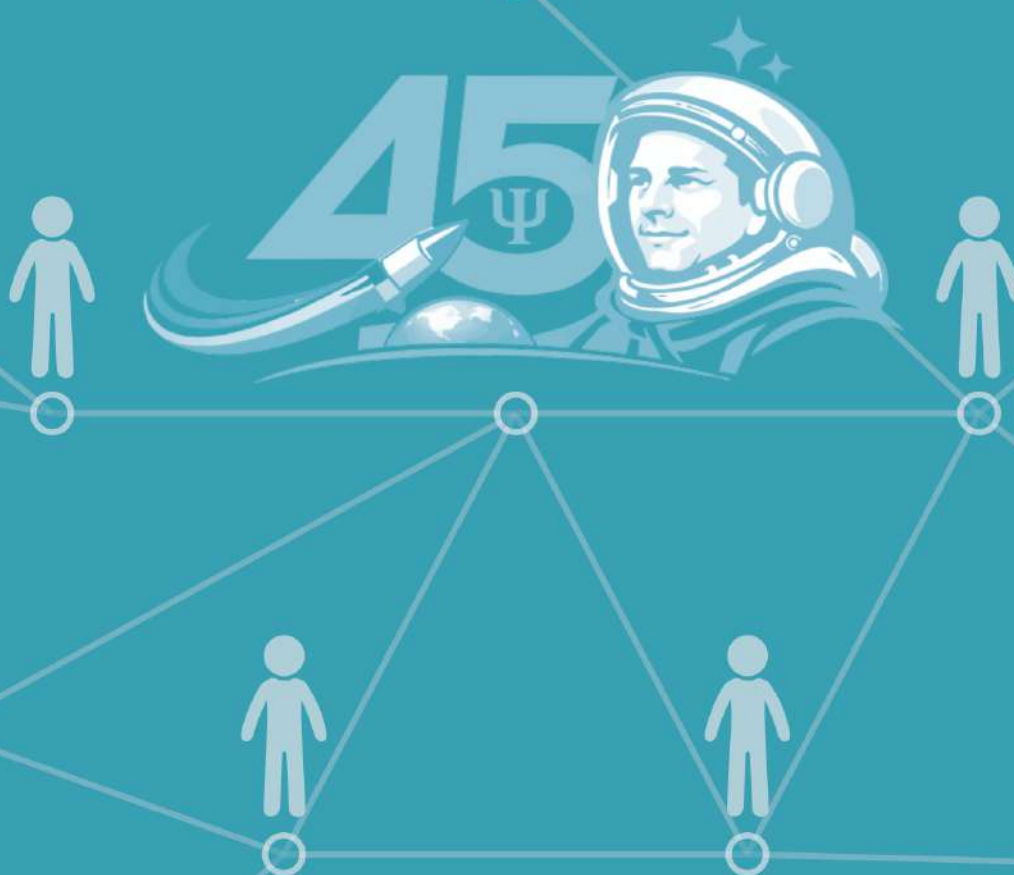


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EDITORIAL

The contribution of Romanian psychologists to Dumitru Prunariu's spaceflight

MARIAN POPA *

Romania

Abstract

The article analyzes the role of psychologists in the success of the *Soyuz 40* mission in May 1981, marking the 45th anniversary of the first Romanian spaceflight. The paper documents the complex process, coordinated by Dr. Valeriu Ceașu at the *Centre for Aeronautical Medicine (CAM)*.

Psychological selection began in 1977, evaluating 200 engineers based on the "activity information circuit model". A *select-in* strategy was used, aiming to identify the best performing candidates, resulting in a final cohort of five candidates. **Assistance in the preliminary preparation phase** was carried out through observational participation. The objectives were: evaluation of the candidates' adaptation in real conditions, development of the capacity for self-knowledge and self-control, stress management, harmonization of the group climate, and initiation in flight psychology.

The "Informația" research program, carried out on the *Salyut 6* station, included seven tests aimed at assessing the impact of weightlessness on cognitive and decision-making processes. The results indicated a temporary decline in performance in the first few days, followed by a recovery based on a state of euphoric mobilization.

The pre-launch and in-flight psychological support aimed at managing the tension caused by the uncertainty of the final selection at Baikonur and ensuring ambient comfort, through specially created video and audio programs.

Each chapter contains an **international practice section**, which presents the psychological activities carried out by the main space agencies, *NASA*, *Roscosmos*, *ESA*.

The conclusions emphasize that psychologists have made significant contributions to all stages of the cosmic program with Romanian participation, demonstrating their ability to prepare professionals for extreme demands.

Keywords

space psychology, astronaut psychological selection, astronaut training, space psychological support

1. Introduction

May 14, 2026, marks 45 years since Dumitru Prunariu and Leonid Popov took off with the *Soyuz 40* spacecraft for an orbital flight of 7 days, 20 hours and 42 minutes, forming a space complex with the *Salyut 6* station, already in orbit.

To better understand the significance of this event, a brief socio-historical contextualization is necessary. The space epic began with the surprising launch by the USSR of the first artificial satellite of the Earth, *Sputnik 1*, on October 4, 1957. It was the beginning of a fierce competition, which reached its climax on July 20, 1969, when the *NASA mission Apollo 11* placed the first two

astronauts on the Moon. The United States was emerging as the undisputed winner of the space race, and the two competitors raised the stakes at the level of the socio-political systems they represented. This is how what was called "space diplomacy" appeared, with the objective of strengthening alliances. The United States launched the *SpaceLab* program in 1983, and space shuttles, in association with *European Space Agency* and then, in 1998, the *International Space Station (ISS)*. The USSR had created, as early as 1966, the organization for space scientific cooperation *Interkosmos* (Steimle & Norberg, 2013), in which the countries of what, with naïve sincerity, was called the "socialist camp", as well as from

* Correspondence concerning this article should be addressed to Marian Popa. E-mail: popamarian@gmail.com.

allied nations, participated. Since 1976, *Interkosmos* has been extended to space programs with humans on board. After a while, this political segregation eased, and common missions emerged. In 1975, the USA and the USSR organized the joint mission *Apollo-Soiuz*, Russia has been co-opted into the *ISS* and sent astronauts from Western countries into space.

The "conquest" of space was an ideologically grounded technological race. The history of spaceflight is inseparable from the geopolitical context that generated it. The rockets that took humans into space were originally vehicles carrying nuclear weapons, and the space race was essentially a battle for the "soul" of humanity: which political system — communism or capitalism — is capable of "producing" the future? And yet, beyond ideology, space flight is an undertaking of extreme complexity, which can only be accomplished through science and technology of the highest level, created and controlled by super-competent, inventive and courageous professionals.

Romania was invited by *Interkosmos* to propose candidates in the spring of 1977. From the somewhat hasty way in which things happened in the months that followed, it can be assumed that it was a surprise. The objective set before the Romanian side was to select a group of potential candidates, engineers, but not necessarily pilots. Of these, the Soviet side was to choose two, in early 1978, to be included in a program of several years of effective training, for a mission in space. The time available for this task was only one year, at the risk of missing, or losing, the chance for a Romanian to join the international community of spacefaring nations. The Romanian side asked for more

details regarding the selection and training of candidates, but did not receive a response, and an information visit of Romanian specialists to the USSR was postponed several times, until it was definitively canceled. Under these conditions, the preparation activities were marked by two critical conditions: time pressure and uncertainty.

Specialists from various fields were part of this effort: doctors, psychologists, military and civilian researchers, officers, and pilots. Medical and psychological evaluations were carried out by the *Centre for Aeronautical Medicine*¹. Responsible for the psychological component was psych. dr. Valeriu Ceașu, the head of the *Psychology Laboratory*², one of the outstanding personalities of Romanian psychology in the twentieth century (Mureșan & Mânzat, 2023; Popa, 2004). With him worked a whole team of psychologists, who contributed to this project.

Curiosity made me check to what extent the internet's memory preserves information about their participation in this event, singular for now, in the history of Romanian psychology. *Google search* found the two collective volumes in which there are chapters dedicated to the contributions related to Dumitru Prunariu's flight: *Dimensiuni psihice ale zborului aerospațial* (Ceașu, 1985c) and *Solicitări psihice la aviatori și parașutiști* (Ceașu, 1987b) (fig. 1). Nothing more than the covers, without any content information, much less the names of the authors.

¹ CAM has an impressive history. The selection and medical evaluation of aviators began in 1918 (!), under the leadership of the military aviator doctor Victor Anastasiu (1886-1972). He fought as a pilot and was wounded, over Bulgaria. In 1920, he obtains, by royal decree, the establishment of the *Institute of Aeronautical Psychophysiology*, which had different names over time. Since 2000 it has been called the *National Institute of Aeronautical*

and *Space Medicine* "Gen. av. dr. Victor Anastasiu".

² Valeriu Ceașu (1924-1991) came to the CAM in 1959, created the *Psychology Laboratory* which, since 1961, has been integrated into the current methodology of selection and evaluation of airborne, military and civilian personnel.



Figure 1. The collective volumes of the *Laboratory of Aeronautical Psychology*, edited by Valeriu Ceașu. (foto M. Popa)

We also turned to some popular artificial intelligence applications, *Perplexity*, *Gemini*, *ChatGPT*, and *Co-pilot*, with the most advanced models available for free. We successively asked them a set of questions on the subject of the Romanian cosmic flight. The results exhibited significant inconsistencies and a lack of specificity. The applications evoke a series of psychological procedures related to Prunariu's flight, but with that general, non-specific character that Melumad and Yun (2025) referred to as '*shallow knowledge*', and the sources of information declared are irrelevant or unrelated to the questions. This fact demonstrates that the answers were based on generic resources on the subject. Although AI applications recognize the existence of a Romanian psychological science program during the mission, its description does not reflect reality, but includes topics taken from any other similar program.

Things are no better in terms of nominating psychologists, either. Three of the apps used admitted, to their praise, however, that they

could not give any names. *ChatGPT* offers a few names, some of which are real, but unrelated to Prunariu's flight, and the others are invented. *Gemini* suggests searching for psychologists in the "*Journal of Hygiene, Psychology and Aeronautical and Space Medicine of the years 1981-1985*", a journal that never existed.

These findings motivated me to submit this testimony, which could be useful for completing the picture of Romanian psychology, which was then in a difficult period of its history. What I propose is to reconstruct the contribution of the psychologists involved in Dumitru Prunariu's cosmic flight project. Some of them are gone, others I have lost contact with. After almost half a century, some memories have disappeared. I relied especially on the reports in the collective volumes mentioned above, but also on the personal notes from that period.

We structured the presentation on the four major activities carried out: psychological selection, assistance during the preliminary training period, in-flight scientific program,

assistance in the pre-launch phase and during spaceflight. We have described them with the maximum accuracy allowed by the available information 45 years after the event. At the end of each chapter, we have added a section dedicated to international practice in that field.

2. Psychological selection

The initial selection base was aeronautical engineers employed in the Ministry of National Defense. Because the number of those available proved to be too small, the recruitment was extended to civil engineers from aeronautical institutions. In total, 200 people, aged between 26 and 36, were recruited, all men. We did not find information about possible sorting of applications based on file criteria. Even if, given the ideological load of those years, we can assume that this criterion existed, the extremely short time available, and the crisis of candidates, probably limited its impact.

Those who accepted the challenge entered the medical and psychological selection program, which was carried out sequentially, first the medical evaluation, and then the psychological one, which meant three days of tests for each candidate. At that time, CAM lacked validated medical and psychological standards for space missions. But this problem was faced by both the USSR and the USA in the pioneering phase of spaceflight. As a result, the selection model used in Romania, both from a medical and psychological point of view, was the one in use for pilots on supersonic fighter jets. While a *select-out* strategy was used for pilots, the emphasis for cosmonaut candidates was placed on a *select-in* strategy. This was justified by the fact that, unlike pilots, where there was the possibility of directing during training to less demanding aviation categories, in the case of cosmonauts this option did not exist, and the risk of elimination during training had to be minimized. At the same time, the specific demands of cosmic flight, described by Soviet and American researchers, were also considered (Ceașu, 1985b).

The psychological selection was based on the "model of the informational circuit of

activity" elaborated by Ceașu (1976). It describes the work activity as a circular process, composed of the following stages:

- *Information constitution*: detection, and integration of sensory inputs;
- *Information processing*: conceptual-logical processing, problematization, decision-making, memorization;
- *Decision*: cognitive component, effector component, level of assumed risk;
- *Motor skills*: verbalization and motor activity (coordination, speed, precision);
- *Self-control*: attention processes, situational awareness;
- *Self-regulation*: volitional mobilization, emotional balance, relational component, risk management, etc.

Their evaluation was carried out through standardized tests, specialized devices, as well as through an in-depth psychological interview. The methods used were mostly designed by Valeriu Ceașu. Among other things, a new system for processing and interpreting the results was also applied, which included the computerized elaboration of the psychological profile. The specific actions of this phase were supported by Valeriu Ceașu, together with psychologists from the laboratory: Maria Magureanu, Maria Nicoleta Drăghici, Marian Popa, and Dr. Vasile Teodorescu.

At the end of the medical selection, only 60 candidates were declared fit (30%). They entered the psychological selection stage, at the end of which 5 received approval of fit (8.3%). Cumulatively for the two selection components, the positive selection rate was 2.5%. The five candidates made up the group that entered the preliminary training program that took place in the country, before being sent to the USSR for the final selection.

International practice

Before a man flew into space, Soviet and American scientists did not have an answer to two fundamental questions: will he survive the conditions of such flight, and if so, will he

retain his physical and mental functionality so as to perform complex tasks? The big unknowns were the high *G* forces, at takeoff and re-entry into the atmosphere, and the state of weightlessness in orbital flight. Beyond the effects on the internal organs, they could also have a major psychological impact. Psychiatrists of the time spoke of the "detachment from the Earth" effect, which could degenerate into psychotic episodes or total detachment from reality. It was estimated that in the absence of familiar sensory inputs, the human brain would begin to hallucinate within minutes. The overloads induced by accelerations of more than 8 times the natural gravitational acceleration could block blood circulation to the brain and, implicitly, its functional incapacitation.

The theory of psychological selection requires the analysis of the workload, or, in our case, exactly this essential thing was not possible. As a result, the solution could only be the use of a proxy workload, which naturally led to the search for future space flyers among military pilots.

In the USSR, the first candidates were sought among pilots of jet aircraft *Mig15*. In his memoirs, Yuri Gagarin, who was to become the first man in space, evokes the selection procedures he went through (apud Santy, 1994). They included modified variants of well-known Western tests, such as: *MMPI*, *Thematic Apperception Test*, *Eysenck Personality Inventory*, *Rorschach* and *Personality Scale of Taylor*. In addition to these, other batteries of tests were used that targeted factors such as stress tolerance, concentration and behavioral stability (Musson, 2020).

In the United States, President Eisenhower decreed that the first astronauts should be recruited exclusively from among military test pilots, considered the most suitable due to their technical skills, discipline and experience in extreme risk situations. The program followed two complementary psychological approaches (Collins, 1985; Harrison & Fiedler, 2011b; Link, 1965):

- the *Select-In* model, focused on identifying the skills and positive traits necessary to fulfill the tasks of

the mission (professional prominence, motivation and decision-making capacity).

- the *Select-Out* model, focused on detecting and eliminating candidates with psychopathological vulnerabilities or traits that could compromise safety (neuroses, personality disorders, phobias or substance abuse).

The candidates were subjected to evaluations with diversified batteries of tests.

- Intelligence and Aptitude Tests: About 12 tests, including the *Wechsler Adult Intelligence Scale (WAIS)*, the *Doppelt Mathematical Reasoning Test*, and the *Miller Analogies Test*.
- Personality and projective tests. 13 tools, including the *Minnesota Multiphasic Personality Inventory (MMPI)*, the *Rorschach Test (inkblots)*, the *Thematic Apperception Test (TAT)*, the *Bender Visual Motor Gestalt Test*, and *Sentence completion tests*.
- Socratic introspective exercises: Candidates had to answer profound questions such as "*Who am I?*" and "*Whom would you send on a mission if you could not go?*", providing clues about self-perception and group dynamics.

In addition, for the stress resilience assessment, candidates were subjected to extreme physical demands.

- *Sensory isolation*: 3 hours in a dark, soundproofed room to assess adaptation to the absence of external stimuli.
- *Extreme physical stress*: Exposure to vibrations, high centrifugal forces, temperatures of 54°C for 2 hours and the "*cold pressor*" test (keeping the feet in ice water).
- *Complex behavior simulation*: Using a panel with 12 different signals that require rapid reactions to measure reliability in confusing situations.

