.8	107	14.8
Total	140	100	115	100	161	100	173	100	133	100	722	100
Education												
Secondary	90	60.0	60	52.2	100	62.1	113	65.3	70	52.2	433	59.1
Special	30	20.0	51	44.3	29	18.1	28	16.2	27	20.2	165	22.5
Higher	30	20.0	4	3.5	32	19.8	32	18.5	37	27.6	135	18.4
Total	150	100	115	100	161	100	173	100	134	100	733	100
Trauma												
Yes	27	20.6	29	25.2	30	18.6	14	8.1	20	20.1	120	17.8
No	104	79.4	86	74.8	131	81.8	159	91.9	75	78.9	555	82.2
Total	131	100	115	100	161	100.4	173	100	95	100	675	100
Type of trauma												
Human losses	15	60.0	5	10.4	17	68.0	1	25.0	1	5.9	39	32.8
Burns**	2	8.0	1	2.1	2	8.0	0	0.0	0	0.0	5	4.2
Injuries	2	8.0	23	47.9	2	8.0	1	25.0	14	82.4	42	35.3
Combined	1	4.0	12	25.0	2	8.0	0	0.0	0	0.0	15	12.6
Other	5	20.0	7	14.6	2	8.0	2	50.0	2	11.8	18	15.1
Total	25	100	48	100	25	100	4	100	17	100	119	100

Note: *No data is available on the sex distribution of the surveyed persons in Gegharkunik. **We refer to the persons who were burned in the explosion at a gas station during the mass migration to Armenia.

Table 2. Severity of depressive symptoms manifestations in forcibly displaced persons according to the Patient Health Questionnaire (PHQ-9)

Severity of depression and need for therapy	Region										Entire sample	
	Goris		Kapan		Sisian		Gegharkunik		Ararat			
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
No depression, no need for therapy (≤4 points)	24	16.0	51	44.3	55	34.2	105	61.0	44	32.8	279	38.1
Mild (5–9 points) and moderate (10–14 points) depression, the need for treatment should be determined	70	46.7	62	53.9	79	49.1	57	33.1	55	41.0	323	44.1
Moderately severe (15–19 points) and severe (20–27 points) depression, therapeutic intervention is necessary	56	37.3	2	1.7	27	16.7	10	5.8	35	26.1	130	17.8
Total	150	100	115	99.9	161	100	172	99.9	134	99.9	732	100

Table 3. Degree of functional impairment in forcibly displaced persons according to the Patient Health Questionnaire (PHQ-9)

Degree of functionality	Region										Entire sample	
	Goris		Kapan		Sisian		Gegharkunik		Ararat			
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Not difficult at all (0 points)	28	18.7	43	37.4	30	18.6	61	35.5	15	11.2	177	24.2
Somewhat difficult (1 point)	43	28.7	56	48.7	46	28.6	61	35.5	43	32.1	249	34.0
Very difficult (2 points)	59	39.3	14	12.2	46	28.6	40	23.3	41	30.6	200	27.3
Extremely difficult (3 points)	20	13.3	2	1.7	39	24.2	10	5.8	35	26.1	106	14.5
Total	150	100	115	100	161	100	172	100	134	100	732	100

Table 4. Severity of anxiety in forcibly displaced persons according to the Generalized Anxiety Disorder Questionnaire (GAD-7)

Anxiety level	Region										Entire sample	
	Goris		Kapan		Sisian		Gegharkunik		Ararat			
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Minimal (0–4 points)	31	20.7	49	42.6	66	41.0	126	73.3	43	32.1	315	43.0
Mild (5–9 points)	46	30.7	47	40.9	48	29.8	20	11.6	41	30.6	202	27.6
Moderate (10–14 points)	44	29.3	17	14.8	22	13.7	24	14.0	35	26.1	142	19.4
Severe (15–21 points)	29	19.3	2	1.7	25	15.5	2	1.2	15	11.2	73	10.0
Total	150	100	115	100	161	100	172	100	134	100	732	100

Table 4 presents data from the anxiety assessment both for the entire sample and by region.

As with depression, the highest mean anxiety score in the entire FDPs sample was 6.67 (SD=5.385). The minimal anxiety level (0–4 points), which did not require therapeutic intervention, was detected in 43.0% of the respondents. An anxiety level requiring some sort of professional therapeutic intervention (psychotherapy or psychopharmacotherapy) was detected in 57% of the FDPs.

A similar trend was observed in the disability of the FDPs assessed with the GAD-7 questionnaire in the entire sample and in individual regions (Table 5). Respondents

Table 5. Degree of disability in forcibly displaced persons according to the Generalized Anxiety Disorder Questionnaire (GAD-7)

Degree of disability	Region										Entire sample	
	Goris		Kapan		Sisian		Gegharkunik		Ararat			
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Not difficult at all (0 points)	24	16.0	41	35.7	30	18.6	65	37.8	12	9.0	172	23.5
Somewhat difficult (1 point)	48	32.0	52	45.2	43	26.7	53	30.8	39	29.1	235	32.1
Very difficult (2 points)	56	37.3	20	17.4	43	26.7	42	24.4	38	28.4	199	27.2
Extremely difficult (3 points)	22	14.7	2	1.7	45	28.0	12	7.0	45	33.5	126	17.2
Total	150	100	115	100	161	100	172	100	134	100	732	100

Table 6. Hierarchical multiple regression predicting anxiety and depression based on socio-demographic and displacement-related factors

Variable	Block 1			Block 2		
	B	SE	β	B	SE	β
Anxiety model						
Constant	4.828	0.793	—	6.106	1.013	—
Sex	1.983**	0.487	0.181	2.007**	0.486	0.183
Age	0.023	0.014	0.074	0.019	0.014	0.061
Marital status	0.698	0.568	0.056	0.730	0.567	0.058
Education level	0.431	0.619	0.031	0.457	0.617	0.033
Relocation with family	—	—	—	–1.385*	0.651	-0.095
Trauma	—	—	—	0.127	0.578	0.010
R^2	0.046	—	—	0.055	—	—
Adjusted R^2	0.038	—	—	0.043	—	—
F	5.858**	—	—	4.689**	—	—
ΔR^2	—	—	—	0.009	—	—
ΔF	—	—	—	2.289	—	—
Depression model						
Constant	4.306	0.925	—	4.974	1.182	—
Sex	0.917	0.568	0.072	0.962	0.568	0.075
Age	0.067**	0.016	0.184	0.064**	0.016	0.178
Marital status	0.827	0.663	0.056	0.844	0.662	0.058
Education level	0.878	0.721	0.054	0.872	0.721	0.054
Relocation with family	—	—	—	-0.926	0.761	-0.054
Trauma	—	—	—	0.867	0.675	0.057
R^2	0.049	—	—	0.056	—	—
Adjusted R^2	0.042	—	—	0.044	—	—
F	6.335**	—	—	4.760**	—	—
ΔR^2	—	—	—	0.006	—	—
ΔF	—	—	—	1.580	—	—

Note: Block 1 — socio-demographic variables (sex, age, marital status, education level). Block 2 — displacement-related factors (being displaced with the family at this time or not and the presence of various types of trauma). B — non-standardized regression coefficient; β — standardized regression coefficient; SE — standard error. $*p<0.05$; $**p<0.001$.

were asked to answer the question "*If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?*". Very difficult and extremely difficult problems were registered in 325 respondents, representing 44.4% of all surveyed FDPs.

Predictors of depression

Statistically significant models were identified at both stages of the analysis of predictors of depression (Table 6). Socio-demographic factors explained a small but significant proportion of the variance of the dependent variable. Age, however, appeared to be the only significant predictor in the first block, indicating that older subjects experienced higher levels of depression. The addition of displacement-related factors did not result in a statistically significant improvement in the model. In the final model, age remained the only significant predictor of depression. Other factors studied, including sex, marital status, education level, relocation with family, and trauma, were not associated with depression.

Predictors of anxiety

Statistically significant predictor models of anxiety were also identified at both stages of the regression analysis. Among socio-demographic factors, sex was the only significant predictor of anxiety, with women showing higher levels of anxiety than men. The addition of displacement-related factors resulted in a slight improvement in the model, which was close to the threshold of statistical significance. In the final model, two factors appeared to be significant predictors of anxiety: sex (with higher rates in women) and relocation with family (a protective factor). Other variables were not associated with the severity of anxiety.

DISCUSSION

Almost all studies in this area surveyed individuals who relocated from one economic, cultural, or ethnic community to another, which acted actually as a trigger, rather than a pathogenic element, in the development of mental disorders. We surveyed a group that was forced to relocate to another state, but to the historical homeland, therefore the displaced did not experienced any cultural or ethnic barriers. The displaced also benefited from the efforts of the state and society to accommodate them in hotels, dormitories, sanatoriums, and boarding houses, rather than in special camps. This context makes our study unique.

Both our study and a number of others have shown that FDPs have a high level of mental disorders, including depression, PTSD, and anxiety [59–61]. A comparison of our data on the prevalence of anxiety and depressive disorders among FDPs shows that they align completely with the significantly divergent prevalence rates reported by other investigator. Forcibly displaced persons face multiple stressors while awaiting for permanent asylum or relocation, often experiencing severe emotional stress. According to our sample, the majority of FDPs were women (which is due to the demographic situation in Nagorno-Karabakh), most of the migrants were married and relocated with their families, and the majority had secondary education. One in five reported a history of mental trauma. Only 38.1% of the FDPs were not diagnosed with depression, therefore they did not need treatment. In 61.9% of the FDPs, depression was at a clinically significant level. The nature and scope of treatment is decided on an individual basis, depending on the severity of the disorder. Moreover, almost every fifth respondent (17.8%) was found to have severe depression, which required psychopharmacological intervention. Anxiety requiring professional therapeutic intervention (psychotherapy or psychopharmacotherapy) was detected in 57.0% of the FDPs. A hierarchical regression analysis showed that women were particularly vulnerable to anxiety, while older age was more associated with depression. Relocation with the family proved to be a protective factor specifically against anxiety symptoms. The obtained data strongly suggest that the process of forced migration to other countries is one of the generating factors in the development of mental disorders.