In the end, out of 31 pilots tested intensively, 4 were eliminated for reasons of

"psychological inadequacy" and 20 for medical reasons. The remaining ones formed the group *Mercury Seven*, which gave the first American astronauts. Their profile was described by Wolfe (1980) under the label *Right Stuff*, which includes a combination of exceptional individual qualities capable of guaranteeing success under conditions of maximum demand. Notably, the selection protocol stipulated that the results of psychological evaluations should not be included in the personal file, so as not to affect their existing professional status.

Although unofficial, the moon landings marked the end of the space competition between the US and the USSR, based on the egos of the political system. Defeated in this first stage, the USSR changed the paradigm of cosmic exploration, turning to quasi-permanent space stations, dedicated to pragmatic objectives: technology, planetary research and, why not, military applications. The USSR launched *Salyut 1* (1971), followed by *NASA*, with *Skylab* (1973), and this series continued in the following years and decades. After the disappearance of the USSR, joint space programs with international crews were developed, which are still in operation today.

The space station stage brought some significant changes from the perspective of human resource management in space. First of all, the missions became longer, in the order of months, which massively amplified the impact of some already known factors (weightlessness, isolation, fatigue, interpersonal compatibility, conflict prevention and management). Secondly, the division of labor on board appeared, by separating the roles: those responsible for controlling the on-board systems, researchers, payload specialists. Having different tasks to perform, and they also had to be selected on different criteria. Moreover, their training emphasized different things. Those differences were such as to give rise to a certain lack of homogeneity of skills, which posed risks to flight safety. Finally, missions with international cooperation have created a new problem, that of intercultural adaptation within crews.

The factors described above can generate a cocktail of psychological risks, the main ingredients of which are: adjustment disorders and psychopathological states, asthenia, degradation of cognitive functions, errors with serious effects, or ruin of interpersonal relationships. Psychological selection is considered the first protective barrier against them (Kanas & Manzey, 2008; NASA, 2016).

In Russia, *Roscosmos* understood even earlier than *NASA* that the main threat to a long-duration mission was not technical failure, but the psychological degradation of the crew and the breaking of trust ties with the ground control center. According to a secret report of the *CIA*, developed just one year before the selection of Romanian cosmonaut candidates, the selection of Soviet cosmonauts followed, in general terms, the criteria for the selection of military pilots (Central Intelligence Agency, 1976). The report mentions the existence of dissatisfaction with the efficiency of psychological selection and the need to improve it. Thus, starting with 1973, the psychological selection methodology has entered a process of reconstruction, to increase the validity and fidelity of in-flight performance prediction, not only in relation to training performance. As a result, the Russians have turned psychological selection from an appendix of medical selection into a strategic component of the mission's success (Santy, 1994).

Currently, the Russian selection methodology includes a computer-controlled psychomotor testing program to assess piloting skills, along with personality assessment. It also emphasizes learning skills, logical thinking, speed of mental processes, stability in isolation, group dynamics and collectivism (preference of group values over individual ones), and the ability to self-control in monotonous environments (*Roscosmos*, 2025; Schmidt & Spychalski, 2021).

In the USA, paradoxically, interest in selection based on psychological criteria was lower than in the USSR. This fact has been the subject of many critical opinions (Collins, 1985; Helmreich, 1983; Santy, 1994), which have gradually led to a change in approach. In the '70s and '80s, *NASA* considered the profile

of the researcher capable of collaborating effectively in a heterogeneous group, in prolonged missions (Collins, 1985). Psychological selection in the '70s was dominated by the *Process Communication Model (PCM)*, developed by clinical psychologist Taibi Kahler (Kahler, 1979, 2008). *PCM* was a method of psychological evaluation based on six personality types, co-present in everyone, hierarchically structured in the form of a "condominium", which allows the communication style to be adapted according to the "language" preferred by the interlocutor. The selection based on this model aimed to foster effective collaboration under conditions of extreme stress. The selection also emphasized emotional stability, communication skills, and teamwork skills. For example, simulations such as "a day in the life of an astronaut" and *feedback* between group members to see who is liked by their peers in living conditions. In terms of personality traits, the *Big Five* model was used, with a special focus on agreeableness, conscientiousness, and emotional stability (Schmidt & Spychalski, 2021).

The selection process was anchored in the philosophy of the *Select-out* clinical (elimination of those with latent pathologies) by the end of the '80s (Kass & Kass, 1999; Santy, 1994). The positive selection rate was very low. In 1978, for the selection of *Group 8* of NASA astronauts, over 8000 candidates were primarily evaluated, of which 208 were invited for final examinations, 35 (0.44%) being retained. (Mullane, 2018). In 1984, for the selection of *Astronaut Group 10*, out of almost 5000 applications received, 17 candidates were admitted, which means a percentage of 0.34% (NASA, 2024).

In our time, the selection of American astronauts takes place through the cooperation of several organizations within the *NASA*, having a central role *Behavioral Health and Performance Group* (Cox et al., 2013). The methodology is currently based on the *Competency Model* and "*Soft Skills*". This represents a refinement of the model *Right Stuff*, with the shift of emphasis from the "test pilot", capable of solving any problem on his own, to the empathetic "team player",

necessary for missions to Mars (Barrett et al., 2017; Roberts, 2025). A two-phase strategy is applied. In the first, those with psychiatric risk are eliminated (*Select-out*), in the second, of the *Select-in*, rigorously, behavioral competencies are evaluated: self-care and team care, communication skills, situational leadership, intercultural skills, interpersonal relationships and conflict management.

The assessment of these competences is carried out by methods validated by *NASA Human Research Program* (2022): personality questionnaires (e.g., *Big Five*); structured interviews; group simulations in which candidates are put in situations with extreme cognitive load (Musson, 2020); peer evaluation (e.g.: "*Which of the other colleagues would you rather be stuck in a capsule for 6 months with?*") (Landon et al., 2018); *Family resilience*, which assesses how well the astronaut's family can handle the stress of prolonged absence, as well as teamwork skills, motivation, reasoning and decision-making capacity (Beven et al., May, 2018). Roberts (2025), appreciates that space missions in the 21st century require an increase in interest in psychic selection criteria such as cognitive flexibility, problem solving under stress and uncertainty and, especially, teamwork. To these must be added the importance of adapting to conditions of cultural and gender diversity,

The *European Space Agency (ESA)* selected the first astronauts between 1977 and 1978 (the *Spacelab*), for the position of 'mission specialist', capable of working in international teams. The selection strategy was twofold: *Select-out* clinical (elimination of those with latent mental pathologies, or emotional instability) and *Select-in* (identifying those with personality traits that favor peak performance and group cohesion under stress). The evaluation methodology was developed by *German Aerospace Center (DLR)*, which focused on three main objectives: cognitive abilities (processing speed and selective attention, spatial orientation, memory and time-scarce logical reasoning); personality (*Big Five*, emotional stability, panic resistance); group behavior (direct observation in simulated tasks)

(Fassbender & Goeters, 1992; Goerres, 1977; Goeters & Fassbender, 1992). Special attention was also paid to intercultural adaptability (tolerance for ambiguity, non-aggressive communication skills, intrinsic motivation) (Kanas et al., 2009; Santy & Jones, 1994)

The selection campaigns carried out by *ESA*, in the years 2008-2009 and 2021-2022, had as their main objective to create cohesive crews composed of people from more than 20 member states. For *ESA* the priority is to identify the "ideal social operator". Because *ESA* does not own its own manned launch vehicles (using US or Russian services), European astronauts must be "ambassadors" capable of integrating into any organizational culture (Sandal et al., 2022). *ESA* works closely with *German Aerospace Centre* for psychological testing. The process is a very rigorous one, being divided into distinct phases of cognitive assessment and behavioral assessment (Golemis et al., 2013; Maschke et al., 2011; Mittelstädt et al., 2016):

- psychomotor and cognitive assessment (working memory, distributive attention and spatial orientation under time pressure);
- group evaluation (*assessment center* exercises, where psychologists evaluate group dynamics, the ability to provide constructive feedback, assuming leadership-follower, conflict management). Added to these are personality assessments, which are based on *the Temperament Structure Scales* and *the NEO Personality Inventory Revised*.

In China, a newcomer to the space power club, an ambitious space program is underway, reminiscent of the competition in the early years of space exploration. The selection of *taikonauts* has gone beyond the phase of purely military criteria and is now multidisciplinary. Candidates who pass medical tests are subjected to psychological screening. Psychology is seen as a component of "mission readiness". The criteria taken into account are personality traits, resistance to stress and experience in risk conditions, exceptional emotional stability, social skills

and resilience, interviews with candidates, but also with their families (Golemis et al., 2013). Experience in emergency or risk situations (e.g. military aviation) is considered a positive indicator (China Space Report, 2016). Among the methods used are: real-time EEG monitoring (to detect cognitive load and fatigue), desert survival exercises (to explore hidden personality traits), cultural criteria (e.g., married candidates are preferred) (Shengjun, 2024).

Systematic validation of psychological selection has long been neglected; the success of the missions being mistakenly considered a sufficient proof of validity. Statistical validation was difficult to achieve due to small samples, lack of systematic performance criteria, and privacy policy restrictions. *NASA*, for example, banned for decades the collection of data on the individual performance of astronauts (Powell, 2001; Schmidt & Spsychalski, 2021).

Evidence of the validity of psychological selection in the *Roscosmos* system:

- Psychophysiological indicators (heart rate, skin conductance), used as predictors of emotional stability in crisis conditions, measured on the ground, had an accuracy of over 80% in predicting the cosmonaut's ability to make correct decisions in the first 30 seconds of a real flight anomaly (Kanas & Manzey, 2008).
- Expert assessments using the so-called "prolonged clinical observation method" in various ground contexts (isolation, sleep deprivation, skydiving) have proven to be superior to any standardized tests. Even "social adaptability" scores better predicted the integration of foreign cosmonauts.
- Myasnikov and Zamaletdinov (apud Harrison & Fiedler, 2011a) reported that subjective expert assessments (flight psychologists) conducted during these endurance tests have a criterion validity superior to any standardized test. They demonstrated that the "social adaptability" scores correctly predicted the integration of

foreign cosmonauts (into the *Interkosmos*) in Russian crews, the pages of the personal diary subsequently confirming clinical observations made 2 years before the flight.

Validity Assessments in the NASA Selection System:

- Use of structured interviews and tests such as *MMPI* resulted in disqualification rates during ground training of about 8.5% for psychiatric problems, confirming the effectiveness of the medical filter (Kanas, 2015).
- In *Project Mercury*, isolation and physical stress tests have been validated *post-hoc*, showing that the selected volunteers were superior to non-volunteers in terms of flight performance and motivation (Collins, 2003).
- *Limitations of the "Select-out" model*: It has not been proven that the elimination of pathologies (according to DSM-IV), has the criterion validity for identifying the competences of effective interaction in the group (Powell, 2001).
- *Superiority of aptitude and intelligence predictors*: Existing data suggests that measures of intelligence and skills can predict performance more accurately than commonly applied personality tests. In particular, "fluid intelligence" (analytical, creative and practical ability) is considered essential for solving novel tasks, being a more robust predictor of success than crystallized knowledge (Powell, 2001).
- *Big Five* data analysis for a period of 15 years, from the *Space Shuttle*, showed that astronauts with low scores in neuroticism are perceived as more desirable flight partners (Landon, 2022). Musson et al. (2004) applied, between 1989 and 1995, *Personal Characteristic Inventory (PCI)* to 259 candidates in the final

stages of their astronaut training, and 147 of them also applied for a revised version of the *Big Five*. The results highlighted a cluster consisting of: *Conscientiousness* ($r \approx .30$) - the strongest statistical predictor for technical performance and compliance with procedures; *Agreeableness* - positively correlated with the success of long-term missions (*ISS*), as it reduces interpersonal conflicts and *Low neuroticism* - essential for emotional stability under stress.

- *Inconsistency of personality predictors in analogous environments*: The validity of personality traits as predictors varies significantly depending on the context. For example, "motivation to achieve" correlated positively with adaptation in submarines, but has been associated with lower performance ratings in Antarctic environments, which raises doubts about its universal validity for spaceflight (Powell, 2001).

Procedures used by *ESA*, in the 2008-2009 selection, which focused on intercultural competences and *leadership* have been reported to have significant success in training multinational crews (Landon, 2022).

Statistical trends cannot exclude individual variations or unpredictable destructive behaviors. The history of spaceflight is marked by such bad incidents:

- *Conflict and isolation*: Crew *Apollo 13* had major tensions with the ground control. In missions *Salyut* and *Skylab 4*, fatigue led to periods of hostile silence and even interruption of communication with the mission control center (Arone et al., 2021; Collins, 1985, 2003; Kanas, 2015; Stuster, 2010).
- *Mental health problems*: Sensory delusions have been reported (*Soyuz 21*), depressive states (*Soyuz T14*) and even threats to open the sunroof in space, amid acute professional frustrations, which led to the

implementation of sunroof locking systems (Berger, 2024; Dunn, 1995; Weitekamp, 2011, March 7).

All this highlights the fact that, although the "psychological fabric" of astronauts is an important factor for the success of missions, selection cannot meet this challenge alone. Complex training and preparation, including from a psychological point of view, is the second barrier of protection against behaviors below the required performance standard.

3. Psychological assistance in the preliminary training phase in Romania

The five Romanian candidates who passed the medical and psychological filter were included in a preliminary training program, carried out in the country, between August 15, 1977, and January 22, 1978. The fundamental objective was to bring everyone in a condition that would maximize their chances of facing the final selection exam, which was to take place in the USSR. This period was not designed as an additional selection filter but, as we will see, not all candidates will go to the next phase. The training program had the following components: knowledge of the Russian language, increasing physical fitness, acclimatization flights on a subsonic reactive aircraft (*MiG 15*, dual command) and acquiring basic theoretical knowledge of cosmic flight.

The idea of including a psychologist in the coordination group, as well as my proposal for this role, belonged to Valeriu Ceaușu. Together with him, I set the guidelines of the activities I was going to carry out, among them being the keeping of a professional diary, which was to provide a basis for objective, post-factum analysis. The presentation below is based on the chapter in the collective volume in which we described this professional experience (Popa, 1985), as well as some journal entries, which can now be made public.

Group K

The group of cosmonaut candidates and the coordination team, constituted what, in official documents, was called *Group K*. This encoding can induce the idea of a secret operation, shrouded in mystery. In reality, this was not the case at all. Although it was not publicized at that time, our activity was not secret, and we were never asked to keep discretion about what we do. Everywhere we went, everyone was aware of the group's purpose.

In the spirit of the objective stated at the beginning of this article, I want to make known here the names of the members of Group K. Some of them have never been mentioned publicly, which is unfair in relation to the effort they have made.

Group of cosmonaut candidates (in alphabetical order):

- Eng. Constantin Cristescu
- Cpt. Eng. Dumitru (Mitică) Dediu
- Eng. Cristian Guran
- Eng. Ioan Ludoșan
- Eng. Dumitru-Dorin Prunariu

Apart from D. Dediu, an engineer officer in the Ministry of National Defense, the others were civil engineers, employed in aeronautical institutions. Only two candidates had practical flying experience on sports aircraft. Four were married, only one of whom had no children. Their average age was close to 28 years, but in fact, four of them formed a homogeneous age group (25-27 years), while the fifth had turned 35.

Coordination team:

- Lt. Col. Constantin Georgescu, squadron commander and *MiG-15* pilot – team leader
- Cpt. Eng. Viorel Burlan – physical training instructor (performance athlete, martial arts specialist)
- Lt. Maj. Florin Sava – Russian language teacher
- Marian Popa - psychologist

Medical assistance was provided by specialist doctors from the *CAM* and, as the case may be, by doctors from the locations where we were.

Locations and objectives

The group was successively deployed to several places, depending on the objectives of the program:

- Poiana Braşov, at the recovery chalet for military aviation pilots: physical training, learning the Russian language.
- Bacău, at the *Military Aviation Training Centre*: physical training, Russian language, aeronautical psychology theory, theoretical training for flight and acclimatization flight with the *MiG-15 aircraft*.
- Bucharest, at the *Centre for Aeronautical Medicine*: physiological training, with emphasis on vestibular training, notions of aeronautical medicine, Russian language, and at the *Military Technical Academy* (theoretical training on spaceflight).

The entire activity was carried out under the authority of the *Military Aviation Command*, recently re-established (May 1, 1977), led by Maj. Gen. Gheorghe Zărnescu.

Challenges

The psychological assistance and support activities for Group K cannot be fully understood without an overview of the conditions under which they were carried out. The most important thing to mention is the uniqueness of this type of training and, implicitly, the lack of previous experience, at national level, in the selection and training of a group of cosmonaut candidates. They include in this category, not only the lack of knowledge, but also the absence of adequate institutional and legislative infrastructure. The most important challenges generated by this context can be classified into the following categories:

- *Institutional*. The coordination of activities was assigned to the *Military*

Aviation Command, which had to cooperate with other institutions in the absence of an adequate legislative framework. The uncertainties of the legal and administrative status of candidates have always created problems with a negative psychological impact. One of the repetitive references in the diary is about a government decision that was supposed to solve the many problems regarding the status of candidates³.

- *Logistics*. The lack of adequate legal support generated numerous logistical problems, which had to be solved through improvisations, often under time pressure. The most pressing of them was that, for several months, the payment of salaries to those outside the Ministry of National Defense was difficult to achieve.
- *Organizational*. The coordination group met for the first time on the day of the establishment of *Group K* for the departure to the first location. I went straight into the activity, with a daily schedule built under the pressure of an urgent timeline that generated a certain pressure and physical and mental overload, sometimes with counterproductive effects. A particular aspect of the program was its limited variety, dictated by the limited content of tasks. This was a source of monotony, with an oppressive effect on morale. Typically, the working day was divided between studying Russian and physical training. The first was carried out according to an intensive plan, including common classroom activity, for 3-4 hours, plus individual study, at least two hours. Physical training began in the morning with gym exercises and

³ I did not find anywhere in the journal that this phantom GD had ever been approved, at least until the selection in the USSR was completed.

outdoor runs (2-3 km). In the afternoon, sports games were organized and, occasionally, swimming sessions or other physical activities. Later it was concluded that sometimes it was exaggerated, both in terms of intensity and the volume of physical training. The cause of this situation was the pressure of the stakes and the lack of information about the exigency of the final Soviet selection. Even if these two main activities have been added, at various times, the flight activity and theoretical courses, there is still not enough variety.

From the perspective of finality, the *K Group* had a unique characteristic: although the performance of the tasks required the cooperation of the candidates, the spaceflight was to be reserved for only one of them. The candidates were in a competitive training regime, in which the members collaborated partially (mutual support), but in reality, they competed for the only place available. This situation created, on the one hand, a sense of collective identity, and on the other hand, a high emotional pressure, which presented a risk of conflict, nervousness, anxiety, fear of failure or demotivation.

The Soviet or American programs of that period offered an almost certain prospect of flight to all those in training, if not "now", then "next time". In the *Interkosmos* program there was no a "next time".⁴ Although our goal was not to choose the one who would fly, everyone was aware that if they were to fly, only one of them would be chosen. And this was likely to generate competitive feelings.

In addition to the challenges to which the candidates were subjected, I must also mention those to which I myself have been subjected. As a student, I had learned about

participatory knowledge, but I had never imagined that I would be in a position to practice it, and still so soon⁵. At that time, it had been only one year since I graduated from college, and my professional experience came, for the most part, from the laboratory work carried out in the few periodic secondments at the CAM, from the "Aurel Vlaicu" Higher School of Aviation Officers, where I was employed.

Specific activities

In the spirit of Gold's typology (1958) Regarding the roles that a psychologist can adopt in participatory observation, we considered that, in the given context, the most appropriate status was that of "participant with the status of explicit observer". This situation posed two major challenges. On the one hand, I was faced with the problem of legitimizing the permanent presence in the group, which could be perceived by the candidates as a threat. This risk was all the greater as I had, with some of them, experience during laboratory selection. Secondly, immersion in the group created the risk of subjective distortion of assessments. On the other hand, the major advantage of being an observer participant was that it allowed me to build a relationship of trust and facilitate access to all forms of training, including free time. Although the presence of an observer could cause subtle changes in behavior on the part of the candidates (*Hawthorne effect*), it was a risk taken. The fact that the group was constituted on competitive premises further amplified those challenges.

The first step in controlling these challenges was to become aware and reflect on them in depth. What helped the most, however, was certainly the fact that I developed authentic personal relationships

⁴ Except for Bulgaria, which also benefited from the second flight, the first being interrupted for technical reasons, in the coupling phase with the *Salyut 6* station.

⁵ On this occasion, I realized, and I told my students, many years later, that they should not risk

appreciating what will be useful to them later, and what will not, from what they learn in college. I would even say that it is precisely seemingly useless things that can make a difference later.

with all the candidates and that I showed a real interest in all the components of the program, in which I participated with them: in the Russian language classes (intermittently, I admit), in the physical training program (in full), in the flight (my request to be included in the *MiG-15* flight program was approved – experience that then helped me throughout my career as an aviation psychologist), to the common activities during free time. It also mattered that we were close in age. During the internship in Bacău, I was even a roommate of one of the candidates. Under these conditions, we have all come to develop authentic personal relationships, in parallel with professional ones. As for the need for objectification, I was helped by the entries in the professional diary and the practice of retrospective evaluation at the end of each day (both required detachment), as well as the periodic meetings with Valeriu Ceașu, which required a professional, objective analysis.

Mainly, psychological assistance during this period focused on four major objectives, which I will summarize below.

- a) Deepening psychological knowledge in conditions of adaptation to real requests.

The psychic characteristics outlined during the psychological selection, however detailed and complex, configure a pattern of behavior specific to the artificial, laboratory environment. Participatory observation offers the chance to enrich psychological knowledge in real, specific conditions in relation to the task for which they were selected. Let's not forget that, until the flight into space, the candidates were going to go through another complex and demanding training program, for several years, far from the country, even if they had family with them. The success of the adaptation at this stage was to be crucial for achieving the final goal.

The most important aspects we followed were motivation and mobilization under pressure, general adaptation, resistance to stress, relationship conduct, conflict management, and performance in different training categories. The methods used were varied: direct observation in current tasks,

individual and group discussions, engaging in joint activities (e.g. sports games, recreational moments). I would highlight, in particular, the value of sports games as an observation medium, due to the attenuation of the defensive and self-image protection mechanisms that manifest themselves in formalized actions.

One of the major problems I encountered was that I had to weigh the assessment of individual adaptation with the impact of the conditions mentioned above. Adaptation is the result of the interaction between personal characteristics and the work context, which had to be taken into account.

- b) Developing the capacity for self-knowledge and self-control

The status of a participant in the life of the group gave me the unique chance to amplify my personal experience with the candidates. Evaluation under laboratory conditions is based on a subject → psychologist relationship, where the arrow indicates the major direction of the flow of information. In real life, I also set out to build a psychologist → subject information flow, through which I would contribute to the development of personal self-knowledge and to increasing the capacity for self-control in demanding situations. In current terms, what I did then would fall within the scope of personal development procedures, but I must admit that, at the time, I had not heard of this phrase.

Concretely, we proposed to the candidates to participate in their own knowledge, using several means. First, we discussed with each of them, separately, the results of the selection assessment, stimulating them to relate analytically, including critically, to them. Secondly, we trained them, during individual or group discussions, to analyze their behavior in various situations, to objectify the perspective and reduce states of tension. I based myself on the idea that a lucid person, willing to rational self-appreciation, has a better chance of dealing with complex situations. The results of this action differed greatly from candidate to candidate, depending on the capacity for self-analysis

and decentralization but, overall, the objective was achieved.

Finally, we initiated and practiced the technique with the candidates. *autogenic training* (Schultz & Luthe, 1959; Stetter & Kupper, 2002), widely used in demanding professions, in sports and even in the training of cosmonauts (which I did not know at the time) (Cowings et al., 1986; Toscano & Cowings, 1982). We have pursued, on the one hand, immediate effects, in terms of adaptation to current demands and, on the other hand, long-term effects, by arming ourselves with a self-control and self-regulation tool potentially useful in the advanced phases of the training program. We carried out the exercises in group sessions, through heterosuggestion, followed by the analysis of the effects felt. The candidates' reports confirmed immediate positive results in terms of recovery after exercise, reduction of tension states, and facilitation of the onset of sleep.

- c) Support for stress management and harmonization of the group climate

The conditions of the preliminary training period, described above, created inevitable premises for some negative psychological developments. Basically, candidates were required to make an intense effort in a partially dysfunctional context and in relation to a goal that, at that time, was nevertheless floating in a certain uncertainty. For this reason, many behaviors that could be labeled as coping problems were merely normal manifestations in relation to conditions below the level of legitimate expectations.

The intensity of the daily schedule generated compliance pressure that required strict timing. Any deviation from compliance pressure, even minor, was a potential source of interpersonal irritation. The accumulation of these "cracks" posed a risk to the stability of the group, which we could not afford. The context had all the ingredients to generate the stress of the training camp: isolation from familiar environment, physical and mental overload, the monotony of the program, the tension induced by a high-stakes goal. Combating the effect of monotony required

careful sounding of the mood and, in collaboration with the other members of the coordination group, taking appropriate measures at critical moments. A positive effect was achieved by consulting the candidates on detailed aspects of the daily program. Their suggestions were treated carefully and accepted, if they did not harm the objective. This resulted in a significant reduction in stress, without giving up training objectives.

One thing that could not be neglected was the pressure from families, different for each candidate, which sometimes became extremely difficult to manage. In fact, family related stress played an important role in the final configuration of the group of candidates.

Each candidate reacted to the conditions of the period in a particular way, depending on their personal context and individual characteristics. Regardless of the constraints, all candidates demonstrated resilience and found resources to fight these conditions. Suffice it to mention that, at one point, out of the need to recover after sustained physical effort, the candidates agreed to pay for their own access to the swimming pool of a hotel in Poiana Braşov. Without this kind of commitment, we would probably have faced failure, because the number of candidates in this phase was very small.

During this period, interpersonal relationships in the group of candidates had a moderate level of competition. This helped boost engagement and maintain a high tone in training. In this context, one of the constant directions of psychological assistance has been to promote functional interpersonal relationships, to mitigate and mediate tensions within the group and the group with the rest of the coordination team. Without missing some rough edges, especially under the effect of the stress of the training camp, the group climate did not reach significant conflict levels at any time. Each member of the coordination group, in his field of activity, noticed competitive feelings among the candidates, but these always remained within manageable limits. Despite occasional, inevitable roughness, interpersonal relationships remained at least fair, when they were not exactly warm and friendly.

In retrospect, the factors that contributed to maintaining the cohesion of the group and managing pressures were, in order: *the leadership* provided by the head of the coordination group (a military pilot with command experience, who approached difficult situations with calm, confidence and even humour); very good cooperation between the members of the coordination team (a prerequisite for the identification and operative dissemination of tensions); the presence of a psychologist, whose main concern was precisely to maintain balance and temper negative manifestations.

Towards the end of the period, we resorted to *Method of objective assessment*, invented by Gheorghe Zapan (1984), centered on the following theme: "*Suppose you were appointed commander of a space flight, and you can choose a teammate. Name one of the members of the group you prefer, and motivate this choice. Also, appoint and motivate a member of the group you wouldn't choose*". The objective was to have an image of the perception that each candidate has in the eyes of the others, at the end of a common experience of several months. Despite the inherent subjectivity, by cumulating them, these appraisals ensure what Zapan called "objective appreciation". The results can be materialized both quantitatively (number of choices/rejections received, reciprocal) and qualitatively, through the graphic representation of the network of preferences and the analysis of motivations.⁶

For such a small group, quantitative analysis is of little relevance. Particularly significant from a psychological point of view, however, were the motivations with which the

candidates supported their preferences. Their analysis outlines an idealized profile of their favorite cosmic teammate. The essential quality, placed by all in the first place, is professional competence. It is correlated with high capacity for learning, intelligence, and creative adaptation to unusual situations. The second component of the portrait accumulates traits of a propensity nature: tenacity, work power, tendency to surpass oneself, competitive spirit, firmness in decisions. Along with them, the favorite cosmic teammate is perceived as a pleasant person, with a high culture and varied interests, cooperative and endowed with a sense of humor.

d) Initiation in the aviation psychology and cosmic activities

The official program of preliminary training also included a theoretical training component. It contained, in addition to knowledge of space flight, an aeronautical psychology module. Its role was, on the one hand, as a form of preparation for the acclimatization flight with *the MiG-15*, and on the other hand, as an incipient form of training for participation in what later received the name of the (psychological) experiment *Informatia*.⁷

We organized this training in the form of colloquiums, with minimal formal requirements. The topics of the discussions included the fundamental problems of human adaptation to the conditions of air and cosmic flight, information loading and dynamics, decision-making stress, risk management, the effects of weightlessness, etc. The reference medium was, of course, limited to the

⁶ Later, during my career, I introduced "objective appreciation" as a method of current evaluation of pilot students, at the end of each year of training. The scores obtained, together with the results of the sociometric test, applied simultaneously, were the basis for the validation of the psychological selection exam, carried out in the CAM.

⁷ This experience was the basis for holding, in the '80s, an aeronautical psychology course for

student-pilots in the first year of the aviation school. It is interesting to note that "*Lessons in flight psychology*" were taught as early as 1912, to the students of the second series of the Cotroceni flight school, by the graduates of the first series, as preparation for flying on Farman airplanes (ing. av. Gh. Negrescu, graduated in 1911, with the license no. 2 in Romanian military aviation, "*Din amintirile unui vechi aviator*", Editura Militară, 1977, p.2)

conditions of the time. The basic source was Valeriu Ceaușu's book on the psychology of flight (1976), along with sporadic references to US space programs.

Although, as I said, the preliminary preparation did not pursue a selection purpose, at the end of the period two candidates left the group. Without going into detail, this was due to the combination of two main factors: significant difficulties in adapting during training, and explicit pressure from families. In essence, it can be said that their motivation for this undertaking was not sufficient to counterbalance the difficulties and external pressures.

On January 23, 1978, the three remaining candidates (D. Dediu, C. Guran and D. Prunariu) left for the USSR for the final selection stage. After a month of "severe" evaluations, as Prunariu mentions (1985), on February 20, we learned that the Russian side decided that D. Dediu and D. Prunariu would be included in the flight training program in the USSR, while C. Guran remained in the country as a reserve. On the same day he entered the *CAM* the first batch of candidates for the next cosmic flight, an action that will be extinguished soon after, without ever being resumed.

International practice

Within *NASA*, during projects *Mercury* and *Apollo*, the involvement of psychologists in the training phase was limited. However, monitoring the basic vital functions of the group of candidates, as well as psychological well-being, was part of the nursing program during the trainings (Link, 1965). Recruited from among test pilots, the astronauts in this group had a culture of "deep aversion" towards psychologists (Musson, 2006). Under their pressure, after 1962, *NASA* prohibited the collection of performance data during training, which blocked the validation of selection and training methods (Harrison & Fiedler, 2011a). As a result of reasoned criticisms (Helmreich, 1983; Santy, 1994), this approach has been gradually abandoned. From resistance to intervention, we have moved on to an

integrated support system. Psychologists are involved in the development of training programs for behavioral health (recognition and management of stress, sleep problems, and circadian rhythm). Also, emphasis is placed on the formation of group interaction, leadership, and subordination skills (Powell, 2001). During the training phase, astronauts participate in various procedures and programs designed to enhance human performance in space (Harrison & Fiedler, 2011a; Kanas, 2015; Landon, 2022):

- *Spaceflight Resource Management*: Adapted from aviation (*Crew Resource Management*), this program trains four essential elements: information sharing, communication efficiency, supportive behavior, and leadership/followership.
- *Expeditionary skills training*: Astronauts are trained in skills such as self-care, conflict management, intercultural adaptation, and group life.
- *National Outdoor Leadership School*: Candidates attend survival courses in extreme environments (e.g., the Arctic) to practice leadership and cohesion under stress
- *Operations in extreme environments*: Training takes place in the Aquarius underwater habitat, which replicates isolation and artificial life conditions in space.
- *Spaceflight Cognitive Assessment Battery (WinSCAT)*: A computerized tool used to establish a baseline level of cognitive functions during training, useful for subsequent monitoring in flight.
- *High-fidelity simulations*: 45-60 days training in isolation rooms (such as *HERA* or *SIRIUS*) where psychologists observe group dynamics and the emergence of the "third quarter phenomenon" (low morale mid-mission).