Our data are consistent with the depression and anxiety prevalence estimates published in the scientific literature: 2.3–80% for depression [29, 30] and 20.3–88.0% for anxiety [30, 32, 33]. Strømme et al. [61] reported that symptoms indicating anxiety and depression were detected in 35% of the displaced persons and symptoms characteristic of PTSD were detected in 7% of the displaced.

The role of factors contributing to depression and anxiety [60, 61] was also confirmed. Traumatic experiences sustained before migration indirectly caused the development of depression and anxiety, increasing life difficulties after migration. Yilmaz et al. [60] reported that even long after relocation, displaced persons demonstrated high levels of depression, anxiety, and PTSD. Without denying the key role of pre-migration injuries, the authors emphasize that post-migration problems further exacerbate the mental disorders of FDPs. Traumatic experiences, according to Strømme et al. [61], are associated with both chronic pain and symptoms of anxiety and depression, with the latter also being associated with migration without family members.

The literature on refugee problems describes a multiple number of factors that play a role in the occurrence and development of mental disorders in refugees and FDPs, which are conventionally divided into pre-, intra-, and post-migration social, economic, personal, psychological, cultural, and other issues [62]. Socio-demographic factors have also been reported as adverse predictors of mental health in the literature [38, 39].

For FDPs, mental health issues are even more important than physical problems, because they left their past in the country of permanent residence and arrived in a country where they are trying to find their present while remaining completely in total ignorance about the future. In their present, they are faced with many problems at once, which can be seen as the search for a place in the sun. The numerous problems make them the most vulnerable members of society. They need to experience the circumstances of relocating and arriving in another country, adapt to the living conditions in the host country, accept the rules of the game in the new society, the established relationships, the specifics of integration of newcomers, living and working conditions that create a variety of needs for the refugees and FDPs, ranging from economic to medical, and sometimes psychiatric.

An analysis of the literature and our data suggests that public health policies and practices focused on displaced persons should take into account the risks associated with migration, especially FDPs, and target the most common disorders, primarily mental health issues, among the displaced. These results highlight the need for comprehensive, long-term mental health interventions that address both past trauma and current life challenges. The specific context of this study may play a role in differentiating the most significant factors in future studies.

This study was conducted without discussing the study protocol with an ethics committee, as it was a cross-sectional study limited in time. It is important to note that this was not a long-term study. The obtained results relate to the initial period of migration of the residents of Nagorno-Karabakh to Armenia and demonstrate the so-called cross-section of their mental status. Anxiety and depression in FDPs were assessed using exclusively psychometric tools, since the conditions of this study did not allow a clinical assessment of the condition of the subjects.

The PHQ-9 and GAD-7 questionnaires we employed provide scores for anxiety and depression, in other words, they demonstrate the severity of the disorder. Validation studies of these screening tools showed a sensitivity of 0.77 to 0.81 for depression and a specificity of the PHQ-9 scale of 0.91 to 0.94, a sensitivity of 0.89 and a specificity of 0.82 for anxiety. PHQ-9 and GAD-7 have high internal and test-retest reliability, as well as a valid design and factor structure [63]. The authors of the questionnaire found acceptable sensitivity and specificity values when the questionnaire was used as a general screening tool for other anxiety disorders (panic disorder, social anxiety, PTSD) (GAD-7, score ≥8: sensitivity — 0.77, specificity — 0.82) [51]. These data guide the further actions of the specialist in relation to the need for and scope of treatment, as well as approaches to its organization. The duration of symptoms, their severity, and the degree of functional impairment, as determined by the PHQ-9 and GAD-7 scores, used in conjunction, help the specialist decide on the importance of and need for treatment.

The depression and anxiety levels were divided according to the categories used in the questionnaires. However, the sensitive question here is whether this categorizationcan be applied to an Armenian sample, particularly to a sample that is highly vulnerable in this regard. This question arises from the general issue of adapting psychometric scales. But, unfortunately, they are not adapted in Armenia. This is the problem we always face in nearly every psychological and psychiatric study. Similar data have been reported by other investigators [64, 65].

The civilian population of Nagorno-Karabakh, which has survived military conflicts, blockade, and forced displacement, often experiences post-stress anxiety and depression reactions that do not always correspond to the classic symptoms of PTSD. The genesis of these reactions is in their living conditions in Nagorno-Karabakh and the forced displacement as a result of sudden military aggression. This indicates the need for context-specific studies and interventions tailored to the specifics of local conflicts. The external validity of our results is worth careful consideration. Although our study sample was rather large (*n*=733) and included individuals settled in different regions, several factors may limit generalizability. First, our study focused specifically on the Armenian FDPs from

Nagorno-Karabakh in the acute phase of displacement (during the first days after the forced displacement). The patterns of anxiety and depression that we have identified may be specific to this particular population, the context of displacement, and the time frame. Second, although the depression (PHQ-9) and anxiety (GAD-7) scales demonstrated good psychometric properties [63], these tools were not specifically validated for the Armenian population from Nagorno-Karabakh. Cultural factors can affect symptom expression and reporting, with a potential impact on the clinical interpretation of scores. Third, our sample happened to be opportunistic, given the crisis context, which could introduce a systematic selection bias: those who experienced the most severe psychological distress might be either more likely (in search of help) or less likely (due to avoidance or a sense of overload) to participate. Finally, the cross-sectional design covers only one point in the travel path. Longitudinal studies are needed to understand how symptoms of a mental disorder develop over time and to determine whether the prognostic relationships we have identified remain stable.

Despite these limitations, our results are consistent with broader studies on forced displacement and mental health, suggesting that although the specific prevalence rates may depend on the context, the identified risk factors (especially sex, age, relocation with or without family) may have wider applicability to other displaced populations experiencing similar trauma. Future studies should focus on the specific aspects of the manifestations of mental disorders in FDPs, the needs of different groups of the affected population, as well as the impact of social and biological factors on their mental state [66].

CONCLUSION

The predominant factor in the development of mental disorders among FDPs from Nagorno-Karabakh was forced displacement. Age was a significant predictor for depressive disorders, whereas anxiety disorders were more associated with the female sex and separation from family. However, the results of regression analysis showed that the studied variables explain only a small proportion of the variability of anxiety and depressive symptoms. This indicates the existence of other, more significant predictors, probably of a socio-psychological nature, which require further longitudinal study. The interpretation of the obtained data is limited by the methodological features of this study, i.e., the use of a single cross-sectional design and the application of psychometric tools without subsequent clinical examination.

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Association of the COMT Gene Polymorphism rs4680 with Cognitive Impairment in Schizophrenia: A Narrative Review

Ассоциации функционального варианта гена COMT rs4680 с когнитивными нарушениями при шизофрении: нарративный обзор

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Review

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ABSTRACT

BACKGROUND: Cognitive impairment in schizophrenia patients is characterized by decreased functioning, reduced quality of life, and is a predictor of a more severe course of the disease. The rs4680 variant of the *COMT* gene (Val158Met), which encodes catechol-O-methyltransferase, affects dopamine metabolism in the prefrontal cortex and is a key genetic modifier of cognitive endophenotypes. However, the associations of the rs4680 alleles with the severity of cognitive impairment remain unclear. This review summarizes and critically re-evaluates the evidence on the role of rs4680 in the development of cognitive deficits in schizophrenia.

AIM: To explore the associations of the rs4680 variant of the *COMT* gene with cognitive functions in schizophrenia.

METHODS: A literature search of the PubMed database for the last 10 years (2014–2024) was performed with the search query “rs4680 schizophrenia cognition”. The review included 11 studies.

RESULTS: In the majority of studies (9 out of 11), carriers of the Met allele demonstrated better cognitive parameters, such as verbal and visual memory, information processing speed, and regulatory functions (especially in men). Individuals with the Val/Val genotype demonstrated worse attention. Women in the Russian population with Met allele had better conceptualization and inhibitory control results, and men in the Han population with Met allele had a better association with memory and attention.

CONCLUSION: The results of this review confirm the association between the rs4680 variant of the *COMT* gene and cognitive function. Although the quality of the studies included in this review was low, the overall results indicate that further investigation of this association is promising. The identification of a stable association between the *COMT* genotype and the severity of cognitive deficit provides the basis for a personalized approach in the management of patients with schizophrenia. Further studies on the validation of genetic markers in independent cohorts and the development of algorithms for the integration of genetic data with complex neurocognitive assessments and clinical endophenotypes are needed to make the clinical implementation of this approach successful.

АННОТАЦИЯ

ВВЕДЕНИЕ: Когнитивные нарушения при шизофрении приводят к снижению функционирования и ухудшению качества жизни, а также служат предикторами более тяжелого течения заболевания. Вариант rs4680 гена *COMT* (Val158Met), кодирующего катехол-О-метилтрансферазу, определяет метаболизм дофамина в префронтальной коре и является ключевым генетическим модификатором когнитивных эндофенотипов. Однако ассоциации аллелей rs4680 с выраженностью когнитивных нарушений остаются недостаточно ясными. В обзоре обобщены и критически переосмыслены сведения о роли rs4680 в формировании когнитивного дефицита при шизофрении.

ЦЕЛЬ: Изучить ассоциации варианта rs4680 гена *COMT* с когнитивными функциями при шизофрении.

МЕТОДЫ: Проведен поиск литературы по базе данных PubMed за последние 10 лет (2014–2024) по запросу «rs4680 schizophrenia cognitive». В обзор было включено 11 исследований.

РЕЗУЛЬТАТЫ: В большинстве исследований (в 9 из 11) носители аллеля Met демонстрировали лучшие когнитивные показатели, такие как вербальная и зрительная память, скорость обработки информации, регуляторные функции (особенно у мужчин). Для группы лиц с генотипом Val/Val наблюдалось снижение внимания. У женщин-носителей аллеля Met российской популяции были выше показатели концептуализации и тормозного контроля, а у мужчин-носителей аллеля Met популяции хань были выше показатели памяти и внимания.

ЗАКЛЮЧЕНИЕ: По результатам данного обзора подтверждена взаимосвязь между вариантом rs4680 гена *COMT* и когнитивными функциями. Несмотря на то что качество исследований, включенных в данный обзор, было низким, суммарный результат указывает на перспективность дальнейшего изучения данной связи. Выявление устойчивой связи между генотипом *COMT* и выраженностью когнитивного дефицита создает основу для персонализированного подхода в ведении пациентов с шизофренией. Для успешной клинической реализации этого подхода необходимы дальнейшие исследования по валидации генетических маркеров в независимых когортах и разработка алгоритмов интеграции генетических данных с комплексной нейрокогнитивной оценкой и клиническими эндофенотипами.

Keywords: *schizophrenia; COMT; Val158Met; cognitive functions; rs4680*
Ключевые слова: *шизофрения; COMT; Val158Met; когнитивные функции; rs4680*

INTRODUCTION

Schizophrenia leads to numerous negative social consequences, including impaired ability to work in the very first years of the disease and lifelong disability [1–3]. The main factors that decrease social activity, work capacity, and the possibility of independent life in patients are not only frequent psychotic exacerbations but also significant cognitive deficits, as well as increased negative symptoms [4, 5]. Schizophrenia is associated with impairments in cognitive domains, such as executive functions (impairment of planning, organization, flexibility of thinking, problem solving, and impulse control), difficulties with abstract thinking and multitasking, memory (working, verbal, and visual), attention (decreased concentration and attention span), information processing speed (understanding, slow perception, and response to information), social perception, and emotion recognition [6]. It is believed that disorders are found in 85% of patients in this group [7]. After the onset of schizophrenia, the majority (98%) of patients demonstrate a decrease in cognitive function compared with the premorbid state, which leads to incomplete remission [7]. Cognitive impairment is observed both in patients on long-term treatment with neuroleptics and in those not receiving neuroleptics [1, 7, 8].

Dihydroxyphenylalanine (L-DOPA), is the precursor to the neurotransmitters dopamine, norepinephrine (noradrenaline), whose metabolism largely determines overall activity, attention control, and vigilance, as does a complex system of motivation and exploratory activities required to meet lower- and higher-level needs [9]. Increased or decreased activity of synaptic dopamine (DA) in the main functional regions helps regulate the cognitive activity and social interaction activity of a person under given circumstances (purposefulness, productivity) [9]. From the perspective of the implementation of cognitive function, maintaining DA activity and balance in the functional pathways from the striatum to the projections in the cortex and subcortical nuclei have been shown to be important [10]. Mesocortical pathways connect the associative regions of the striatum with the prefrontal cortex (PFC), regulating working memory, behavioral strategy assessment, and decision flexibility. The mesolimbic pathways connect the limbic striatum with the amygdala and the hippocampus and are responsible for declarative and state-dependent memory, memory recall from past experiences, motivation, and the reward system [11]. In addition, an important role is played by the feedback system of the sensorimotor striatum (sensory information processing speed, visual and motor functions, and the formation of habits) [9, 10, 11]. Optimal regulation of DA in the PFC is of key importance for cognitive functions, especially working memory, attention, and executive control [9, 12]. This regulation depends on the balanced stimulation of D1 (activating) and D2 (inhibiting) dopamine receptors. The DA imbalance in the PFC that is characteristic of schizophrenia is directly related to underlying cognitive impairment and negative symptoms [9]. The pathogenesis of this disease includes developmental disorders and dysfunctional interactions of DA with the glutamatergic and serotonergic systems [13, 14].

In most regions of the brain, the DA activity level is regulated by the reuptake transporter. Catechol-O-methyltransferase (*COMT*) is the main enzyme that metabolizes DA in the PFC, where the dopamine transporter (DAT) density is low [12]. *COMT* inactivates DA but more slowly than the reuptake transporter does, so the effects of DA can persist for much longer [12]. In humans, the *COMT* protein has two isoforms: 1) the soluble cytosolic S-COMT (221 amino acids), which is predominant in peripheral tissues, and 2) membrane-bound MB-COMT (271 amino acids), which are characteristic of nervous tissue. The MB isoform interacts more effectively with DA than the S isoform does [15]. The *COMT* gene is located in the q11 region of chromosome 22 and has 6 exons and 2 promoters. The P1 promoter initiates the synthesis of the transcript encoding the S-COMT isoform, whereas the P2 promoter initiates the synthesis of a transcript that can be translated into the MB-COMT or S-COMT isoform [16]. The best studied variant of the *COMT* gene is rs4680 in exon 4, a point mutation that leads to the substitution of methionine for valine in the amino acid sequence of the protein at position 158 of the MB-COMT isoform (Val158Met) and at position 108 of the S-COMT isoform (Val108Met). The *COMT* enzyme was shown to have higher activity in people with the Val 158 allele than in people with the Met allele, which is associated with accelerated removal of excess DA from the extracellular space [16].

The main factors regulating cognitive function in the PFC include the inactivation of DA activity by *COMT* [17]. Consequently, carriers of the Met allele have increased synaptic levels of DA in the PFC. Although this dual mechanism could be adaptive in theory, in the pathological context of schizophrenia, both excessive (Val/Val, low DA) and insufficient (Met/Met, high DA) *COMT* activity are associated with cognitive deficits, as they disrupt the precise regulation required for optimal prefrontal network function. [12]. Thus, the *COMT* rs4680 variant is a key genetic factor that modulates the dopaminergic tone of the PFC and, as a result, forms cognitive endophenotypes in schizophrenia.

According to the dopamine theory of the pathogenesis of schizophrenia, impaired cognitive function and social behavior may be associated with low levels of DA in the PFC and other essential regions of the brain. The rs4680 variant of the *COMT* gene can alter (slow down) the degradation of DA, increase its concentration in the PFC, and thus decrease the risk of cognitive impairment in schizophrenia patients.

Although the above has been known for many years and the genetic variant Val158Met has been studied in many aspects with regard to its association with schizophrenia, no studies have been conducted in the past 10 years to analyse a possible relationship between variants of the *COMT* gene and the severity of cognitive impairment in schizophrenia.

The aim of this review is to explore the associations of the rs4680 variant of the *COMT* gene with cognitive functions in schizophrenia.

METHODS

Eligibility criteria

Inclusion criteria:

- systematic reviews, meta-analyses, and clinical studies;
- the study material included patients with schizophrenia and with schizoaffective disorders;
- cognitive functions were assessed using with standardized tests for cognitive impairment in patients with schizophrenia. In addition, several relative indicators of the Positive and Negative Syndrome Scale (PANSS) were included: N5 (abstract thinking disorders), P2 (thinking disorders), and G11 (attention disorders);
- the results present data on the impact of position 158 of the *COMT* gene.

Exclusion criteria: studies that failed to meet any of the listed inclusion criteria.

Information sources

A literature search was conducted in the PubMed database for articles published between 2014 and 2024. The search query "rs4680 schizophrenia cognitive" returned 32 articles.

Selection process

A total of 11 articles that met the inclusion criteria were selected for analysis. Furthermore, two relevant systematic reviews published in 2017 were identified [18, 19]. No statistical analysis was conducted.

Data analysis

The risk of bias in the included studies was assessed using the following methods:

1. testing for the Hardy-Weinberg equilibrium (for genetic studies);
2. analysis of the presence and comparability of control groups;
3. assessment of researcher blinding during testing;
4. assessment of the therapy's effects (neuroleptics, cognitive training);
5. analysis of systematic biases (absence of data on sex, age, and duration of the disorder).

The results were presented and summarized through the following approaches:

1. synthesis of data to identify the main trends;
2. comparison of the findings across individual studies;
3. discussion of consistency/contradictions between studies, including a comparison with the data from an earlier meta-analysis [18].

RESULTS

Analysis of systematic review data

Our analysis included the systematic review by Zai et al. [18], which was published in 2017 and included 12 original researches. The authors reported a significant correlation of the Val/Val allele with worse cognitive performance in healthy subjects in the control group than in carriers of the Met/Met allele. Compared with patients with the Val allele, patients with schizophrenia and the Met allele presented higher scores for verbal learning, false memory, prepulse inhibition, and abstract reasoning. Studies of the interaction between rs4680 and environmental factors revealed that carriers of the homozygous Val/Val genotype had improvements in executive functions only in the absence of a history of traumatic experience. However, cognitive deterioration was observed even in patients without traumatic experiences. These data suggest that the effect of *COMT* variants on cognitive function may not be specific to schizophrenia [18].

Another 2017 systematic review that employed a meta-analysis of 58 individual studies demonstrated no associations between *COMT* rs4680 and working memory or intelligence [19].

After that, we analysed and performed a quality assessment for each of the 11 researches. The included studies are presented in Table S1 in the Supplementary.