In the USSR/Russia, *Roscosmos* has been focusing on intense psychophysiological monitoring and human factor engineering

since the '70s. The central objective was to assess the "psychological readiness for the mission". This included psychological compatibility, personality analysis, and the type of role they play in interacting with others. It was also aimed at familiarizing themselves with psychological reactions during flight and emotional stability in stressful situations. To this end, *Roscosmos* use various procedures and programs (Central Intelligence Agency, 1976; Gazenko, 1980; Kanas, 2015; Kanas & Manzey, 2008; Musson, 2020):

- *Surdokamera (Silence Room)*: A fundamental procedure where candidates are sensory isolated for up to 15 days, sometimes with sleep deprivation, to assess emotional stability and the ability to stick to a dense schedule without external stimuli.
- *The "Homeostat" device*: Used to assess crew compatibility through a task whose success depends on the timing of reactions to achieve a common balance. Prunariu (personal communication, March 4, 2026) remembers that he went through this test, together with Popov, receiving congratulations for the ease with which they synchronized in positioning the pointing needle. The cohesion scores obtained at this device gave negative correlations with the level of interpersonal conflict in long-term missions. Their validity was also confirmed by the fact that crews that showed indices of 'harmonious interaction' maintained 15-20% higher productivity under conditions of chronic fatigue in orbit ((Santy, 1994).
- *Skydiving training*: Used as a stress research tool, cosmonauts must solve logical problems or report technical data during free fall, under cardiac and EEG monitoring. Prunariu also went through this type of training. However, it was later restricted due to the high risk of accident and endangerment of *Interkosmos*

missions (personal communication, March 4, 2026).

- *Psychoprophylactic training*: It is a form of psychological training on the dangers of spatial asthenia (chronic fatigue, irritability) and methods of compensating for sensory deficits.

In the book dedicated to his cosmic experience, Dumitru Prunariu mentions the importance of psychological training during training in the USSR (Prunariu & Stark, 1982). This type of training was not explicit, but implicit, by engaging in analogous situations: flying, parachuting, survival training in special conditions (personal communication, March 4, 2026). An important role in the *Roscosmos* It plays a role in monitoring communications during training and their psychological analysis, to determine the level of stress, frustration, anxiety and conflict (Gushin et al., 1998). With the Joint Program *Shuttle-Mir* (1995-1998), psychologists from the US and Russia began to collaborate to harmonize training methods for multinational missions (Harrison & Fiedler, 2011a).

Within *European Space Agency (ESA)*, the training period is designed to transform candidates from individuals with outstanding individual qualities into effective crew members capable of functioning in complex multinational missions, such as those on the *ISS* or from future expeditions to Mars. Along with technical competence, the second major objective is the development of psychosocial competences: leadership, cohesion, coordination, stress management and coping, intercultural competences, and language competences. The training is carried out in cooperation with *NASA* (e.g., flight training program), or is built on similar models (e.g., training in analog environments – caves, arctic environment). To reduce cultural barriers and promote a common space culture, astronauts *ESA* learn Russian and can live for short periods with families in Russia, during the years of preparation for the *ISS*. *ESA* promotes the identification of common elements between members of different nationalities in order to create a new cultural identity of the crew, a method that has proven successful on

the *ISS* (Bishop, 2011; Kanas, 2015; Landon, 2022; Manzey & Schiewe, 1992).

In China, the taikonaut training program is based on isolation training and simulations, with a focus on preparing for long-duration missions. To this end, they are trained for long periods of more than 100 days in the Beijing lunar station simulator (Kanas, 2015; Wu & Wang, 2015). During this time, they are subjected to behavioral monitoring with a focus on mood, interpersonal tensions, resistance to stress and isolation, autonomy in situations of interruption of communications with the ground. Adapted Western techniques are used to monitor group cohesion and the working climate. Unlike Western models, programs in China tend to be influenced by collectivist values, which can make it easier to train crews for long-term missions (Draguns & Harrison, 2011).

In addition to the formative purpose, which is fundamental, the preparation period also functions as an additional mechanism for filtering astronauts. The effort to adapt to intense and prolonged stresses brings to the surface fragilities or latent pathologies. *Roscosmos* can eliminate a cosmonaut at any time during the program if a psychological incompatibility occurs. During the pioneering space period, about 10% of candidates were rejected in the very first month of training, largely due to failure on stress tests (Central Intelligence Agency, 1976). If *NASA*, although once entered the astronauts' corps the dropout rate is very low, field exercises, such as survival in the Arctic or underwater training, are used, at least informally, as an additional level of selection for the designation of astronauts on the *ISS* (Musson, 2006). The use of simulators and situational interviews during training eliminates unsuitable candidates, as these tasks require a minimum level of effective mental functioning (e.g., judgement under pressure) that cannot be simulated in the long term (Roe & Hermans, 2006).

4. Space Scientific Research Program

Dumitru Prunariu had on board the space complex *Soiuz 40-Salyut 6* the status of researcher. The mission's protocol included over 20 scientific experiments, 15 of which were carried out by Romanian researchers. Starting with 1979, several meetings with Soviet specialists took place, as a result of which the experiments to be carried out in the cosmos were approved. They covered three areas: astrophysics and nuclear physics (*Astro-1, Astro-2, Minidoza* and *Integral*), space technologies (*Capilar* and *Nanobalanta*), space medicine and psychology (*Imunitatea, Pneumatic, Balisto, Reo Interferon, Neptun, Guler, Informatia*) (Prunariu & Stark, 1982; Șerban, 2016; Surcel, 2011).

The scientific program *Informatia* was developed by Valeriu Ceașu, with whom Ilie Puiu Vasilescu, Mircea Toma and Mihai Aniței worked. We must specify from the beginning that this program was aimed only at the Romanian cosmonaut and was carried out only during the flight. The main objective of the experiment was to highlight the changes that the specific factors of cosmic flight (overloads, weightlessness, the feeling of cloister, sensory deprivation and increased responsibility) induce psychic processes. The following were particularly followed: variations in psychological arousal (mental energy mobilization), speed and precision of thought processes, decision-making, coordination of movements, emotional reactivity, and efficiency of attention.

The experiment consisted of seven tests (Ceașu, 1985b): *Psychotonus, Calculation, Centering, Reading, Sta-Ball, Risk, TV report*. With the exception of the TV report, all the others were conceived in the *Psychology Laboratory of CAM*.

1. *Psychotonus*. It is a test designed to evaluate the capacity for mental effort from a subjective and objective perspective (Ceașu, 1987a). The subjective component involves self-assessment on a scale from 0 to 100 of five defining factors for effort capacity.

The objective component consists of the free association of numbers (*ASLN*) and is based on Shannon's concept of information entropy (1948). The subject must write numbers from 0 to 9 on a form, with the request that the sequence be random. If, for example, the number 2 is followed by the number 3, according to the counting stereotype, this brings a small amount of information (small entropy). However, if 2 is followed by a more "distant" number, therefore less predictable by the counting stereotype; this brings a greater amount of information (high entropy). The hypothesis is that, under the effect of fatigue, the brain tends to resort to stereotypes to a greater extent, to conserve its energy. This means that certain (stereotypical) numerical pairs will tend to occur at a higher frequency than others. At the same time, pairs removed from the (less likely) counting stereotype will appear less frequently. The analysis of the data of this test involves laborious calculations, for which a specialized software was necessary, created at the *Polytechnic Institute of Timișoara*⁸. Before being used in space, the sample was tested in a transoceanic flight, on a crew of *Boeing 707* (Ceașu & Năstoiu, 1987). The test was also proven valid in a study on the mental fatigue curve, on a sample of 200 student pilots. They were tested for a week, at the beginning of each school day and after the last class hour (Aniței & Popa, 1987).

2. *Calculation*. It consists of simple arithmetic calculations, performed under time pressure.
3. *Centering*. It assesses the quality of perceptions, aspects of decision-making, hand-eye interaction, and the ability to self-control by marking the center of circles.
4. *Reading*. It consists of reading a text aloud, at the first reading, with recording. It analyzes neuropsychic dynamics, verbalization, and emotion control.
5. *Sta-bil* (Stabilization of the ball). It electronically simulates the sliding of a ball on an inclined plane, the subject having the task of keeping the ball as long as possible in the central part of that surface by operating a lever. Evaluates the hand-eye interaction in the steering movements, in the conditions of delayed feedback, aiming at the speed of reaction and the ability to restructure skills. The device was made in collaboration with the *Polytechnic Institute of Timisoara*.
6. *Risk*. The subject is faced with situations of uncertainty, in which he can choose his working conditions, respectively the level of risk assumed, depending on the confidence he shows in his own qualities and possibilities. The device was made in collaboration with the *Polytechnic Institute of Bucharest*.
7. *TV report*. It analyzes behavior in front of the TV camera, determining aspects of the influence of flight factors on mental activity, such as stage fright or self-confidence. It can be considered complementary to the evidence of *Reading*.

The *Informatia* program was applied in three distinct phases of the mission: before the flight (all the tests), during the flight (five tests: *Psychotonus*, *Calculation*, *Centering*, *Reading*, *TV Report*) and after the flight (the same five tests, only once, three days after landing). It should be noted that D. Dediu performed the same tests, in parallel with D. Prunariu, before and after the flight.

Without overemphasizing the generalization potential of an experiment with a single subject with one control, the analysis of the results led to some interesting and useful conclusions (Ceașu, 1985a):

⁸ For those who find computer analysis trivial, we remind you that this happened in the years 1980-1981!

- In the first 3-4 days of the flight, there is a slight decline in mental performance - a decrease in the speed and efficiency of information processing processes.
- After this period, performance increases and sometimes even exceeds that before the flight.
- The onset of fatigue usually occurs faster in flight than on the ground. This leads to the idea that the work-rest cycle must be adjusted according to specific rules in flight, compared to those on the ground.
- Exposure to the flight environment, at least for a cosmonaut on the first mission and for a similar duration to this flight, tends to generate a slight state of euphoria, with a positive effect on mobilization in the task.

Referring to the performance at these tests during the flight, Prunariu (1985) made some interesting observations. In his opinion, technical and medical experiments involved him only as an operating agent (he acted on pre-established commands, observed and transmitted information read on screens), and the results did not have a meaning that concerned him personally. By contrast, the psychological tasks involved him personally, which induced him "a special psychological setting", which he describes as a "need for prestige" associated with a "slight fear of failure". If in the case of the other experiments, the one who "worked" was the equipment, in the case of the psychological experiment he was the one who worked, and the data referred to his performance, which had a significant mobilizing effect.

International practice

Space psychology research is carried out in two different contexts: on the ground, in so-called "analog" spaces, and in-flight. Analogue environments represent terrestrial conditions, natural or artificial, with characteristics similar in some respects to spaceflight. They are used as terrestrial substitutes for space conditions, for the study of human performance, the health and well-

being of crews. Subjects can be astronauts in training, or volunteers who will never fly in space. The most common analogue media are: *research stations in polar areas* (real isolation and constant danger, immediate evacuation impossible); *underwater and underwater habitats* (crews are totally dependent on life support systems and limit immediate exit to the surface, just like in space); *isolated room simulators* (specially built habitats, where environmental variables can be strictly controlled to study the state of isolation and coercion) (Bishop, 2011; Musson, 2006). The longest isolation experiment (*March-500*) simulated a round-trip flight to Mars. It lasted 520 days (2010-2011) and took place in a complex of isolated modules at *Institute for Biomedical Issues* in Moscow. The subjects were six male volunteers (three Russians, two Europeans and one Chinese), who lived in total isolation, without access to natural light or direct atmospheric air (Basner et al., 2014).

From the point of view of historical evolution, space psychological research followed, similarly to selection, the phases of space programs.

First stage includes the period between the preparation of space flights (late '50s) and the completion of the *Apollo* lunar program (1969). The fundamental question that was sought at the time was whether a man can survive the impact of environmental factors, even under the protection of the cabin and the flight suit. The second question was whether it can also function efficiently under these conditions. The tests to which the American astronauts in the *Mercury* program were subjected have become legendary. This emphasized survival, resistance to extreme physical stressors (rapid alternating exposure to extreme temperatures, vibrations, centrifugal forces, sensory isolation in dark rooms). This type of physical and mental training, alike, was the basis of the phrase *Right Stuff*, invented by Wolfe (1980). This type of training has remained in the history of *NASA* by its draconian character, later considered excessive, justified only by the lack of knowledge regarding the conditions of survival in the extra-planetary environment.

Research from the period *Mercury–Gemini–Apollo* emphasized individual resilience, acute stress tolerance, and the ability to function in a team under pressure (Kanas & Manzey, 2008). During the flight, were tracked: psychological reactions to launch, separation and re-entry into the atmosphere; ability to maintain cognitive performance in short missions; data on mission stress and cabin behavior (Harrison & Fiedler, 2011a).

Interestingly, this information was not obtained through explicit research protocols, but through methods that we can call "opportunistic": observations made by mission control personnel, analysis of logbooks, operational reports or personal diaries of astronauts. At the time *NASA* did not have a scientific program dedicated to psychological research in flight. And this was because the first detachment of astronauts had been selected from among the test pilots, the elite of American military aviation. They were the ones who flew advanced experimental aircraft, facing exceptional challenges and considering themselves exceptional. Through their professional culture, they were inclined to perceive medical and psychological evaluations as potential threats to their own status⁹. As a result, they wanted to spend as little time as possible in relation to psychologists and psychiatrists¹⁰. Their antipathy to behavioral science led to the premature cancellation of a large study on the mental stress and performance of astronauts, conducted by scientists of *NASA* in the first years of the project *Mercury*. This has had long-lasting effects on research in the field of space medicine and psychology at *NASA* (Santy, 1994).

In the USSR, *Roscosmos* showed an open interest in psychological research during cosmic flights, since the beginning phase of their space program (*Vostok*, *Voskhod*; 1961–

1965). The main objectives were to assess emotional stability, physiological reactions during flight, and in-flight clinical data collection to validate cosmonaut selection. The methods used were medical reports and clinical observations.

Stage Two began with the first permanent orbital stations (*Salyut 1* - 1971, *Skylab* – 1973) and continued until 2000, with the *Mir* and the *Space Shuttle* program. With the transition to longer and more complex missions, and having diversified crews (pilots, payload specialists and researchers), *NASA* recovered interest in scientific research in the field of behavioral sciences (Harrison & Fiedler, 2011b; Helmreich, 1983; Santy, 1994). The main objectives were to study the psychosocial effects of long-term missions, to develop countermeasures for isolation and mission monotony, to optimize the selection and training of mixed crews. The literature highlights the shift from individual measures to monitoring team dynamics and psychosocial interventions (Harrison & Fiedler, 2011a; Kanas & Manzey, 2008). A large-scale study from this era, carried out by Helmreich and Wilhelm (1987), is based on the idea that human error and crew coordination deficiencies pose greater threats than lack of technical competence. On this assumption, the authors isolated two fundamental dimensions of personality: *Instrumental features* (goal-oriented and goal-oriented) and *Expressive features* (oriented towards interpersonal behaviors), both of which are essential for the command of complex, multi-crewed spacecraft. The results highlighted the so-called "honeymoon effect", which suggests that high motivation during workouts can mask the negative influence of personality, its traits becoming stable predictors of performance only after the individual settles into the job routine.

⁹ During the *Apollo 13 mission*, after the explosion that compromised the moon landing, astronauts Jim Lovell, Jack Swigert and Fred Haise removed their biometric sensors, much to the dissatisfaction of doctors at the control center in Houston.

¹⁰ This attitude is still valid today in the world of military and civilian pilots.

Research carried out under the aegis *Roscosmos* focused on the new working environment created on orbital stations. Gushin et al. (1998) studied audio and computer communications between space simulation crews and ground control personnel during two ground isolation experiments, for 135 and 90 days. In-flight research on the stations *Salyut* and *Mir* focused on studying the long-term effects of microgravity on sleep, mood, and cognitive performance; monitoring crew dynamics in flight; testing of countermeasures applied in the mission. Regular assessments of cognitive performance and affective status were also carried out during long missions, including clinical trials and measures to promote mental health in flight (Gushin et al., 2021; Lyssakova & Lysakov, 2021).