Tests used to assess cognitive impairment

The analysis of the systematic review data revealed that the study of cognitive impairment in schizophrenia patients was performed via standardized batteries and tests focused on key domains:

1. Regulatory functions (planning, control, and error monitoring): MATRICS Consensus Cognitive Battery (MCCB), Trail Making Test B (TMT-B), Wechsler Adult Intelligence Scale (WAIS), Stroop Color and

Word Test (SCWT), Wisconsin Card Sorting Test (WCST), and Frontal Assessment Battery (FAB) [20].

2. Attention (focus, stability, switching, inhibitory control): MCB, TMT-AB, SCWT, FMS, WAIS, Visual Working Memory (VWM), FAB, and the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), as well as the PANSS attention subscale and the FAB parameter "Inhibitory control" [20, 21].
3. Thinking (formation of concepts, reasoning, problem solving): MCCB, CNS Vital Signs, WCST, WAIS, FAB. Disorganization and impairment of abstract thinking were additionally assessed via the corresponding PANSS subscales (positive and negative symptoms).
4. Working memory (information retention and manipulation): MCCB, CNS Vital Signs, TMT-B, SCWT, WCST, WAIS, VWM, Keep Track, Letter Memory Task, FAB, RBANS.
5. Information processing speed: MCCB, CNS Vital Signs, TMT-A, SCWT, WAIS.

Analysis of original researches data

In the selected 11 original researches, we analysed the association between rs4680 and cognitive impairment in patients with schizophrenia (see Table S1 in the Supplementary). A quality assessment was performed for each study.

Among the 11 clinical and biological studies, three were conducted in outpatients with schizophrenia [22–24], seven were conducted with inpatients [21, 25–30], and one included both groups [31].

Different features of cognitive functioning in schizophrenia, depending on the rs4680 allele, were reported in 10 of the 11 articles. The authors reported better cognitive performance in patients with schizophrenia with the Met allele in the vast majority of the studies (9 out of 11) [21, 22, 24, 25, 27–31]. However, the conclusions of the two studies were opposite [23, 26]. Most often, cognitive impairment in schizophrenia patients manifests as deterioration of verbal and visual working memory, attention switching, information processing speed, cognitive activity, regulatory functions, and social cognition.

The analysis of cognitive phenotypes revealed a number of strong associations. Two studies [22, 24] demonstrated better preserved executive functions in carriers of the Met allele, but data from one paper suggest the opposite result [23]. A previous study [28] revealed an association with impaired attention; a decrease in attention was observed in men with the Val/Val genotype [29]. According to the analysis, the Met allele was associated with significantly higher scores in tests for verbal and visual learning and memory [27, 29, 31], as well as with other memory domains in men [29]. In another publication [30], the authors reported that carriers of the Met allele have a faster processing speed. In another study [27], carriers of the Met allele were found to have had higher scores on the VWM and Keep Track tests, whereas impaired information processing speed in patients with schizophrenia was associated with a decrease in working memory. The authors of one study [28] identified a tendency toward shorter TMT-A and TMT-B test performance times in carriers of the Met allele, assuming its contribution to the speed of information processing. Two studies have identified associations between thinking and the rs4680 genetic variants [22, 26]. Carriers of the Met allele made fewer perseverative errors [22] but had worse results in the assessment of abstract thinking [26], i.e., the results from different studies were contradictory in terms of this domain. In another study [21], women with the Met allele had better "conceptualization" and "inhibitory control" results, as assessed by the FAB scale, which can also be considered in the context of thinking tests. The results of the analysis are in good agreement with the data of a meta-analysis [18], which included earlier (conducted more than 10 years prior) studies and demonstrated better executive functions, working memory, and abstract thinking in carriers of the Met allele. Despite the difference in methodologies and time intervals (the meta-analysis data include studies conducted more than 10 years prior), the revealed pattern persists, which confirms the reliability of this genetic association. Decreased activity of the *COMT* enzyme in carriers of the Met allele leads to an increase in DA in the PFC, optimizing functions dependent on this region (executive functions, working memory, and abstract thinking) [12]. Thus, most studies confirm the association of the Met allele with better cognitive function in patients with schizophrenia in terms of cognitive control, thinking, working memory, and, to a lesser extent, attention and information processing speed.

There were no significant genetic differences for rs4680 when comparing European, South African, and South American populations: the frequency of the A allele is approximately 0.5 (according to information from the PubMed database). For the African and Asian populations, the frequency of the A allele is lower, at approximately 0.3, based on the data from the PubMed database. No overall Russian data on the prevalence of the A allele were found. According to our own data, the frequency of the A allele was 0.507 for patients with early-onset schizophrenia and 0.53 for healthy volunteers [21].

Two studies [21, 29] reported a sex-specific dependence of cognitive functions on the genotype among women in the Russian population [21] and men in the Han population [29]. Another study [29] reported a difference in the frequency of rs4680 genotypes between men and women with schizophrenia. It was previously shown that male patients have more severe negative symptoms, a greater decrease in social functioning, and an earlier age of disease onset [32]. A previous study [33] demonstrated sex-specific effects of the *COMT* gene on the predisposition to mental disorders and personality traits. Intersex differences have not been investigated in other studies or populations. The impacts of education, the nature of work and other factors were practically not studied in the studies we considered; therefore, they were not taken into account in our review.

Psychopharmacotherapy was not described in 4 studies [21, 24, 26, 27]. Patients received atypical neuroleptics in 2 studies [22, 31] and only risperidone in one study [28]. Another publication [23] described patients who received not only neuroleptics but also other psychotropic drugs, although their proportion was relatively small. Thus, assessing the effects of drug therapy on cognitive functions in relation to the *COMT* genotype appears challenging.

DISCUSSION

In the psychiatric genetics of schizophrenia, associations with the disease or disease endophenotypes (which may include a decrease in certain cognitive domains) are ambiguous, and the manifestation of genetic factors depends on many other factors. Studies indicate that several factors may influence the assessment of the association of gene variants with cognitive functions, including ethnicity, sex, age, environmental factors, education and work during one's lifetime, and other sample characteristics that affect cognitive functions.

The main limitations of our review are the quality of the included papers and the small number of published studies available. We detected several sources of systematic biases, such as the absence of a control group, significant sociodemographic differences between the experimental and control groups, the absence of blinding among the researches who conducted the testsing, the absence of information about the prescribed treatment and the duration of antipsychotic therapy, and a failure to analyze the association between genetic variants and cognitive deficits in connection with sex and age. Only a few studies were conducted with minimal systematic errors [21, 27, 29].

Five studies did not have a control group [24–26, 30, 31]. Two studies evaluated cognitive function after cognitive training [24, 31]; these studies included neither a control group nor a group without cognitive training. No testing for the Hardy-Weinberg equilibrium was reported in five studies [22, 25, 28, 30, 31]. The testing for the Hardy-Weinberg equilibrium is a principle in population genetics that describes the distribution of alleles in a population and their frequencies in the absence of factors that disrupt the genetic balance [34]. Deviations from the testing for the Hardy-Weinberg equilibrium indicate bias in the study (incorrect sampling or methodological errors) rather than a mutational process or genetic drift. Thus, the absence of a testing for the Hardy-Weinberg equilibrium in medical genetics studies is a factor that significantly compromises their quality. The study results may also be affected by the occurrence of certain alleles and genotypes in the study population. The quality of the studies was greater when the sex of the subjects was taken into consideration in the data analysis. Sex differences in the role of rs4680 polymorphism in cognitive impairment were demonstrated in two publications we analysed [21, 29]. Difficulties arose due to the need to compare the cognitive functions of patients with schizophrenia during an exacerbation/psychosis (inpatient monitoring) and remission (outpatient monitoring). The results of studies combining longitudinal and cross-sectional designs and showing a similar degree of cognitive impairment in patients after the first episode of schizophrenia and in cases of stable clinical presentation of the disease were taken into account [35]. However, some cognitive disorders, such as executive dysfunctions, may be less common in the early stages of the disease. Antipsychotics of different classes, which are used for the treatment of schizophrenia, could have direct and indirect effects on cognitive functions, including a negative impact, which was difficult to assess within the framework of our review [36].

In the future, investigators should also aim to compare homogeneous groups of patients in terms of sex, age, education level, disease stage, and the nature and duration of the psychotropic agents used, which will increase the reliability of the results.

CONCLUSION

To improve the quality of research on genetic predisposition to cognitive impairment in schizophrenia, particularly the impact of rs4680 it is essential to refine assessment protocols. This refinement should include the adoption of a minimum set of validated tests and the development of combined tools that allow precise characterization of cognitive endophenotypes, intermediate phenotypes, and behavioral indicators in conditions close to real-world practice. Our data highlight the importance of a comprehensive approach combining clinical assessment with quantitative analyses of executive functions, attention, working memory, information processing speed, and verbal fluency, as well as operational and motivational aspects of thinking, for accurate phenotypic characterization.

Analysis of the available data suggests a significant association of rs4680 with cognitive functioning in schizophrenia. Carriers of the Met allele demonstrate less pronounced cognitive deficits, especially in terms of working memory and executive functions, which is consistent with the results of a systematic review that included studies conducted more than 10 years ago [18]. Despite the limited number and heterogeneity of the methodological quality of available studies, the identified patterns indicate the potential for using this genetic marker to predict the severity of cognitive impairment and develop personalized rehabilitation programs. Further studies with unified protocols for neurocognitive assessment, taking into account potential modifying factors (age of onset, duration of the disease, drug therapy), are needed to clarify the role of rs4680 in the development of cognitive endophenotypes and optimize strategies for the cognitive rehabilitation of patients with schizophrenia.