This stage was also characterized by international cooperation on orbital stations. As a result, appeared joint US-Russian research on multinational crews in the program *Shuttle-Mir*. One of these highlighted several critical psychological difficulties, such as depressive episodes, feelings of loneliness and sociocultural isolation, highlighting the need for rigorous long-term support strategies. The results demonstrated the fundamental importance of intercultural competences, tolerance to prolonged periods of low stimulation and the ability to cohabit in an isolated environment, providing essential data for the optimization of training and the coordination of international missions (Kanas, Salnitskiy, Weiss, et al., 2001).

Another research, in the same context, studied psychosocial dynamics for 4.5 years. The results refuted the "third quarter" hypothesis (the degradation of the group climate at the beginning of the third quarter of the mission), identifying instead a novelty effect, in the first phase of the mission, and a decrease in perceived support from the leader, after the middle of the mission. Although no evidence was found for space asthenia, the study confirmed the phenomenon of displacement of tension and negative emotions from crew members to mission ground control personnel, and subsequently to higher-level management, highlighting the

complexity of interactions between groups in orbit and those on the ground (Kanas, Salnitskiy, Grund, et al., 2001).

European Space Agency, in cooperation with *NASA*, aimed at this stage to harmonize the psychological monitoring tools applied in flight (electronic diaries, short cognitive batteries, sleep monitoring, adaptation of protocols to multinational teams) and to develop countermeasures applicable in international missions (Harrison & Fiedler, 2011a).

Stage Three (2000 - present) is marked by the interest in establishing permanent bases on the Moon, and further, in the flight to the planet Mars (Barger et al., 2012; Bell, 2023; Shengjun, 2024; Smith, 2024). To get an idea of the current orientations of space psychology research, we turned to *Scispace AI Agent* (<https://scispace.com/>). For the period 2020-2025, it found 83 scientific articles on "space psychology" published in scientific journals, which can be grouped into seven thematic clusters:

- Mental health and psychological well-being: 27 articles (32.5%).
- Countermeasures and technological interventions: 19 articles (22.9%).
- Neurobiology and physiological mechanisms: 14 articles (16.9%).
- Future preparation, nursing, and support services: 12 articles (14.5%).
- Isolation, confinement, and analogue environments (ICE): 6 articles (7.2%).
- Sleep and circadian rhythms: 3 articles (3.6%).
- Team dynamics and communication: 2 articles (2.4%).

As can be seen, the first two clusters, mental health, well-being and psychological protection of the crews in long-term space travel, accumulate the majority of published studies (55.4%)

5. Pre-launch and in-flight psychological support

In the first half of 1981, after three years of complex training, the two Romanian cosmonaut candidates entered the phase prior to spaceflight. In this last stage, we record three types of contributions of Romanian psychologists: support for carrying out the psychological experiment in space, assistance in the launch phase, ensuring a comforting environment during the flight.

As for the operative support for carrying out the psychological experiment, it was provided by Valeriu Ceașu in two forms: firstly, by prior training, in the USSR, on the procedures of the experiment, and secondly, by being present in the Flight Control Center, for its entire duration, for operational support. However, as he mentions (1985b), everything worked according to plan, and he didn't have to intervene.

The assistance in the period prior to the flight was not provided by a psychologist, but by the crew doctor on the Romanian side, a position for which Lt. Col. Dr. Vasile Teodorescu was appointed. At the time, he was a member of the psychology laboratory team, with psychophysiological evaluation attributions. In his account of his experience as a crew doctor, Teodorescu (1985) affirms, on the one hand, the importance of the psychological component of the interaction with the crew, and on the other hand, the advantage that the experience of working in the psychology laboratory gave him. This capacity put him in contact with the candidates since the selection phase.

His job began on April 23, 1981, when he participated in an information meeting in the *Cosmonauts' Town* (or *Star Town* – a closed-regime locality, where cosmonauts live and prepare space flights). On this occasion, it was announced that the training of the crews was over, and the two Romanian candidates obtained the qualification "excellent". From April 27 the activity moved to the *Baikonur*

Cosmodrome, where he spent most of his time with the two cosmonauts. Beyond the current problems of preparing for flight, he evokes the most sensitive psychological problem felt by the two candidates: "*who will fly?*".

If during the preparation period in the country this problem was hypothetical and distant, and yet it was felt, we can imagine how acute it had become in those days, when there were about two weeks left until the launch. The tension was in the air, and the role of the crew doctor was to dissipate it as much as possible and shift the focus to the success of the missions, which was a common interest. Despite this situation, naturally, the two performed their tasks professionally, participating together in relaxation activities in their free time. The official confirmation of the crew chosen for the mission took place on May 12, just two days before the launch, and from this moment the crew doctor divided his attention, with different objectives, to each of the two. Despite the natural psychological impact, they still maintained a professional, goal-oriented attitude.

On the evening of May 14, 1981, Dumitru Prunariu, together with Leonid Popov, was in the cabin of the ship *Soyuz 40*. A little over four years had passed since the spring of 1977, when he had agreed to enter the selection process for an uncertain future flight into space. At 8.17 p.m. the launch started, and what followed became history. To ensure mental comfort during the space mission, the Romanian Television, in collaboration with Valeriu Ceașu, produced a program composed of fragments of approximately 20 minutes, recorded on videotapes. In total, around three hours of the program were provided, which had varied content. It should be noted that the program was recorded in color, and Ceașu (1985b) noted that he was well received by cosmonauts¹¹.

¹¹ At that time, the Romanian Television had not yet started broadcasting color. Daily color transmission only began in 1985

(http://www.tvr.ro/istoric-alb-negru-si-color_2223.html).



Figure 2. Dumitru Prunariu, preparing for a medical experiment, on the *Salyut 6* space station. On the left panel, the audio cassettes with the crew members' favorite music. (Source: D. Prunariu's personal archive)

Referring to this program, Prunariu remembers that they watched it only once, about 30 minutes. The cosmonauts preferred to listen to music from the audio cassettes brought by each one, depending on their personal preferences. An important advantage of ambient music was that it allowed you to continue activities, unlike video recordings that blocked attention on a screen. The officially established schedule provided 8 hours of activity, 8 hours of sleep, and 8 for administrative tasks and free time. However, for the full fulfillment of the scientific program, 12 hours a day were also worked. Under these conditions, the preferred entertainment was looking at the Earth through cabin porthole (Prunariu, personal communication, March 4, 2026).

International practice

During the pioneering space period, there was no explicit psychological monitoring during flight. Monitoring was limited to vital functions and basic medical telemetry (Harrison & Fiedler, 2011a). The study of group dynamics and tensions between crew and ground began with the *Skylab* and *Salyut* missions, and this involved the establishment of psychological monitoring of the crews.

Roscosmos set up a *psychological support group* since the '70s, which actively

supervised the compatibility and morale of the crews. For this, spectral voice analysis was used to detect emotional stress during radio communications (Gushin et al., 1998). A common practice, which has been imposed over time, consists of the so-called "countermeasures", materialized in the sending of favorite foods, surprise gifts from the family, and music, through resupply vehicles, to combat "space asthenia". Such a role played the mission itself *Soyuz-40* of Popov and Prunariu, for the crew *Saliut 6*, which had been in space for more than 60 days at the time. From the perspective of long-haul flights, *Roscosmos* is considering a complex psychological support program (Gushin et al., 2021; Rozanov et al., 2022)

For *NASA*, "the strike on *Skylab*", which I mentioned earlier, was a turning point in terms of managing relations with flight crews. The incident was the result of the accumulation of stressors generated by poor mission management (Bor & Hubbard, 2006; Stuster, 2010):

- *Unrealistic time scheduling*. Planners on the ground had programmed almost every minute of the astronauts, using unrealistic time estimates for complex tasks.
- *Treating astronauts as "robots"*. The control center in Houston had eliminated any relaxation period

from the program, shortened meal times and those needed to prepare for experiments.

- *Prohibition of recreational activities.* Astronauts were initially forbidden to spend time looking out the window at Earth or the Sun, their favourite relaxation activities.
- *Physical and mental exhaustion:* The crew sacrificed the first three days of planned rest to try to make up for the delays in the program, reaching a state of extreme fatigue and low morale.
- *Lack of empathy from the ground crew:* Astronauts began to perceive the Control Center as lacking support and empathy for the real difficulties on board.

Following this event, NASA learned several important lessons:

- *Recognizing the importance of leisure:* Rest periods and free time are essential for the success of long-term missions.
- *Introduction of the "Task List":* All activities that did not strictly depend on the station's orbital position were taken out of the rigid minute-by-minute schedule and placed on a flexible list, which astronauts could manage according to their condition.
- *Increased autonomy:* It was decided to give astronauts greater freedom to schedule their own activities, recognizing that the fast, sustained pace of short missions cannot be maintained in long-duration missions.
- *Mediation sessions ("Bull Sessions"):* To resolve tensions, discussions were held between the crew and the ground, a procedure that became a model for managing disputes.
- *Changing the paradigm of selection and training:* The incident demonstrated that selection based only on individual resilience is not sufficient for long missions, and an assessment of flexibility and group dynamics is also necessary.

Currently, *NASA* is implementing a computerized and structured crew monitoring system. On *ISS*, astronauts are required to participate in private audio-video discussions (15-20 minutes) with an operational psychologist every two weeks (Kanas, 2015). Monitoring is also practiced through *WinSCAT* (*Spaceflight Cognitive Assessment Tool*), a battery of computerized tests that measure memory and attention to detect cognitive fatigue (Powell, 2001). In the spirit of the concept of behavioral health, social support is practiced, which consists of weekly family conferences and, more recently, access to mobile phones for private communication with the Earth (Landon et al., 2021). In orbital missions, counseling sessions, crisis intervention or even short intervention psychotherapy are organized, through private audio-video connections. For interplanetary flights, intervention guides are developed, and at least one crew member is trained to recognize severe problems and intervene appropriately (Kanas & Manzey, 2008).

The European Space Agency focuses on the supervision of multicultural and linguistic factors in multinational missions. It is monitored how the styles of *leadership* (directive vs. participatory) influences cohesion (Sandal & Leon, 2011). Under the Chinese space program, psychologists are monitoring the impact of long-term weightlessness on memory and sensory information processing (Shengjun, 2024)

6. Conclusions

Dumitru Prunariu's Space Flight was a unique opportunity for Romanian psychology to participate in a scientific project of historical scope. The Psychology Laboratory of the *CAM*, led by Valeriu Ceașu, was involved in this project for its entire duration, between April 1977 and May 1981. The ways of involvement described in this article are, in principle, similar to international practice at the time, from selection to psychological research during the flight.

The pattern of our contribution was similar to the *Interkosmos* model. To what extent we can talk about the importance of this

contribution to the finality of the program is a subject of debate. There is no question that credit should be given primarily to the long years of specialized training in the USSR, which was at the time one of the world's two space powers. Without overestimating our role, I am convinced that Romanian psychologists were nevertheless part of the success of this flight. In a period of one year, from April 1977 to March 1978, Romania selected, including psychologically, five cosmonaut candidates, whom it went through a basic training program. Three of them passed the selection tests in the USSR. Two successfully completed an intense training program, which they graduated with a qualification of excellence, and one executed a mission in space without reproach.

Added to these is the development of a scientific psychology program, carried out in flight, developed in collaboration with technological research and higher education institutions in Romania. An additional argument, not to be neglected, is also the quality of Dumitru Prunariu's adaptation to the status of "the first Romanian to fly in space", as well as his subsequent professional career. All of them undoubtedly confirmed the intellectual and personality qualities for which he was admitted to the group of five candidates who began the race for space in 1977.

During the training period in the country, two important officials, who came on control and information visits to group *K*, evoked optimistic prospects regarding Romania's future participation in space flights. In August 1977, in Poiana Braşov, a senior officer from the military aviation management evoked the prospect of associating ourselves with the American space program! A few months later, in November, in Bacău, the head of a space research organization announced that by 1990 a few dozen Romanians would fly into space! Both situations created emulation among the candidates, but neither of these predictions came true.

It's been 45 years since then. Dumitru Prunariu remains the first and, for now, the only Romanian cosmonaut. The flight of another Romanian into space does not have a

predictable perspective. Until it happens again, we are left with the satisfaction of having made an honorable contribution to this event.

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RESEARCH ARTICLE

Workplace ostracism, organization-based self-esteem, and employee voice in a participative climate: A moderated mediation model

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Abstract

This study examines the relationship between workplace ostracism and employee voice by testing a moderated mediation model grounded in conservation of resources and self-determination theories. Specifically, it investigates whether organization-based self-esteem (OBSE) mediates the relationship between workplace ostracism and employee voice and whether this indirect relationship varies depending on perceived participative climate. Data were collected from Turkish white-collar employees ($N = 291$). The findings indicate that workplace ostracism is negatively related to employee voice and that OBSE fully mediates this relationship. A perceived participative climate moderates the relationship between workplace ostracism and OBSE, such that the negative relationship is weaker when the perceived participative climate is higher. In addition, the indirect relationship between workplace ostracism and employee voice through OBSE becomes weaker as perceived participative climate increases, supporting a moderated mediation model. These findings suggest that workplace ostracism may undermine employee voice by reducing OBSE, while a perceived participative climate can buffer this negative indirect process.

Keywords

Workplace ostracism, employee voice, organization-based self-esteem, OBSE, perceived participative climate.

Modern workplaces are dynamic social systems in which employees experience a wide range of interpersonal interactions, both positive and negative. Within this context, workplace ostracism has emerged as a common psychosocial stressor (Ferris et al., 2008; O'Reilly et al., 2015; Robinson et al., 2013). Workplace ostracism refers to an individual's or group's omission to take socially appropriate actions that would engage another organizational member (Robinson et

al., 2013). Experiencing ostracism is widely described as a psychologically painful experience, as social exclusion threatens individuals' sense of connection (Eisenberger, 2012; Peng & Zeng, 2017). Workplace ostracism appears to be relatively widespread in organizational settings. In a study of 1,300 full-time working adults, 71% reported experiencing some degree of workplace ostracism during the previous six months (O'Reilly et al., 2015). A systematic review of

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89 studies indicated that workplace ostracism is associated with increased destructive behaviors and reduced constructive behaviors (Sharma & Dhar, 2022).

Ostracism may contribute to psychological strain. Research indicates that it is associated with suicidal (Chen et al., 2020) and death-related thoughts (Yaakobi, 2018). Besides psychological problems and personal distress, ostracism may also undermine work-related outcomes. Chung & Yang (2017) reported negative relationships between ostracism and helping, voicing, and in-role behaviors and showed that these relationships were mediated by organization-based self-esteem. Prior research also links workplace ostracism to less favorable work attitudes and behaviors, including lower belongingness and greater withdrawal-related outcomes (O'Reilly et al., 2015) and reduced knowledge sharing (Takhsha et al., 2020), as well as higher counterproductive work behaviors (Fatima, 2016; Yang & Treadway, 2018; Zhao et al., 2013).

Employee voice broadly refers to employees' opportunity to have a say and express views regarding work-related and organizational matters, which potentially contribute to both individual and organizational improvement (Wilkinson & Fay, 2011). Negative interpersonal dynamics, such as workplace ostracism, can reduce employees' willingness to voice (Deniz & Çimen, 2024; Wu et al., 2019). Supportive coworker relationships have been shown to encourage voice climate and support employee voice (Liang & Tang, 2010). In contrast, ostracism may undermine the interpersonal and psychological conditions that typically support speaking up, and it has been linked to lower employee voice (Chung & Yang, 2017; Deniz & Çimen, 2024; Wu et al., 2019).

OBSE is defined as employees' perception of being important, worthwhile, valued, and capable in the organization (Pierce et al., 1989), and it plays an important role in linking workplace ostracism to employee voice. Chung and Yang (2017) found that workplace ostracism was negatively related to OBSE and that OBSE was positively related to voice. From a conservation of resources (COR) perspective (Hobfoll, 1989), ostracism can be

viewed as a signal of threatened or lost valued resources, such as respect and belonging, which may undermine OBSE. Accordingly, experiencing ostracism at work may lead employees to avoid discretionary and voluntary behaviors to conserve valued resources.

The consequences of ostracism may vary depending on contextual factors. A participative climate, employees' shared perception that management invites input such as new suggestions, opinions, and even dissenting views (Huang et al., 2005), may serve as a contextual buffer. Drawing on COR theory (Hobfoll, 1989), workplace ostracism can be viewed as a signal of resource loss that may lower OBSE and, in turn, reduce employee voice. In line with self-determination theory (SDT) (Deci & Ryan, 2000), a participative climate is likely to provide greater support for employees' needs for autonomy, relatedness, and competence, which may help protect OBSE under conditions of threat and, in turn, weaken the indirect association between workplace ostracism and employee voice.