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Supplementary data

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Revisiting Delirious Mania in the Context of Neurosyphilis: A Case Report

Делириозная мания при нейросифилисе: клинический случай

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Case report

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ABSTRACT

BACKGROUND: Delirious mania (DM) is a severe neuropsychiatric syndrome characterized by the acute onset of delirium, psychosis and increased psychomotor activity. Its classification remains debated, with overlapping features of mania, catatonia, and delirium complicating diagnosis and treatment. The condition poses significant challenges in differential diagnosis, particularly in patients with comorbid medical conditions.

CASE PRESENTATION: We report the case of a 52-year-old man with bipolar disorder who presented with acute agitation, disorientation, confabulation, incontinence, and severe behavioral disturbances, initially suggestive of DM. Despite targeted psychiatric treatment, his condition remained refractory until a syphilitic infection was identified, with a possible presentation of neurosyphilis, and treated with antibiotic therapy. Resolution of his symptoms followed, with the delirium persisting briefly after the mania had subsided, suggesting an organic contribution to his presentation.

CONCLUSION: This case highlights the importance of considering organic etiologies, such as neurosyphilis, in presentations of DM. It also supports the view that DM may represent a syndromic entity with both psychiatric and medical underpinnings, rather than merely a subtype of bipolar disorder. Early identification and treatment of DM, along with any underlying medical conditions, are crucial for patient recovery.

АННОТАЦИЯ

ВВЕДЕНИЕ: Делириозная мания (ДМ) — это тяжелый нейропсихиатрический синдром, характеризующийся острым возникновением делирия, психоза и повышенной психомоторной активности. Классификация заболевания остается предметом дискуссий, поскольку наличие симптомов — мании, кататонии и делирия, — присущих нескольким синдромам, усложняет его диагностику и лечение. Также это создает существенные трудности при дифференциальной диагностике, особенно у пациентов с сопутствующими заболеваниями.

ОПИСАНИЕ КЛИНИЧЕСКОГО СЛУЧАЯ: В представленном клиническом случае у мужчины 52 лет с биполярным расстройством наблюдались острая ажитация, дезориентация, конфабуляция, недержание мочи и выраженные поведенческие нарушения, первоначально трактовавшиеся как проявления ДМ. Несмотря на целевую психиатрическую помощь, состояние пациента оставалось рефрактерным вплоть до выявления сифилитической инфекции с возможной манифестацией нейросифилиса. После проведения антибактериальной терапии последовало разрешение симптомов. При этом после исчезновения мании кратковременно сохранялся делирий, что указывает на органическую природу заболевания.

ЗАКЛЮЧЕНИЕ: Данный клинический случай подчеркивает важность исключения органических причин (в частности, нейросифилиса) при диагностике ДМ. Кроме того, он подтверждает концепцию, согласно которой

ДМ не просто является подтипом биполярного расстройства, а может представлять собой синдромальную категорию, имеющую как психическую, так и соматическую основу. Раннее выявление и лечение ДМ, равно как и заболеваний, лежащих в ее основе, играют решающую роль в восстановлении пациента.

Keywords: *delirious mania; bipolar disorder; catatonia; neurosyphilis; electroconvulsive therapy*
Ключевые слова: *делириозная мания; биполярное расстройство; кататония; нейросифилис; электросудорожная терапия*

INTRODUCTION

Delirious mania (DM) is a severe neuropsychiatric syndrome characterized by the acute onset of delirium, increased psychomotor excitement and psychosis [1]. Delirium and psychosis are clinically distinct. The first one is defined as an acute fluctuating disturbance in attention and awareness due to an underlying medical condition, and it may be accompanied by psychotic symptoms (hallucinations or delusions) that are secondary to the confusional state [2]. In contrast, primary psychotic disorders such as schizophrenia or bipolar disorder with psychotic features typically present with preserved consciousness and sustained attention, despite marked alterations in thought content [2]. Although not formally classified in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition, Text Revision (DSM-5-TR) [3] or International Classification of Diseases, 11th Revision (ICD-11) [4], DM is extensively documented in clinical literature [5–7]. Since Calmiel's initial description in 1832, it has been identified by Kraepelin E. and, subsequently, Klerman G.L. as an extreme manifestation of mania [5, 6]. Several authors emphasize the frequent occurrence of catatonic symptoms within DM, observing that both DM and catatonia show significant responsiveness to electroconvulsive therapy (ECT) [1]. ECT is currently considered a safety first-line treatment for catatonia, including malignant and treatment-resistant forms, and in cases of DM [8–10]. Fink's classification further categorizes DM as a subtype of catatonia, alongside excited catatonia [1]. This condition closely parallels hyperactive or excited delirium, as observed in cases of neurosyphilis (NS) [11] as well as substance intoxication or withdrawal [12].

This case report outlines the clinical challenges encountered when managing presentations of suspected DM in psychiatric patients with a history of affective disorder, comorbid substance abuse, and engagement in unprotected sexual activities with multiple partners.

CASE PRESENTATION

Patient information

A 52-year-old Caucasian male with a personal history of bipolar disorder (BD), substance abuse, and multiple sexual partners, and a family history of major affective disorders (mother and sister), presented in January 2024 with a worsening mood disorder likely exacerbated by recent cocaine use. He had been stable for seven years on valproic acid 1500 mg/day, lithium carbonate 900 mg/day, and quetiapine 300 mg/day.

Clinical findings

Following this decline, his psychiatrist recommended a short-term residential stay for therapeutic stabilization. Approximately 20 days into the stay, the patient developed an acute dysphoric mood, marked psychomotor agitation, disorientation, confabulation, incontinence, sporadic visual hallucinations, and inappropriate toileting. He also exhibited severe thought and behavioral disorganization, hypersexuality, and a tendency toward physical aggression. Consequently, he was transferred to a psychiatric emergency department.

Diagnostic assessment

Routine blood tests and a CT-scan were unremarkable, and toxicology screening ruled out recent substance use.

Preliminary diagnosis

Given his history of BD, DM was suspected as a potential diagnosis.

Relevant interventions with outcomes

The patient was admitted to the psychiatric ward, and his medication regimen was modified: risperidone was increased to 8 mg/day, delorazepam[1] 6 mg/day was added, and quetiapine was replaced with olanzapine 20 mg/day, while lithium carbonate and valproic acid

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[1] *Editor's note:* The drug is not registered in the Russian Federation.

were continued. Despite these adjustments, his condition failed to improve over the following week; he remained persistently disoriented, restless, and displayed purposeless overactivity. Subsequently, VDRL-test returned positive, and TPHA-test confirmed syphilis while an HIV test was negative. Due to his agitation, a brain MRI and lumbar puncture could not initially be performed.

Revised diagnosis

Following the infectious disease investigations, the diagnostic orientation shifted to NS.

Therapeutic intervention

Intramuscular benzylpenicillin therapy was started, and his psychiatric medication was adjusted to monotherapy with haloperidol 6 mg/day.

Follow-up and outcomes

After three weeks of antibiotic treatment, the patient's symptoms rapidly improved, with notable reductions in agitation, and within days, a reduction in delirium. He had no recollection of events during the acute phase. Subsequent brain MRI and lumbar puncture findings were normal. He was discharged on lithium carbonate 600 mg/day and haloperidol 2 mg/day. Four months later, at follow-up, he showed no signs of mood or psychotic symptoms and reported residual memory gaps from the period of delirium.

Prognosis

The patient's prognosis appears favorable. The suspected NS was identified and treated promptly with appropriate antibiotic therapy, leading to a rapid and sustained remission of neuropsychiatric symptoms [13]. From a psychiatric perspective, the patient has a prior diagnosis of bipolar disorder, for which he is now receiving lithium prophylaxis. With therapeutic drug monitoring to ensure serum levels remain within the effective range, lithium remains a first-line mood stabilizer with well-documented efficacy in preventing relapses [14]. Continued abstinence from substance use is essential for long-term stabilization and to reduce the risk of further decompensation [15].

Timeline

The patient timeline is presented in the Figure 1.