This study examines the mediating role of OBSE in the relationship between workplace ostracism and employee voice and tests whether perceived participative climate weakens the negative relationship between workplace ostracism and OBSE. Thus, the indirect association between workplace ostracism and employee voice through OBSE is expected to be stronger in a less participative climate and weaker in a more participative one. From the perspectives of SDT (Deci & Ryan, 2000) and COR theory (Hobfoll, 1989), a participative climate may weaken the negative effects of ostracism by supporting employees' psychological needs and preserving important social resources. In this way, it may help protect OBSE and sustain employee voice.

Theoretical background

Relationships between workplace ostracism, organization-based self-esteem, and employee voice

Workplace ostracism is defined as employees' perceived social exclusion by others in their work environment (Ferris et al., 2008). Typical workplace ostracism includes behaviors such as ignoring greetings, avoiding eye contact, leaving the area when the person arrives, excluding them from conversations, or treating them as if they were absent (Ferris et al., 2008). Research suggests that workplace ostracism is negatively associated with employees' psychological well-being and work-related processes (Ferris et al., 2008). It is also associated with lower belonging, job satisfaction (O'Reilly et al., 2015), knowledge sharing (Takhsha et al., 2020), and higher counterproductive behaviors (Yang & Treadway, 2018). Feeling excluded in the workplace is negatively related to constructive behaviors such as voicing (Chung & Yang, 2017; Deniz & Çimen, 2024; Wu et al., 2018, 2019).

Employee voice refers to promotive behavior that involves expressing constructive suggestions, concerns, or ideas intended to improve work-related practices and organizational functioning (Van Dyne & LePine, 1998). Employee voice is important for organizations because it is typically voluntary, discretionary, and aimed at supporting positive change for the organization or its stakeholders (Morrison, 2023).

A variety of individual factors, including personality traits, as well as job and organizational factors, have been identified as predictors of employee voice (Chamberlin et al., 2017). Prior research indicates that perceived support is associated with higher levels of employee voice in organizations (Chamberlin et al., 2017; Xie et al., 2015). In particular, coworker support can foster employees' felt responsibility to make constructive change, which is associated with higher promotive voice (Xie et al., 2015). In contrast, negative social interactions, such as workplace ostracism, are associated with

lower willingness to speak up (Deniz & Çimen, 2024; Wu et al., 2019). Workplace ostracism may lower employees' perceived relational value and threaten their self-esteem (Peng & Zeng, 2017). Employees who feel excluded may become less likely to share opinions or concerns, as perceived ostracism damages their sense of belonging and self-esteem (Chung & Yang, 2017; O'Reilly et al., 2015).

OBSE is the extent to which organizational members believe that they can satisfy their personal needs through participation in organizational roles (Pierce et al., 1989). OBSE extends the concept of self-esteem into the workplace, reflecting employees' perceived worth and competence as members of the organization (Bowling et al., 2010). Pierce and Gardner (2004) grouped antecedents of OBSE as individual traits and work and organizational experiences. Among individual factors, global self-esteem has been one of the most consistently observed correlates of OBSE. In terms of work and organizational experiences, organizational structures, job conditions, and management practices that provide opportunities for self-control, self-direction, and participation are positively associated with OBSE. Similarly, organizational signals that make employees feel valued and competent, including trust, organizational support, fair procedures and outcomes, pay level, a sense of ownership, and success-building role conditions such as performance support, security, and role clarity, are positively related to OBSE.

Studies indicate that higher OBSE has been associated with desirable outcomes such as job performance, job satisfaction, and organizational commitment (Bowling et al., 2010; Pierce et al., 1989). However, negative social experiences such as ostracism may undermine OBSE and thereby limit these advantages. Sharp et al. (2020) found that perceived exclusion was associated with lower OBSE. Similarly, Penhaligon et al. (2013) showed perceived rejection was related to lower OBSE and higher depressive symptoms among employees exposed to workgroup mistreatment.

COR theory (Hobfoll, 1989) proposes that people seek to acquire, retain, and protect

valued resources, which may include personal and social resources such as social support, status, and self-esteem. In line with COR, workplace ostracism can be conceptualized as a resource-loss threat that may deplete socio-emotional resources and increase perceptions of loss, which can contribute to psychological strain and lower engagement in voluntary, constructive behaviors. Accordingly, ostracism may undermine OBSE and, in turn, reduce employee voice.

OBSE is likely to support employees' sense of value and competence at work, which may encourage constructive contributions such as suggestions, sharing opinions, and voicing concerns. Research suggests that OBSE can serve as a pathway between workplace experiences and employee outcomes. Su et al. (2021) showed that OBSE partially mediates the relationship between developmental feedback and promotive and prohibitive voice. Chung and Yang (2017) found that OBSE mediated the relationships between workplace ostracism and several workplace behaviors. Similarly, Norman et al. (2015) reported indirect effects through OBSE from managerial roles to outcomes such as organizational commitment, job satisfaction, and intentions related to absence and quitting. Kim and Beehr (2018) also reported indirect effects through OBSE linking empowering leadership to behavioral outcomes, including organizational citizenship behaviors and deviant behaviors. A meta-analysis further provided evidence that OBSE mediates the relationship between workplace ostracism and outcomes such as job satisfaction, performance, and organizational commitment (Li et al., 2021). Choi (2016) found that OBSE mediates the relationship between abusive supervision and employee voice. These studies suggest that OBSE helps explain how workplace experiences shape employee outcomes. Integrating theoretical and empirical findings, the following hypothesis is offered:

H₁: *OBSE mediates the relationship between workplace ostracism and employee voice.*

The Moderating Role of Perceived Participative Climate

A participative climate describes employees' shared perception that management encourages the expression of new ideas and even opposing views (Huang et al., 2005). A participative climate reflects broader managerial, structural, and climate conditions that support employee involvement and participation across organizational levels in decision-making, work planning, and problem-solving (Tesluk et al., 1999). Evidence suggests that a stronger participative climate is associated with lower opinion withholding across work contexts (Huang et al., 2005). As a contextual factor, participative climates can enable or constrain the behavioral impact of interpersonal experiences.

Workplace ostracism can signal resource loss and frustrate relatedness, depleting socio-emotional resources and thereby reducing discretionary behaviors such as voicing. However, contextual conditions may buffer these resource losses. Drawing on SDT (Deci & Ryan, 2000), a participative climate is expected to support employees' autonomy, competence, and relatedness needs at work, thereby protecting OBSE when resources are threatened by ostracism.

Huang et al.'s (2005) study, based on the data from various countries, indicated that participation-supportive practices are associated with lower opinion withholding, signaling greater employee voice. Luo et al. (2022) found that an inclusive climate mitigates the adverse effect of workplace ostracism on basic psychological needs, consistent with the idea that supportive workplace climates may buffer the negative effects of ostracism. By encouraging speaking up and being involved in group discussions (Lee et al., 2014), a strong participative climate may therefore mitigate the negative association between workplace ostracism and OBSE. Thus:

H₂: *Perceived participative climate moderates the relationship between workplace ostracism and OBSE; the negative relationship between workplace ostracism and OBSE is weaker when the perceived participative climate is high.*

Moderated Mediation Model

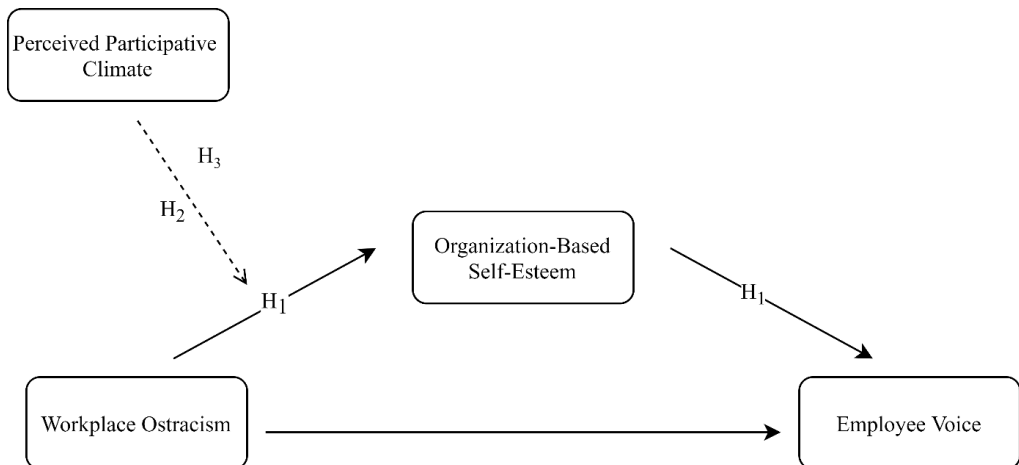
From a COR perspective (Hobfoll, 1989), workplace ostracism can signal resource loss, which may undermine OBSE and, in turn, reduce employee voice. SDT (Deci & Ryan, 2000) further suggests that a participative climate can support basic psychological needs, helping to maintain OBSE under threat. Accordingly, the negative indirect association between workplace ostracism and employee voice via OBSE is expected to be weaker at higher levels of perceived participative climate.

Research indicates that participative decision-making can promote trust in leadership, which is associated with upward voice (Silla et al., 2020). Therefore, a

participative climate may help protect OBSE by indicating that employees' input is valued and that they are competent organizational members, even when they experience exclusion. Consequently, a participative climate is expected to weaken the indirect negative association between workplace ostracism and employee voice through OBSE.

H₃: *Perceived participative climate moderates the indirect relationship between workplace ostracism and employee voice through OBSE; the negative indirect effect is weaker when the perceived participative climate is high than when it is low.*

Figure 1 provides an overview of the research model.



Note. H₁ denotes mediation, H₂ denotes first-stage moderation, and H₃ denotes moderated mediation.

Figure 1. Research Model

Method

Data were collected from Turkish white-collar employees using convenience sampling. White-collar employees were selected because their work context typically involves formal structures, hierarchy, performance pressure, and interpersonal dynamics that may make workplace ostracism relevant (O'Reilly et al., 2015). Participants came from various sectors, including finance, logistics, and technology, and they were reached through professional networks and online platforms.

Participants and Procedure

Ethical approval for this study was obtained, and all participants provided informed consent.

Participants had a mean age of 34.7 years (SD = 7.90), ranging from 21 to 61 years. The mean tenure with the current employer was 5.7 years (SD = 5.21), and the mean total experience was 11.6 years (SD = 8.06). 57% of respondents were female, and 43% were male. Most participants held a bachelor's

degree (55.7%), followed by master’s degrees (16.5%), associate degrees (14.1%), high school diplomas (9.3%), and doctoral degrees (4.4%). Respondents came from organizations of all sizes, though roughly two-thirds worked in firms with fewer than 250 employees (1–9: 15.1%; 10–49: 27.8%; 50–249: 23.4%). Large organizations were also represented (250–499: 9.3%; 500–999: 8.2%; 1000+: 16.2%). The demographic distribution of participants is presented in Table 1.

Table 1. *Participant Demographics (N = 291)*

Characteristi	Frequency	%	Characteristics	Frequency	%
cs					
<i>Gender</i>			<i>No. of employees</i>		
Female	166	57.0	1-9	44	15.1
Male	125	43.0	10-49	81	27.8
<i>Age</i>			50-249	68	23.4
21-25	28	9.6	250-499	27	9.3
26-30	80	27.4	500-999	24	8.2
31-35	66	22.7	1000+	47	16.2
36-40	47	16.2	<i>Current Employer Tenure (Years)</i>		
41+	70	24.1	1-4	157	54
<i>Education</i>			5-9	81	27.8
High School	27	9.3	10+	53	18.2
Associate	41	14.1	<i>Total Work Tenure (Years)</i>		
Bachelor’s	162	55.7	1-4	49	16.8
Master’s	48	16.5	5-9	86	29.6
Doctorate	13	4.4	10-14	65	22.3
			15+	91	31.3

Measures

Workplace ostracism was assessed by the Workplace Ostracism Scale, consisting of 10 items developed by Ferris et al. (2008) and adapted to Turkish by Karakiraz et al. (2023). OBSE was measured by the 10-item scale developed by Pierce et al. (1989), and the Turkish adaptation was conducted by Akalın (2006). Employee voice was measured by the 6-item scale developed by Van Dyne and LePine (1998), and adaptation to Turkish was carried out by Arslan and Yener (2016). Perceived participative climate was assessed

with four items proposed by Huang et al. (2005). Items were translated into Turkish using forward-back translation. Two bilingual researchers translated the items, and a separate bilingual researcher back-translated them. Discrepancies were discussed, and minor edits were made after asking for clarity from 10 graduate students.

All items were scored on a five-point Likert scale, and no items were reverse-coded.

Results
Descriptive Statistics, Validity, Reliability, and Correlations

The psychometric quality of the measures and the correlations among the variables were tested before hypothesis testing. Descriptive statistics, internal consistency coefficients, distributional diagnostics, and bivariate correlations were computed using IBM SPSS Statistics 25. Composite reliability and average variance extracted were calculated from the CFA loadings. CFAs were conducted in IBM SPSS AMOS 24. The results are reported in Table 2.

The measures showed satisfactory psychometric properties. Cronbach’s alpha and composite reliability values ranged from .84 to .93, indicating strong internal

consistency (Hair et al., 2022; Nunnally & Bernstein, 1994). AVE values ranged from .57 to .59, and exceeded the recommended .50 threshold, and supported convergent validity (Fornell & Larcker, 1981). Distributional indices were within acceptable ranges (skewness $- .86$ to 1.09 ; kurtosis $- .08$ to $.95$), suggesting no serious departures from normality (George & Mallery, 2010).

Workplace ostracism was negatively correlated with OBSE ($r = -.50$), employee voice ($r = -.23$), and perceived participative climate ($r = -.36$), whereas OBSE was positively correlated with employee voice ($r = .55$) and perceived participative climate ($r = .71$), and employee voice was positively correlated with perceived participative climate ($r = .47$).

Table 2. *Descriptive Statistics, Reliability, and Correlations*

	M	SD	α	CR	AVE	Skewness	Kurtosis	1	2	3
1. WPO	1.66	.66	.93	.93	.59	1.09	.63			
2. OBSE	4.24	.63	.93	.93	.57	-.86	.95	-.50**		
3. EV	3.91	.67	.89	.89	.58	-.56	-.08	-.23**	.55**	
4. PPC	3.71	.80	.84	.84	.58	-.70	.39	-.36**	.71**	.47**

Note. M: Mean; SD: Standard Deviation; α : Cronbach’s Alpha; CR: Composite Reliability; AVE: Average Variance Extracted; WPO: Workplace Ostracism; OBSE: Organization-Based Self-Esteem; EV: Employee Voice; PPC: Perceived Participative Climate. Two-tailed significance: ** $p < .01$.

The heterotrait–monotrait ratio of correlations (HTMT) was used to assess discriminant validity. HTMT values ranged from .25 to .79, below the more conservative

.85 threshold, supporting discriminant validity among study variables (Henseler et al., 2015). HTMT ratios are presented in Table 3.

Table 3. *HTMT Ratios for Discriminant Validity*

	WPO	OBSE	PPC
OBSE	.524		
PPC	.406	.794	
EV	.252	.611	.543

Note. WPO: Workplace Ostracism; OBSE: Organization-Based Self-Esteem; PPC: Perceived Participative Climate; EV: Employee Voice.

Measurement Model

The measurement model was evaluated by first testing the hypothesized model comprising four factors (WPO, OBSE, PPC,

EV) and then comparing it with three, two, and one-factor alternatives. Measured fit indices are presented in Table 4.

Table 4. *Confirmatory Factor Analyses of Alternative Models*

	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR
4 Factor Model (WPO, OBSE, PPC, EV)	827.333	398	2.079	.92	.92	.06	.06
3 Factor Model WPO, OBSE+PPC, EV	966.499	401	2.410	.90	.89	.07	.06
3 Factor Model (WPO+OBSE, PPC, EV)	2015.839	401	5.027	.73	.70	.12	.12
2 Factor Model (WPO+OBSE, PPC+EV)	2388.221	403	5.926	.67	.64	.13	.14
2 Factor Model (WPO+OBSE+PPC, EV)	2203.816	403	5.469	.70	.67	.12	.13
1 Factor (WPO+OBSE+PPC+EV)	2879.026	404	7.126	.58	.55	.14	.17

Note. χ^2 : chi-square; df: degrees of freedom; CFI: Comparative Fit Index; TLI: Tucker–Lewis Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual; WPO: Workplace Ostracism; OBSE: Organization-Based Self-Esteem; PPC: Perceived Participative Climate; EV: Employee Voice.