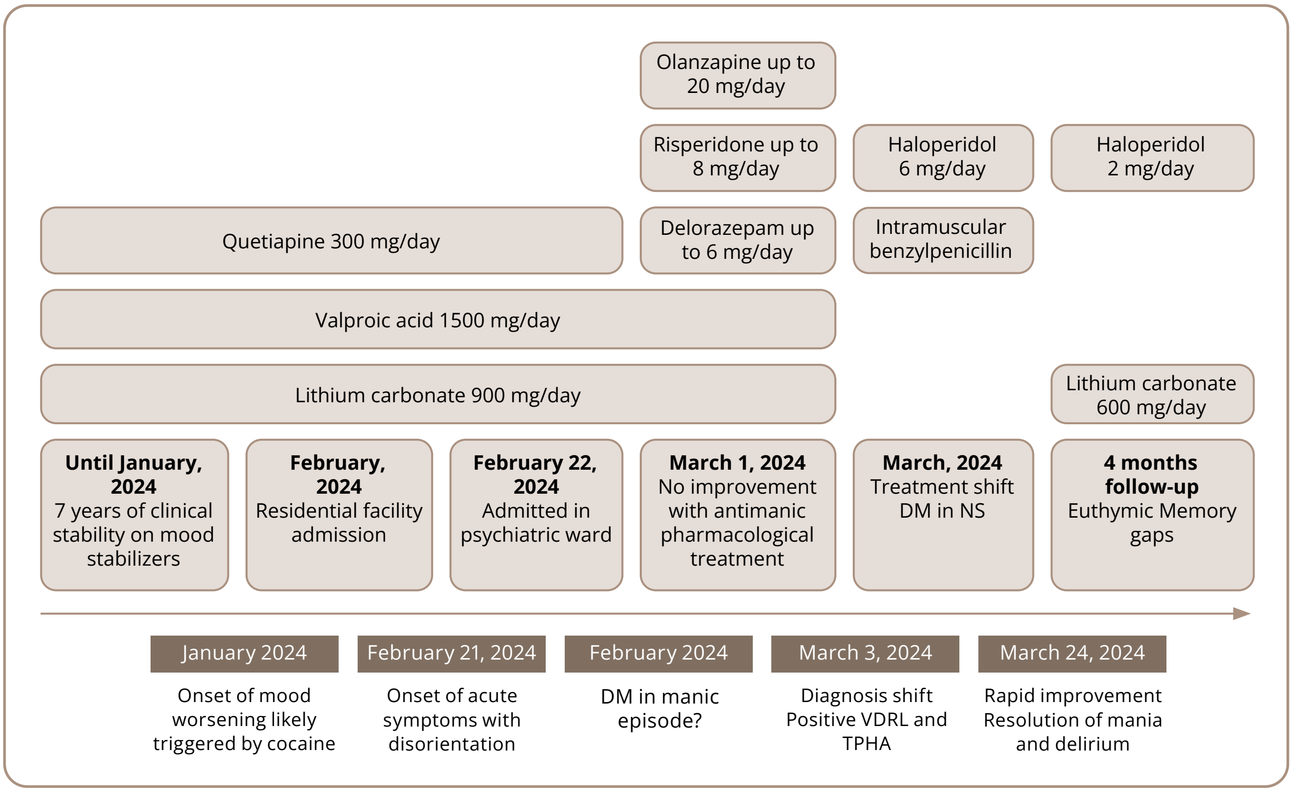

Figure 1. Chronology of the patient's disease.

Note: TPHA — Treponema pallidum hemagglutination assay; VDRL — veneral disease research laboratory test.

Source: Hirsch et al., 2025.

DISCUSSION

This case highlights the diagnostic complexity encountered in the assessment and management of suspected DM, given its lack of clear nosological classification and the absence of established guidelines for its differential diagnosis and treatment.

Initially, the most probable diagnostic hypothesis was DM in the context of a manic episode, considering that our patient met 5 out of the 6 clinical criteria proposed by Bond for DM: acute onset, presence of mania at some point during the episode, features of delirium, personal history of mania or depression, and family history of major affective disorders [7].

Additionally, another characteristic that led us to consider DM was the fact that the patient exhibited a continuous tendency toward incontinence/inappropriate toileting, pouring water on the floor, and denudativeness, which were described as distinctive of DM in Karmacharya et al. study [16].

Given the impossibility of administering ECT due to difficulties in obtaining informed consent from the patient, a pharmacological treatment was established, taking into account the literature's recommendations regarding the positive role of benzodiazepines while avoiding the use of typical antipsychotics [17, 18]. Previous clinical reports had highlighted the utility of olanzapine, quetiapine, risperidone, valproate, and lithium [19], as confirmed in the study by Karmacharya et al. [16], which was the therapeutic regimen we implemented.

Another diagnostic option we considered, for which the therapy we chose could have been equally effective, was excited delirium related to substance withdrawal, particularly from cocaine [12]. The patient had indeed reported to his psychiatrist that he had used cocaine before admission to the psychiatric residential facility. Although the exact signs and symptoms of excited delirium are difficult to define precisely, the criteria most frequently cited include hyperaggressive behavior with superhuman strength, a combative attitude toward the police, hyperactivity, bizarre behaviors, unusual pain tolerance, and hyperthermia [12]. However, these criteria do not occur with equal frequency, and none appear to be mandatory [12]. In our patient, hyperthermia was never present.

Most cases of excited delirium occur in the context of psychoactive substance abuse or among psychiatric patients [20]. In more than 90% of cases, toxicology screening tests are positive, and 50% of patients have a pre-existing psychiatric background [21]. Benzodiazepines or classic antipsychotics, such as haloperidol, are the most frequently proposed treatments [20]. Recently, ketamine has also been suggested as an alternative for acutely agitated patients, offering the added benefit of maintaining airway patency and spontaneous ventilation [22].

Given the lack of improvement with standard therapy for a manic episode, as expected under Bond's sixth criterion [7], together with the absence of response to the withdrawal hypothesis and the positive TPHA test, we considered a diagnostic reorientation toward possible NS to be appropriate, based on our clinical judgment.

NS is an infection of the central nervous system caused by the spirochete *Treponema pallidum* [23]. The frequency of psychiatric signs and symptoms associated with NS ranges from 33 to 86% [24]. Personality changes, dementia, abnormal behavior, and emotional problems are the most common psychiatric manifestations, though depression, psychosis, and mania have also been noted [25]. In a study of 52 NS patients, 34% presented with cognitive impairment, and 25% showed signs of delirium [26]. Although these conditions may coexist, they represent distinct clinical phenomena. Cognitive decline typically develops progressively and manifests as a stable disturbance of memory, attention, or executive function, with preserved consciousness [27]. In contrast, delirium is an acute, fluctuating disturbance in attention and awareness, often accompanied by altered consciousness and disorganized thinking [28]. This variable, non-specific presentation not only creates diagnostic challenges but also leads to potential therapeutic missteps. A case report very similar to ours by Wahab et al. described a male patient in his 40s who was disoriented to time, place, and person, agitated, aggressive, and exhibiting bizarre behavior, initially diagnosed and treated for psychosis with a poor response to antipsychotic therapy, later testing positive for VDRL and improving with antibiotic treatment [29].

In our patient, once the hypotheses of DM in the context of mania and excited delirium due to cocaine withdrawal became less likely, the clinical picture of delirium associated with NS became predominant. As a result, haloperidol was introduced as monotherapy alongside antibiotic therapy. A recent review has shown that, in patients with delirium, haloperidol may reduce mortality and likely results in little to no difference in the occurrence of serious adverse events or serious adverse reactions compared with placebo [30].

The sequence of clinical improvement — mania first, followed by delirium — further supports the hypothesis that delirium was not driven by mania but rather by the underlying infection [10].

Although the VDRL serum test is a screening test for syphilis, the Centers for Disease Control and Prevention (CDC) outline the need to satisfy two diagnostic criteria for the diagnosis of NS: one being a reactive cerebrospinal fluid (CSF)-VDRL test and the second being CSF abnormalities with clinical signs and symptoms consistent with syphilis [31]. In our case, a limitation was the inability to perform a lumbar puncture due to psychomotor agitation. However, the negativity of the CSF after antibiotic treatment does not exclude a diagnosis of NS, as serological and CSF abnormalities after treatment may become ambiguous and difficult to interpret [32]. Similarly, regarding the negative brain MRI, the literature indicates that brain MRIs in most NS patients are normal or show non-specific changes [33].

Based on our clinical experience, we believe that, similar to catatonia, it may be more appropriate to conceptualize DM as a syndrome with both psychiatric and organic underpinnings, rather than solely as a manifestation of BD. Likewise, as with catatonia, the treatment could target DM itself, such as with ECT and benzodiazepines, and its underlying cause. Adopting such a perspective could broaden diagnostic frameworks and guide more effective treatment strategies.

In terms of distinguishing catatonia from DM — considering that some authors have classified DM as a subtype of catatonia [1] — tools such as spatial-temporal psychopathological assessments and the concept of *personal experience* might prove valuable [34]. Northoff et al. argue that patients with catatonia often report feeling overwhelmed by emotions and frequently retain memories of the acute phase, recalling, for example, specific interactions with medical staff during episodes of psychomotor agitation or immobility [34]. In contrast, patients with DM typically experience profound memory gaps, rendering them unable to recall most events during the acute phase, such as family visits or medical interventions [16, 35].

Finally, regarding the relationship between DM and excited delirium, it is evident that the lack of a universal and objective definition of excited delirium remains a major obstacle [12]. Developing such a definition is urgently needed to enable more structured and standardized research with higher levels of evidence, such as prospective cohorts investigating toxic, metabolomic, and genetic factors [12].

CONCLUSION

This case illustrates the need for a broader, integrative approach to understanding and managing DM. A critical objective for future research is to harmonize the definitions of DM and its specific signs, while also developing clear thresholds for making a diagnosis. Studies of spatiotemporal psychopathology could contribute significantly to refining these criteria. Additionally, there is an urgent need for clinical trials focused on DM, as current treatment data are predominantly derived from small case reports, which limits the generalizability of findings.

Informed consent: Written informed consent for publication of clinical details was obtained from the patient, as well as for the publication of any data in this article that could potentially identify him. This consent was provided after the resolution of the delirious mania, when the patient had fully regained decision-making capacity.

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Shared Psychotic Disorder in the Digital Age: A Case Series of Virtual “Folie à Trois”

Индуцированное бредовое расстройство в эпоху цифровых технологий: серия случаев виртуального «folie à trois»

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Case report

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ABSTRACT

BACKGROUND: This case series presents a unique manifestation of shared psychotic disorder “folie à trois” transmitted entirely through digital interactions. It is among the first documented clinical accounts demonstrating that immersive online alliances — without physical proximity — can serve as fertile ground for psychotic contagion. The report contributes to evolving psychiatric frameworks by highlighting the role of “virtual cohabitation” in shaping shared delusional systems.