The comparisons reported in Table 4 suggest that the four-factor model showed the best fit among the tested alternative models ($\chi^2 = 827.333$, $df = 398$, $\chi^2/df = 2.079$, CFI = .92, TLI = .92, RMSEA = .06, SRMR = .06) and met commonly used fit criteria (Hu & Bentler, 1999; Kline, 1998), supporting the distinctiveness of the four constructs.

Common method variance was assessed using Harman's single-factor test (Podsakoff et al., 2003). Test results showed that the first

factor explained 38.242% of the total variance, which is below the commonly used threshold of 50%, suggesting that common method bias is unlikely to be a serious concern in this study.

Lastly, multicollinearity was assessed for the predictors included in the first-stage moderation model using mean-centered predictors and their interaction term. Multicollinearity diagnostics are reported in Table 5.

Table 5. *Collinearity Statistics*

Predictors	Tolerance	VIF
WPO	.851	1.174
PPC	.862	1.159
WPOxPPC	.962	1.040

Note. WPO: Workplace Ostracism, PPC: Perceived Participative Climate.

Multicollinearity is commonly considered a concern when tolerance values fall below .20, particularly below .10 (Menard, 2002), and VIF values exceed 10 (Hair et al., 2006). The results suggested no multicollinearity concerns, as the highest VIF value was 1.17 and all tolerance values were .85 or higher.

Hypothesis Testing

The hypotheses were tested using the PROCESS macro for SPSS (Hayes, 2022) through mediation, first-stage moderation, and moderated mediation analyses. For the mediation analysis, Model 4 was used to examine the total, direct, and indirect effects of workplace ostracism on employee voice via OBSE. First-stage moderation was then tested using Model 1 by including the workplace ostracism $\times$ perceived participative climate interaction term in the prediction of OBSE and examining the change in explained variance (ΔR^2). Finally, moderated mediation was tested using Model 7 by reporting conditional indirect effects at low, mean, and high levels of perceived participative climate, together with the index of moderated mediation (Hayes, 2015, 2022). Workplace ostracism and perceived participative climate were mean-centered before creating the interaction term. Statistical significance was tested using p-values and bootstrap confidence intervals (CIs). The results are presented in Table 6.

Results from Model 4 showed that workplace ostracism was negatively associated with OBSE ($b = -0.475$, $SE = 0.048$, $t = -9.824$, $p < .001$, 95% CI $[-0.570, -0.380]$), and OBSE was positively associated with employee voice ($b = 0.623$, $SE = 0.061$, $t = 10.276$, $p < .001$, 95% CI $[0.504, 0.743]$). The total effect of workplace ostracism on employee voice was negative and significant ($c = -0.235$, $SE = 0.058$, $t = -4.033$, $p < .001$, 95% CI $[-0.349, -0.120]$). However, the direct effect became insignificant when OBSE was included ($c' = 0.061$, $SE = 0.058$, $t = 1.066$,

$p = .287$, 95% CI $[-0.052, 0.175]$), while the indirect effect through OBSE was significant ($ab = -0.296$, $BootSE = 0.046$, 95% CI $[-0.392, -0.216]$), suggesting an indirect association and supporting H_1 .

Model 1 results indicated a significant first-stage moderation. The workplace ostracism $\times$ perceived participative climate interaction positively predicted OBSE ($b = 0.125$, $SE = 0.051$, $t = 2.466$, $p = .014$, 95% CI $[0.025, 0.224]$). The interaction term explained an additional 0.9% of the variance in OBSE, $\Delta R^2 = .009$, $F(1, 287) = 6.078$, $p = .014$. This result indicates that the negative association between workplace ostracism and OBSE became weaker at higher levels of perceived participative climate. Accordingly, H_2 was supported.

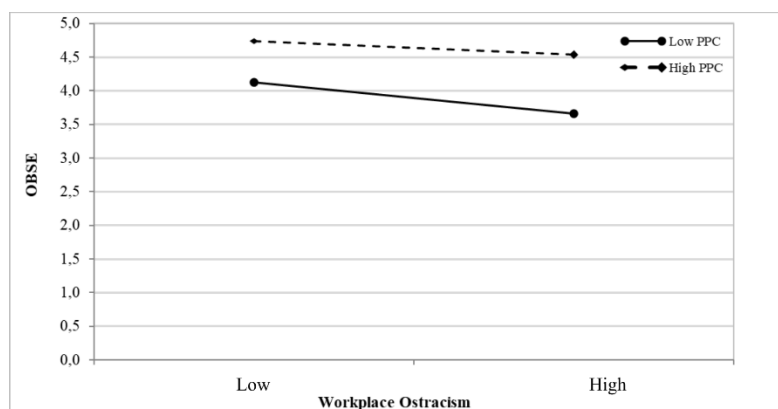
Finally, Model 7 showed that the conditional indirect effect of workplace ostracism on employee voice through OBSE varied across levels of perceived participative climate. The indirect effect was stronger at lower levels of perceived participative climate (effect = -0.217 , $BootSE = 0.044$, 95% CI $[-0.310, -0.137]$) and weaker at higher levels of perceived participative climate (effect = -0.095 , $BootSE = 0.038$, 95% CI $[-0.176, -0.026]$). The index of moderated mediation was significant (index = 0.078 , $BootSE = 0.036$, 95% CI $[0.009, 0.150]$), indicating that a higher level of perceived participative climate weakened the negative indirect effect of workplace ostracism on employee voice through OBSE. Thus, H_3 was supported.

These findings are illustrated in Figures 2 and 3. Figure 2 presents the simple slopes for the workplace ostracism $\times$ perceived participative climate interaction predicting OBSE, and Figure 3 shows the conditional indirect effect of workplace ostracism on employee voice through OBSE at low, mean, and high levels of perceived participative climate with 95% bootstrap confidence intervals.

Table 6. *Direct, Indirect, Moderation, and Moderated Mediation Effects*

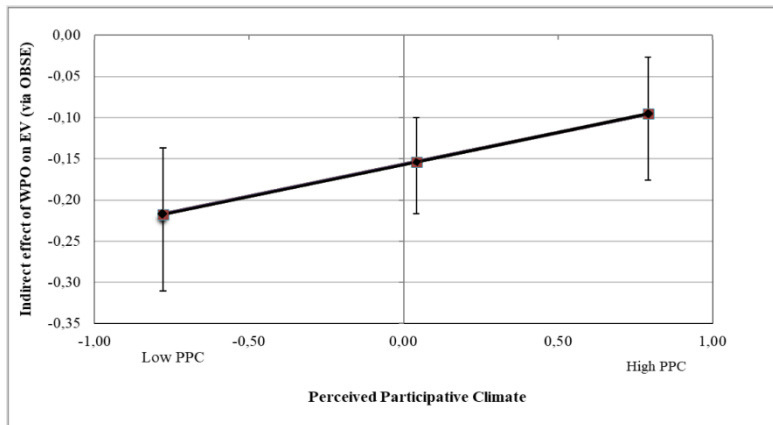
Effect	Estimate	SE / BootSE	t	p	95% CI
<i>H1. Mediation Results (Model 4)</i>					
WPO → OBSE (a)	-0.4752	0.0484	-9.8237	< .001	[-0.5704, -0.3800]
OBSE → EV (b)	0.6234	0.0607	10.2761	< .001	[0.5040, 0.7429]
WPO → EV (total, c)	-0.2348	0.0582	-4.0331	< .001	[-0.3494, -0.1202]
WPO → EV (direct, c')	0.0614	0.0576	1.0663	.287	[-0.0520, 0.1749]
WPO → OBSE → EV (indirect effect, ab)	-0.2963	0.0455	-	-	[-0.3919, -0.2159]
<i>H2. First-Stage Moderation Results (Model 1)</i>					
WPO → OBSE	-0.2515	0.0393	-6.4022	< .001	[-0.3288, -0.1742]
PPC → OBSE	0.4708	0.0322	14.6358	< .001	[0.4075, 0.5341]
WPO × PPC → OBSE (a3)	0.1248	0.0506	2.4655	.014	[0.0252, 0.2244]
<i>H3. Moderated Mediation Results (Model 7)</i>					
Cond. indirect effect at low PPC (-0.7786)	-0.2174	0.0441	-	-	[-0.3102, -0.1370]
Cond. indirect effect at mean PPC (0.0414)	-0.1536	0.0296	-	-	[-0.2167, -0.1002]
Cond. indirect effect at high PPC (0.7914)	-0.0952	0.0377	-	-	[-0.1758, -0.0263]
Moderated Mediation Index	0.0778	0.0360	-	-	[0.0086, 0.1498]

Note. Coefficients are reported as unstandardized estimates (b). Bootstrap standard errors and bootstrap confidence intervals are reported for the indirect effect, conditional indirect effects, and the index of moderated mediation, based on 5,000 bootstrap samples and 95% confidence intervals. Predictors involved in the interaction term were mean-centered prior to analysis. WPO: Workplace Ostracism; OBSE: Organization-Based Self-Esteem; PPC: Perceived Participative Climate; EV: Employee Voice; Cond.: Conditional.



Note. OBSE: Organization-based self-esteem; PPC: Perceived participative climate. The lines depict the association between workplace ostracism and OBSE at low and high levels of perceived participative climate.

Figure 2. Interaction Effect of Workplace Ostracism and Perceived Participative Climate on OBSE



Note. WPO: Workplace ostracism; OBSE: Organization-based self-esteem; PPC: Perceived participative climate; EV: Employee voice. Points show the conditional indirect effect at low, mean, and high levels of perceived participative climate; error bars represent 95% bootstrap confidence intervals.

Figure 3. Conditional Indirect Effect Across Levels of Perceived Participative Climate

Discussion

This study aimed to examine the association between workplace ostracism and employee voice through OBSE and to investigate the moderator role of perceived participative climate in this indirect relationship. The mediation findings indicate that workplace ostracism is negatively associated with OBSE, that OBSE is positively associated with employee voice, and that the direct association between workplace ostracism and employee voice becomes insignificant when OBSE is included in the model. Grounded in COR theory (Hobfoll, 1989), perceived exclusion due to ostracism can be viewed as a social stressor that threatens valued resources such as self-esteem, status, and social support, which may undermine OBSE and, in turn, lower employees' engagement in voice behavior. Prior research indicates that ostracism is associated with poorer employee well-being and other negative work-related outcomes (Ferris et al., 2008; Li et al., 2021) and is associated with serious mental health risks (Chen et al., 2020; Yaakobi, 2018). Workplace ostracism has also been shown to relate to reduced employee voice and other constructive behaviors (Chung & Yang, 2017; Wu et al., 2019). The mediation findings are consistent with prior evidence demonstrating

that OBSE functions as a path between social interactions at work and constructive behaviors, including voice (Chung & Yang, 2017; Li et al., 2021; Su et al., 2021).

Drawing on SDT (Deci & Ryan, 2000), this study examined perceived participative climate as a contextual mechanism that may support employees' basic psychological needs when they experience exclusion. The findings indicate that a perceived participative climate buffers the negative relationship between workplace ostracism and OBSE. That is, the negative association between workplace ostracism and OBSE was weaker at higher levels of perceived participative climate. These findings are also consistent with Luo et al. (2022), who reported that an inclusive climate can weaken the negative effect of workplace ostracism on basic psychological needs.

From a COR perspective, workplace ostracism can be viewed as a source of psychological resource loss that undermines OBSE and, in turn, employee voice. From an SDT perspective, a participative climate may help buffer this process by supporting employees' needs for autonomy, relatedness, and competence. Prior research indicates that participation mechanisms and participative climates are associated with greater employee

voice and lower opinion withholding (Huang et al., 2005; Silla et al., 2020). Building on this literature, the present study specifies OBSE as the mediating mechanism and perceived participative climate as a buffering moderator, indicating that the indirect association is weaker when the participative climate is higher. Accordingly, organizations may reduce self-worth losses associated with interpersonal exclusion by building climates that encourage employees' input and support voice through both formal and informal channels.

Workplace ostracism is reported widely across settings and is associated with poorer well-being (Ferris et al., 2008; Li et al., 2021), reduced sense of belonging (O'Reilly et al., 2015; Wu et al., 2018), lower voice (Wu et al., 2018, 2019), and increased counterproductive work behaviors (Fatima, 2016; Yang & Treadway, 2018; Zhao et al., 2013). Participative climates and participation mechanisms have been linked to lower opinion withholding (Huang et al., 2005), and participative decision-making can promote upward voice via trust in leadership (Silla et al., 2020). In line with the present findings, such a climate may help buffer the adverse effect of ostracism on OBSE. From the perspectives of COR (Hobfoll, 1989) and SDT (Deci & Ryan, 2000), participative practices may help reduce the negative effects of ostracism by preserving valued resources and supporting basic psychological needs, thereby helping employees maintain OBSE under threat and remain willing to speak up.

From a practical perspective, managers can strengthen participative practices and support employees' OBSE. In organizational contexts where participation practices and opportunities are limited, simple practices may help employees feel more comfortable sharing their ideas. Organizations can provide accessible channels for suggestions and concerns, clearly explain how employee input will be reviewed, and give a reasonable response timeline. Prior research shows that climates encouraging employee input are associated with higher employee voice and lower withholding (Huang et al., 2005; Silla et al., 2020). In addition, OBSE can be strengthened through organizational and managerial practices that support employees'

self-control and self-direction (Pierce & Gardner, 2004). Such practices may help employees feel capable, important, and valued, which can lead to more constructive behaviors and positive work attitudes (Chung & Yang, 2017; Liu et al., 2013; Norman et al., 2015; Su et al., 2021). From an SDT perspective, this idea is also supported by prior research showing that workplace ostracism can weaken employees' basic psychological needs and help explain its negative outcomes (Luo et al., 2022). Therefore, when organizations encourage participation and make employees feel recognized, employees may be more likely to maintain their sense of value and feel comfortable speaking up.

Organizations can support employee voice by reducing workplace ostracism, strengthening employees' OBSE, and creating a more participative climate. A useful first step may be to recognize and address everyday forms of exclusion within teams, such as ignoring, excluding, or withholding information from coworkers. Since the present findings and prior research (Chung & Yang, 2017) show that ostracism can weaken OBSE and reduce employee voice, organizations may benefit from practical actions such as training to raise awareness of exclusionary behaviors, setting clear team norms against exclusion, and implementing safe procedures for reporting interpersonal mistreatment. In addition, intervention efforts may focus on strengthening employees' sense of value and competence in the organization. Prior research indicates that developmental feedback and supportive leadership practices can enhance OBSE (Kim & Beehr, 2018; Su et al., 2021), suggesting that managers can be trained to provide constructive feedback, invite and recognize employee contributions, and respond to employee suggestions with respect and appreciation. Moreover, organizations can reinforce a participative climate by embedding opportunities for voice into work processes and by organizing regular consultation meetings, structured suggestion systems, and participative problem-solving practices, which may support a safer and more worthwhile work environment in which to speak up.

This study has several limitations. First, the study used a cross-sectional design based on self-reported data collected at a single time

point. Although the hypothesized moderated mediation model implies a theoretical causal sequence, the cross-sectional nature of the data limits strong causal inferences. Future studies could strengthen these insights by using multi-source and longitudinal designs. Second, the study relied on convenience sampling of Turkish white-collar employees, which may limit the generalizability of the findings beyond similar occupational and cultural contexts. Future research could extend this work by examining other work settings and employee groups. Third, although procedural remedies were used and common method variance was assessed through Harman's single-factor test (Podsakoff et al., 2003), some common method variance may still remain. Future research may reduce this concern by using multiple data sources and longitudinal designs. Fourth, participative climate was examined at the individual perception level. Future studies could establish within-group agreement and examine unit-level or cross-level effects. Fifth, although OBSE was identified as a key mediating mechanism, other psychological processes that are not included in this study model may also link workplace ostracism to employee voice. Finally, future studies could differentiate workplace ostracism by source, such as supervisor or coworker ostracism, and employee voice by form to better specify the nature of these relationships.