CASE SERIES PRESENTATION: Three young adult males from different cities in West Bengal developed a shared persecutory delusional system over three years of daily interaction within an online gaming guild. The inducer (Case A) presented with severe paranoia, digital surveillance delusions, and insomnia. Recipients (Cases B and C) displayed alignment with these beliefs, marked social withdrawal, and psychological dependency on the inducer. All patients were diagnosed with shared psychotic disorder. Interventions included second-generation antipsychotics (risperidone, olanzapine, aripiprazole), structured cognitive-behavioral therapy, digital hygiene protocols, and psychoeducation. Separation of digital communication among the triad facilitated therapeutic gains. All three demonstrated symptomatic improvement over 2–3 months, with partial restoration of social functioning.

CONCLUSION: This case underscores that psychological proximity fostered through immersive digital platforms may suffice for the transmission of delusional beliefs. Clinicians must routinely explore virtual relationships and digital group identities as potential vectors of psycho-pathology. Early detection, digital boundary setting, and integrative therapy approaches are essential in managing such emerging presentations.

АННОТАЦИЯ

ВВЕДЕНИЕ: В работе представлены клинические случаи индуцированного бредового расстройства «folie à trois», уникальность которых заключается в том, что пациенты контактировали друг с другом только в цифровом пространстве. Это одно из первых документальных подтверждений гипотезы, что тесное онлайн-общение без физических контактов может стать благоприятной средой для развития указанного расстройства. Данная работа расширяет концепции психических расстройств, подчеркивая значение виртуального сосуществования в формировании общих бредовых идей.

ОПИСАНИЕ СЕРИИ КЛИНИЧЕСКИХ СЛУЧАЕВ: У трех молодых мужчин, проживающих в разных городах индийского штата Западная Бенгалия, развился общий бред преследования после трех лет ежедневного общения во время онлайн-игр. У индуктора (случай А) наблюдался тяжелый паранойяльный синдром, бред цифрового преследования и бессонница. Реципиенты (случаи B и C) начали разделять эти убеждения, у них отмечалась выраженная социальная изоляция и психологическая зависимость от индуктора. У всех пациентов диагностировано индуцированное бредовое расстройство. Терапия включала антипсихотические препараты второго поколения (рисперидон, оланзапин, арипипразол), структурированную когнитивно-поведенческую терапию, а также программу цифровой гигиены и психообразование. Прекращение онлайн-коммуникаций между пациентами способствовало достижению целей лечения. Через 2–3 месяца у всех троих пациентов было достигнуто симптоматическое улучшение с частичным восстановлением утраченных социальных связей.

ЗАКЛЮЧЕНИЕ: Представленные клинические случаи подчеркивают, что психологической близости, возникающей при тесном общении на цифровых платформах, может быть достаточно для передачи бредовых идей. Врачам следует систематически оценивать виртуальные отношения и групповую цифровую идентичность в качестве возможных путей распространения психопатологических нарушений. Раннее выявление, формирование цифровых границ и интегративные подходы к лечению имеют решающее значение в ведении этих новых проявлений.

Keywords: *shared psychotic disorder; folie à trois; digital cohabitation; online gaming; persecutory delusions; virtual psychopathology*
Ключевые слова: *индуцированное бредовое расстройство; folie à trois; цифровое сосуществование; онлайн-игры; бред преследования; виртуальная психопатология*

INTRODUCTION

Shared psychotic disorder (SPD), traditionally referred to as “folie à deux” (“madness shared by two”) [1], is a rare psychiatric syndrome in which delusional beliefs are transmitted from a primary individual (the “inducer”) to one or more close associates (the “recipients”) through prolonged interpersonal closeness and emotional bonding [2]. While the classic phenotype was first described in 19th century asylum settings [3], the syndrome has since evolved conceptually to include variants such as “folie à trois” (“madness shared by three”) and “folie à famille” (“madness shared by family”), characterized by shared delusions among three or more individuals within closely knit environments [4].

With the exponential rise of digital communication platforms, virtual cohabitation has emerged as a modern analogue of traditional physical proximity [5]. “Digital households/communities” characterized by emotionally intense and immersive interactions within online gaming guilds, fan communities, or ideologically bonded social media groups [6] may offer fertile ground for the development of shared psychoses. The digital age has expanded the psychosocial landscape, allowing individuals to form tightly interconnected identities and alliances without physical co-location. To the best of current evidence, no prior published case has documented shared psychosis transmitted solely through digital interactions, without any physical proximity. A thorough search of the scientific databases during the literature review did not yield any relevant sources that have mentioned shared psychosis through digital/virtual media.

Emerging evidence suggests that social media can contribute to the amplification of conspiracy theories, health-related anxieties, and belief reinforcement, often without critical external appraisal [7]. While these phenomena have been well-documented in the realm of mass psychogenic illness and sociogenic spread of ideas, their role in the crystallization of frank psychotic delusions in digital dyads or triads remains underexplored [8].

To the best of our knowledge, no prior case has been published that describes “folie à plusieurs” (“madness shared by several individuals”) manifesting entirely within virtual relationships. Here, we report a rare and clinically instructive series of three individuals — each residing in different cities within West Bengal — who developed a shared persecutory delusional system within the context of an online gaming guild and daily social media interactions. This report highlights the evolving nature of delusional contagion in the digital era and emphasizes the need for clinicians to remain alert to the psychiatric risks embedded in technologically mediated relationships.

CASE SERIES PRESENTATION

Patients' information

Identification and referral pathway

The index case (Case A) was the first to seek psychiatric attention at our outpatient department. During the clinical evaluation, his family disclosed that he had been part of a tightly bonded online gaming group with two other individuals — Cases B and C — whom he referred to as his "only real family". Suspecting that their son's paranoid beliefs might be digitally reinforced by his companions, the parents contacted the families of the other two individuals through phone numbers and gaming platform logs. Both families reported similar patterns of behavioral change in their sons, prompting referrals to our facility over the next 10 days.

All three individuals were male (ages 24–30), Bengali-speaking, from middle-class families in different cities of West Bengal (Kolkata and Barrackpore). They had known each other for 3 years through a shared online multiplayer gaming guild and interacted daily via encrypted chat and voice platforms. None had met in person for over two years due to the COVID-19 pandemic and financial constraints, yet they maintained close emotional ties, describing themselves as "soul allies".

Table 1 presents the characteristics of three patients with shared psychotic disorder and a brief description of the clinical events.

Shared delusional system

All three individuals subscribed to a cohesive delusional narrative involving targeted cyber-surveillance, AI-based psychological profiling (refers to the patients' delusional belief that their online activities and interactions were being systematically analyzed by external entities to predict their behaviors, intentions, or vulnerabilities), and persecution for "digital activism". They believed they were being hunted for exposing "truths" about government-backed surveillance embedded in online gaming networks.

Table 1. Summary of the cases

Item	Case A (Inducer)	Case B (Recipient 1)	Case C (Recipient 2)
Demographics	30-year-old male, unemployed computer science graduate from Kolkata	27-year-old male from Barrackpore, freelance video editor	24-year-old male from Kolkata, aspiring illustrator
Presentation	Increasing fear of surveillance, insomnia, refused to leave house, believed syndicate tracked his internet and targeted his gaming group	Destroyed home router, mute and withdrawn, feared "data taps" in electronics, emotional dependency on Case A	Felt "bugged" via electric lines, refused to speak at home, believed group conversations were used against them
Mental status examination	Well-kempt, guarded, intense persecutory delusions, partial insight (Grade 2/5), attention intact	Disheveled, ideas of reference, persecutory delusions aligning with Case A, minimal insight (Grade 1/5)	Speech soft, thought content dominated by delusions of surveillance, minimal insight (Grade 1/5)
Clinical findings	PANSS (Baseline): Positive=22, Negative=18, General=40; BPRS=62; Follow-up: PANSS=50, BPRS=38	PANSS (Baseline): Positive=24, Negative=20, General=42; BPRS=66; Follow-up: PANSS=44, BPRS=36	PANSS (Baseline): Positive=20, Negative=16, General=36; BPRS=58; Follow-up: PANSS=40, BPRS=34
Diagnostic assessment	Normal blood tests; no substance use	Computer tomography of brain, labs tests normal	Low Vitamin B12 and Vitamin D
Therapeutic interventions	Risperidone 3 mg/day, weekly CBT, family psychoeducation	Olanzapine 10 mg/day, supportive counselling, structured routine, digital abstinence	Aripiprazole 10 mg/day, family psychoeducation, boundary-setting regarding digital access
Follow-up and outcomes	Significant reduction in delusions, resumed freelance digital work, maintained improvement at 3 months	Full remission of acute symptoms, improved family communication, residual guardedness	Reduced suspiciousness, improved social functioning, ongoing psychotherapy

Note: BPRS — Brief Psychiatric Rating Scale (baseline) [9], CBT — cognitive behavioral therapy, PANNS — Positive and Negative Syndrome Scale (baseline) [10], Partial insight — patient was aware at times that his fears might be exaggerated, but still maintained firm belief in the persecution narrative; insight assessed clinically via structured clinical interview focusing on self-awareness of symptoms and beliefs [11]. Minimal insight — patient showed virtually no awareness of the abnormal nature of his beliefs despite clear contradictory evidence; assessed via structured clinical interview on self-awareness of beliefs and behaviors [11].

The beliefs were reinforced through daily voice chats and gaming roleplays, with Case A perceived as the most "informed" and directive member.

The possible inference that inducer caused dependence in recipients 2 and 3 was drawn from clinical interviews, wherein Cases B and C consistently described Case A as the authoritative source of information, emotional reassurance, and direction. Both Cases B and C reported distress and impaired functioning when unable to communicate with Case A, indicating psychological dependence.

Therapeutic intervention

All three were treated with second-generation antipsychotics and digital hygiene protocols.

1. Psychoeducation was provided to each family on the mechanisms of shared psychosis and digital enmeshment.
2. Direct communication among the three patients was restricted during the acute treatment phase to reduce the shared delusional network.
3. Cognitive behavior therapy for Case A: involved structured psychotherapeutic techniques such as cognitive restructuring, reality-testing exercises, guided questioning, thought-challenging tasks, and Socratic dialogues, aimed at modifying distorted beliefs and promoting more realistic appraisals [12, 13].

Follow-up and outcomes

At follow-up (2–3 months), all three showed functional improvement with reductions in PANSS and BPRS scores. However, Case A (inducer) demonstrated comparatively slower improvement in insight and higher residual suspicion than Cases B and C, indicating a differential course of psychosis recovery consistent with primary versus induced psychosis dynamics [1, 3].

Residual cognitive rigidity and suspicion persisted in Cases A and C, but insight had partially improved in all three.

Diagnostic assessment

The working diagnosis for all three patients was Shared psychotic disorder or "folie à trois", with persecutory delusional disorder as the primary differential diagnosis considered and ruled out due to clear evidence of delusional transmission from Case A to Cases B and C. This was based on the Diagnostic and Statistical Manual of mental disorders, fifth edition (DSM-5) [14].

Prognosis

Overall prognosis for all three patients was optimistic. While significant symptom improvement was achieved in the short term, prognosis was dependent on continued therapeutic adherence, ongoing management of digital exposure, and supportive family involvement. Residual symptoms such as cognitive rigidity and intermittent suspiciousness warranted continued psychotherapeutic intervention.

Timeline

A rough timeline showing the chronology of evaluation, treatment and response of the cases is presented in Table 2.

This figure outlines the chronological sequence of clinical events over a 12-week period in three individuals diagnosed with shared psychotic disorder. At baseline (week 0), the primary case (Case A, inducer) presented for psychiatric consultation. Within one week, Cases B and C (recipients) were referred for evaluation following similar behavioral issues. Full diagnostic assessments were completed by weeks 2–3. Therapeutic interventions including antipsychotic medication, digital abstinence

Table 2. Timeline of clinical progression, diagnostic evaluation, and therapeutic intervention in the shared psychotic disorder ("folie à trois") case series

Week	Key event
0 (Baseline)	Initial consultation with Case A (inducer)
1	Case B and C referred for treatment
2–3	Diagnostic assessments completed for all three cases
4	Treatment started for all three cases
6–8	Initial improvement in Cases B and C
10–12	Remission in Cases B and C / partial remission in Case A / functioning improved in all three cases

protocols, and family psychoeducation were initiated at week 4 for all three cases. Initial symptomatic improvement was observed in Cases B and C by weeks 6–8, with Case A showing slower but notable progress. By weeks 10–12, Cases B and C achieved remission, while Case A showed partial remission with functional improvement. This shows the synchronized trajectory of illness emergence, the effectiveness of early intervention, and the role of temporally coordinated treatment in targeting delusional symptoms via digital platforms.

DISCUSSION

Historically, SPD was considered a product of intense interpersonal bonding and sustained physical proximity, often documented among family members, close friends, or institutional cohabitants [3]. However, the digital revolution has redefined the landscape of interpersonal relationships, prompting the need to revisit established psychiatric models through the lens of virtual interactions.

In the present case series, we documented three individual who developed a tightly interlinked persecutory delusional system through prolonged virtual cohabitation — namely, their involvement in a shared online gaming group and encrypted messaging platforms. This delusional system, which centered on themes of surveillance, persecution, and ideological martyrdom, evolved entirely within the confines of digital interactions.

To our knowledge, this is one of the first documented case series from South Asia exploring shared psychotic disorder emerging from an online context among individuals who had not met physically in recent years. Similar cases documenting SPD in entirely virtual contexts have been reported globally but remain exceedingly rare for a recent systematic review and comparison [15].

Several key factors aligned with classical SPD: emotional dependency, cognitive rigidity, social isolation, and thematic coherence [2]. Case A, who functioned as the inducer, showed stronger delusional conviction, resistance to contrary evidence, and a higher PANSS score at baseline, consistent with previous literature describing the “primary case” as the more dominant and psychotically ill individual [4]. Recent studies by Incorvaia [2] and Schneider et al. [15] similarly underscore the dominance and greater psychopathology of the inducer in shared psychotic disorders. Case B and Case C showed features of suggestibility, passive belief acceptance, and psychological vulnerability — traits common among recipients in SPD [2].

The mechanism of delusional transmission in our cases challenges the traditional necessity of physical proximity. Digital platforms allowed not only for consistent contact but for the *immersion* of recipients within the inducer’s narrative universe. Online gaming, in particular, fosters sustained shared attention, reward anticipation, and identity fusion — conditions conducive to group delusion formation [5, 6, 16]. The role of algorithm-driven content reinforcement on social media and chat platforms further potentiates belief confirmation and delusional crystallization [7, 8]. As Kirmayer and Gómez-Carrillo argue, technology may not just facilitate social contagion, but actively shape psychopathology itself by altering modes of attention and narrative construction [17].

Cultural context also played a vital role. The shared language, worldview, and sociopolitical beliefs of the triad enabled rapid cross-validation of delusional ideas. Bhui and Bhugra emphasize that when delusions are culturally resonant — especially in contexts of governmental mistrust or marginalization — they are more likely to be accepted without scrutiny [18]. In our group of patients, real-world examples of surveillance (e.g., Pegasus spyware debates, internet bans during political unrest) may have served as fertile ground for paranoid elaborations.

Despite of the unusual etiology, treatment followed conventional lines: antipsychotics, digital detox, boundary setting, and psychoeducation. Importantly, separating the recipients from the inducer (temporarily limiting digital contact) facilitated the dismantling of the shared delusional system, even without use of antipsychotics — a finding echoed in the literature [1, 3]. All three patients showed improvement in PANSS and BPRS scores within 2–3 months, with no rehospitalizations reported.

Recent studies [2, 14] have supported earlier findings by Ungvari & Leung [19], confirming that separation from the inducer remains a central therapeutic strategy. Recent evidence suggests that recipients can show significant symptom improvement merely through isolation from the inducer, especially if their psychosis is transient and less severe [4, 15]. However, antipsychotic medication remains standard clinical practice, particularly for severe cases, persistent symptoms, and relapse prevention — as isolation alone may be insufficient for sustained remission [20].

These findings underscore the pressing necessity for psychiatrists to integrate digital history-taking as a core part of assessments in paranoid and delusional disorders. Familiarity with the patient’s online networks, digital alliances, and virtual group identities may be just as critical as family and occupational histories [21, 22]. Methods for early detection of psychosis risk in online communities could include monitoring for rapid shifts toward paranoia, increased immersion in conspiratorial narratives, abrupt digital withdrawal from diverse interactions, and intensified emotional dependency on virtual communities [23].

Virtual interaction, while lacking physical co-location, can replicate key psychosocial ingredients necessary for delusional transmission through mechanisms such as emotional intensity, persistent exposure, and identity fusion [24]. Platforms like online gaming guilds and encrypted chat groups enable sustained shared attention, ideological reinforcement, and affective enmeshment, thereby functionally mirroring the "prolonged interpersonal closeness" classically seen in "folie à deux" and its variants [25].

In our patients, the concept of "digital cohabitation" was operationalized through nearly daily contact over years, shared rituals (gaming, strategy discussions), emotionally validating conversations, and role-based alliances — creating a persistent interpersonal environment analogous to shared physical living. As highlighted by Starcevic and Aboujaoude [25], such immersive digital environments can serve as psychological retreats, increasing vulnerability to delusional ideation.

However, online interaction alone is rarely sufficient. As highlighted in our report, additional psychosocial and intrapersonal factors likely mediate susceptibility. These include:

- real-world social isolation, as seen in all three individuals during the post-pandemic period and financial constraints;
- psychological dependency, especially of the recipients on the inducer (Cases B and C);
- cognitive rigidity and suggestibility, which contributed to belief absorption;
- pre-disposing vulnerabilities, including prior subclinical anxiety traits and lack of offline emotional supports.

These findings are consistent with broader frameworks proposed in cultural and social psychiatry, which posit that structural vulnerability, context, and affective resonance are as crucial as content transmission in psychosis formation [8, 9].

Strengths of this case series include detailed clinical descriptions, robust use of standardized psychometric tools (PANSS, BPRS), clear demonstration of digital transmission mechanisms, and the novelty of reporting SPD exclusively within digital interactions. Limitations include small sample size, absence of long-term follow-up, inability to objectively measure online interaction intensity or exposure, and lack of detailed exploration into predisposing personality and familial factors. Further, the association between the psychotic symptoms of Case A and those of Cases B and C has been inferred by the author based on clinical evidence and the timeline of psychopathology, and does have a subjective bias. Larger-scale studies are warranted to generalize these findings.

CONCLUSION

This case series highlights a novel manifestation of shared psychotic disorder in the context of digital cohabitation, underscoring that psychological proximity, rather than physical closeness, may suffice for the transmission of delusional beliefs in the modern age. Immersive virtual platforms, emotionally intense online alliances, and algorithmic echo chambers can serve as powerful amplifiers of psychotic contagion. While our cases responded well to standard antipsychotic and psychotherapeutic interventions, this phenomenon calls for an expanded clinical framework that incorporates digital relational dynamics into routine psychiatric evaluation. Future research is warranted to better understand how online communities influence the structure and content of emerging psychopathologies.

Informed consent: Written informed consent was obtained from all three patients after they had clinically improved for publication of this case series report and any accompanying anonymized clinical data or imagery (Case A — 31.03.2025, Case B — 04.04.2025, Case C — 04.04.2025). Efforts were made to protect patient identity, and no identifiable information is included in this article.

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