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RESEARCH ARTICLE

Power to perform or to delay? Job insecurity moderates the effects of empowering leadership on work procrastination

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Abstract

Past research suggested that empowering leadership may decrease work procrastination and highlighted perceived job insecurity as detrimental to employee attitudes and behaviors. The present cross-sectional study (N = 378 white-collar employees from Romania and the Republic of Moldova) examined the relationship between empowering leadership and workplace procrastination, and the moderating effects of perceived job security controlling for other leadership styles and work-related variables that were previously found to be linked with procrastination. The results of the multiple regression analysis indicated that the interaction between empowering leadership and perceived job security on workplace procrastination was significant. Simple slope analyses showed that the negative effect of empowering leadership on procrastination emerged only in employees with moderate job security. Oppositely, in those with low job security, empowering leadership was associated with higher procrastination. Finally, no significant association emerged between empowering leadership and procrastination in the high job security group. These findings extend current knowledge on the influences of empowering leadership by highlighting job security as a critical factor of the effects of this leadership style on work procrastination.

Keywords

work procrastination; empowering leadership; job insecurity; role ambiguity.

Introduction

Procrastination at work is defined as a self-regulatory failure to carry out an intended work task (Nguyen et al., 2013). In the present study, it is conceptualized as a negative and non-productive form of work-related activity.

Metin et al. (2016) developed the Procrastination at Work Scale (PAWS) to assess and examine specific forms of employee work behavior. Within this framework, procrastination at work refers to delaying work-related actions by engaging, either behaviorally or cognitively, in activities

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unrelated to work tasks, without the intention of harming the employer, colleagues, or clients. The authors distinguish between two main forms: soldiering and cyberslacking. Soldiering refers to avoiding work tasks through offline behaviors such as taking longer breaks or daydreaming, without intending to harm others or shift responsibilities onto colleagues. Cyberslacking, in contrast, involves using the internet or mobile devices for personal purposes during work hours, such as browsing social media or online shopping (Metin et al., 2016).

Procrastination at work affects both the organization and the employees, generating high costs (Nguyen et al., 2013), low quality of work caused by performing tasks in a hurry (Metin et al., 2018), decreased work performance and productivity (Metin et al., 2018). Employees who procrastinate at work, on the other hand, face high levels of stress (Wan et al., 2014), low job engagement (Metin et al., 2018), and emotional exhaustion (Gu et al., 2022). This broad range of detrimental effects emphasizes how crucial it is to identify the risk factors for work procrastination.

Leadership plays an essential role in shaping employees' motivation, behaviour, and engagement in work tasks. Leaders influence not only the way work is structured and resources are distributed, but also how employees perceive their roles, their confidence in their own abilities, and the psychological climate of the organization (Cheong et al., 2016; Fernández-Muñiz et al., 2017; Tummers & Bakker, 2021), factors considered important antecedents of workplace procrastination. This study focuses on empowering leadership, which has yet to be examined in relation to work procrastination. Empowering leadership has become increasingly important in the current economic context, as organizations rely on leadership practices that enhance employee motivation, self-efficacy and autonomy (Sun et al., 2025; Xiang et al., 2020). Furthermore, this study also considers job insecurity as a potential factor that may limit the effectiveness of empowering leadership on procrastination. Many employees perceive their job as insecure, an experience that was

found to have negative impacts on their work attitudes and behaviors. Nevertheless, there is a gap in the existing knowledge about whether job insecurity can also hinder the influences of positive organizational practices, such as empowering leadership, on counterproductive behaviors. The present study aims to address this gap by investigating the impact of empowering leadership on procrastination at work and the moderating effect of employees' job security on this impact.

Antecedents of workplace procrastination

Previous research suggests that workplace procrastination may be fostered by several negative psychological and organizational factors, including high levels of stress and fatigue, low work engagement, and reduced intrinsic motivation (DeArmond et al., 2014; Lin, 2018; Metin et al., 2018; Wan et al., 2014). Additionally, burnout, role overload, and psychological strain have also been identified as factors associated with higher tendencies toward procrastination at work (DeArmond et al., 2014; Gu et al., 2022; Huang et al., 2022; Sirois, 2023). At the organizational level, poor leadership, favoritism, bureaucracy, low organizational identification, and counterproductive work environments may further contribute to the development of workplace procrastination (De Clercq et al., 2021; Huang et al., 2022; Metin et al., 2018; Vveinhardt & Sroka, 2022).

Recent findings indicate the importance of team leadership for the occurrence of workplace procrastination. Specifically, leader-member exchange was found to reduce workplace procrastination by entailing high-quality relationships between leaders and their followers (De Clercq et al., 2022). Also, transformational leadership, paternalistic leadership (Göncü Köse & Metin, 2018), and inclusive leadership (Lin, 2018) have emerged as negatively associated with employees' procrastination behaviors. Other research findings further suggest that transactional and laissez-faire styles of leadership foster workplace procrastination (Bass, 2000; Musteață & Holman, 2025; Singh et al., 2021).

Empowering leadership and workplace procrastination

Empowering leadership focuses on delegating authority, providing support, encouraging autonomy and self-management (Amundsen & Martinsen, 2015; Arnold et al., 2000), and a sense of psychological ownership (Kim & Beehr, 2017) among team members. Empowering leaders display trust in the capabilities of their team members and aim to facilitate their growth and development (Matsuo et al., 2019). This type of leadership has numerous benefits for the organization and its members, enhancing employees' general mental health (Tripathi & Bharadwaja, 2020) and work-related factors such as thriving at work (Li et al., 2016), satisfaction (Amundsen & Martinsen, 2015), work engagement (Alotaibi et al., 2020), trust in the leader (Raziq et al., 2025), organizational commitment (Harris et al., 2014), organizational citizenship behavior (Raziq et al., 2025), individual innovative behavior and learning orientation (Mutonyi et al., 2020). Furthermore, empowering leadership increases psychological empowerment (Alotaibi et al., 2020; Amundsen & Martinsen, 2015; Tripathi & Bharadwaja, 2020), consequently fostering intrinsic motivation (Zhang & Bartol, 2010) and work effort (Amundsen & Martinsen, 2015). Besides these psychological benefits, empowering leadership was also found to be associated with higher work performance (Vecchio et al., 2010) and task performance (Harris et al., 2014), better leader-member-exchange (Hassan et al., 2013) and stronger work group cohesiveness (Mutonyi et al., 2020). Moreover, several of factors listed above, such as intrinsic motivation (Lin, 2018), work engagement (Metin et al., 2018), organizational citizenship behaviors (Göncü Köse & Metin, 2018), or leader-member-exchange (De Clercq et al., 2022) were also found to have a significant influence in reducing procrastination in the workplace.

Although prior research has not directly examined the relationship between empowering leadership and workplace procrastination, self-determination theory provides a strong theoretical basis for expecting such an association. According to

this perspective, the satisfaction of employees' basic psychological needs for autonomy, competence, and relatedness enhances intrinsic motivation and self-regulation, thereby reducing maladaptive behaviors such as procrastination (Ryan & Deci, 2000; Vansteenkiste et al., 2023). Empowering leadership is characterized by behaviors that promote autonomy, participation, and confidence in employees, which align closely with the fulfillment of these psychological needs (Arnold et al., 2000). Previous studies have shown that empowering leadership fosters psychological empowerment and psychological ownership (Amundsen & Martinsen, 2015; Tripathi & Bharadwaja, 2020). In turn, research indicates that these psychological states are associated with lower levels of procrastination (Kausar et al., 2025). Furthermore, empowering leadership was positively linked to intrinsic motivation among employees (Zhang & Bartol, 2010), which is negatively associated with procrastination, as employees who are intrinsically motivated are more likely to engage proactively in their tasks and are less likely to delay or engage in non-work-related activities (Lin, 2018). Additionally, prior research indicates that empowering leadership reduces counterproductive work behaviors (Jacques et al., 2023) and specific procrastinating behavior at work, such as time theft or unauthorized non-work-related activities (Kim & Beehr, 2021; Lorinkova & Perry, 2017). Therefore, we anticipate a negative impact of empowering leadership on workplace procrastination, as these leaders empower employees by giving them the resources, guidance, and trust (Kim & Beehr, 2021) needed to take initiative and make decisions, therefore having the potential to prevent or decrease employee workplace procrastination.

H1: Empowering leadership is negatively related to workplace procrastination.

Perceived job security and workplace procrastination

The evolving nature of work has diversified the contexts in which employees operate, amplifying the complexity of these dynamics. Within this context, job insecurity has

emerged as a critical factor, being widely recognized as one of the most hazardous work stressors in the twenty-first century. Perceived job security is a set of emotions and perceptions about the durability of one's job in the current company in relation to the factors that may threaten it (Lazarus, 1990). The results of a meta-analysis (Sverke et al., 2002) indicate that job insecurity has detrimental consequences on employees' work and organizational attitudes, health, and, to some extent, their behaviors within the organization. Past research found that job insecurity negatively impacts task performance, organizational citizenship behavior, safety behavior, and counterproductive work behavior, as well as work motivation and effort, work engagement, burnout, job satisfaction, turnover intentions, presenteeism, and strain-related outcomes such as anxiety and work-life conflict (Charkhabi et al., 2024; Jiang, & Lavaysse, 2018), which are closely associated with self-regulation difficulties and avoidance behaviors such as procrastination (Göncü Köse & Metin, 2018; Gu et al., 2022; Lin, 2018; Metin et al., 2016; 2018; Wan et al., 2014).

This process can be further understood through Social Exchange Theory (Cropanzano & Mitchell, 2005), which suggests that employment relationships are governed by reciprocal exchanges. When employees perceive job insecurity, they may interpret it as a failure of the organization to uphold its obligations, prompting them to reciprocate negatively. As a result, employees may reduce constructive behaviors, such as organizational citizenship behaviors, and increase destructive behaviors, including counterproductive work behaviors (Jiang et al., 2022). Furthermore, employees who perceive their jobs as insecure tend to lower their involvement in their work tasks (Cheng & Chan, 2008). This motivational effect aligns with the Conservation of Resources Theory (Hobfoll, 1989), as job insecurity signals threats to valuable resources such as income, stability, and professional identity, leading employees to adopt resource-conservation strategies and thus lower their work efforts. In this context, procrastination may function as a short-term mechanism to preserve energy and

psychological resources, even though it is ultimately detrimental in the long term (Hobfoll et al., 2018; Liao et al., 2022). Consequently, job insecurity may cancel or at least diminish the positive influence of empowering leadership on the key psychological states that deter procrastination, such as intrinsic motivation and psychological ownership (Amundsen & Martinsen, 2015; Zhang & Bartol, 2010). In this rationale, we anticipate that low job security deters the positive influence of empowering leadership in attenuating procrastination.

H2: Job security moderates the relationship between empowering leadership and workplace procrastination, such that the negative effect of empowering leadership on procrastination is weaker among employees with low job security compared to those with high job security.

Aims of the present study

The present study aims to examine the relationship between empowering leadership and workplace procrastination in a sample of white-collar employees in Romania and the Republic of Moldova. We expect employees who evaluate their leaders as displaying to a higher degree the behaviors characterizing empowering leadership to procrastinate less. We also aim to investigate the moderating effect of perceived job security in this pattern of relationships. While investigating these relationships, we also aim to control for the effects of other leadership styles that previous studies found to influence employees' tendency to procrastinate, i.e., transformational, transactional, and laissez-faire styles (Göncü Köse & Metin, 2018; Singh et al., 2021), as well as the variations in procrastinations associated to country, age (Gu et al., 2022), gender (De Clercq et al., 2022), tenure (Gu et al., 2022), employment status (full-time vs. part-time; Nguyen et al., 2013), and work model (office vs. remote; Hen et al., 2021).

Method

Participants and procedure

An online survey was conducted from June to December 2024 in Romania and the Republic of Moldova. The survey was disseminated using researchers' professional and social networks, and mentioned as inclusion criteria being currently employed in a white-collar job, involving knowledge-based, managerial, or administrative work in an office or a similar setting, i.e., physicians, lawyers, engineers, teachers, psychologists, public clerks, human resources specialists, administration (supervisor, manager, director), finance (accountant), and technology (e.g., developer, system engineer). The survey included an informed consent section explaining the research goals and ensuring participants about data anonymity and confidentiality. The study was approved by the Research Ethics Committee of the Faculty to which the authors are affiliated (reference number 1178).

A total of 394 individuals completed the survey, out of which 16 did not meet the inclusion criteria and were excluded from the final sample, which included 378 participants, 46.3% ($N = 175$) working in Romania and 53.7% ($N = 203$) in the Republic of Moldova. Most respondents ($N = 276$, 73.0%) were female, and their age varied between 20 and 73 years ($M = 38.99$ years, $SD = 11.54$). The majority of the participants had at least a bachelor's degree (92.1%) and over 5 years of tenure (70.6%), with 93.9% having a full-time program. About 74.6% were working in the office, 20.1 % had a hybrid work model (combining remote work with on-site work), and 5.3% were working remotely (i.e., online).

Measures

Empowering leadership was measured using the 38-item Empowering Leadership Questionnaire (Arnold et al., 2000). Each item describes a behavior displayed by the leader. "My manager sets high standards for performance by his/her own behavior." Participants indicated to what extent it is used by their supervisor on a Likert scale from 1 = "Never" to 5 = "Always". (Cronbach's $\alpha = 0.91$).

Job security was measured with the Job Security Scale (Oldham et al., 1986). An example item is: "I will be able to keep my present job as long as I wish." Participants rated the items on a Likert scale from 1 = "Totally disagree" to 7 = "Totally agree" ($\alpha = 0.88$).

Work procrastination was measured using the 12-item Work Procrastination Scale (Metin et al., 2016). Items are measured on a 7-point Likert scale, ranging from 0 = "Never" to 6 = "Always". An example item is: "When I work, even after I make decision, I delay acting upon it." ($\alpha = 0.89$).

Transformational, transactional, and laissez-faire leadership were measures using the Multifactor Leadership Questionnaire, Form 6-S (Vinger & Cilliers, 2006). An example item is: "My manager enables others to think about old problems in new ways." The items were answered on a 5-point Likert scale from 0 = "not at all" to 4 = "frequently, if not always". In this study, Cronbach's α was 0.96 for transformational leadership, 0.86 for transactional leadership, and 0.70 for laissez-faire leadership.

The survey also included items collecting sociodemographic data, i.e., current country of residence (Romania vs. Republic of Moldova), age, gender, tenure (years of service in the current company: under 1 year, 1 to 3 years, 3 to 5 years, over 5 years), education, work program (full-time vs. part-time) and work model (office vs. hybrid vs. remote).

Data analysis

First, we analyzed the normality of the distributions of the study variables and examined their associations through Pearson correlations. Second, we used multiple regression analysis to investigate the moderating effect of perceived job security on the relationship between empowering leadership and workplace procrastination, while controlling for transformational, transactional and laissez-faire leadership styles, country, age, gender, education, tenure, employment status and work model. To this aim, we created the interaction term accounting for the moderating effect under scrutiny as the product between the scores on

the perceived job security and those on the empowering leadership scale, and we introduced it as predictor in the regression analysis. As work model is a categorical variable with more than two levels, we dummy coded it with “remote” as the reference group. Finally, we used simple slope analyses to examine the relationships between empowering leadership and workplace procrastination at specific values of perceived job security, i.e., low, moderate and high. All analyses were performed in SPSS 26.

Results

The descriptive statistics of the four main variables in our hypothesized model and the three leadership styles we measured to control their effects are presented in Table 1. All Skewness and Kurtosis values were within the 2/-2 limit, indicating the normality of the distributions (Hair et al., 2022). The Pearson correlations (see Table I) indicated weak positive relationships between workplace procrastination and all four leadership styles measured. Workplace procrastination was not significantly linked to job security.

Table 1. Descriptive statistics and correlations between the main study variables

	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	1	2	3	4	5	6
1.Empowering Leadership	3.54	1.06	-.45	-.97	-					
2. Job Security	5.00	1.43	-.52	-.60	.48**	-				
3.Workplace Procrastination	1.82	1.18	.71	.30	.15**	-.06	-			
4.Transformational leadership	2.46	1.09	-.44	-.78	.79**	.45**	.11*	-		
5.Transactionall leadership	2.59	.95	-.53	-.30	.79**	.42**	.13*	.89**	-	
6.Laissez-faire leadership	2.25	.92	-.15	-.33	.59**	.31**	.11*	.69**	.64**	-

Note: * $p < .05$; ** $p < .001$.

The results of the regression analyses indicate that the set of predictors explained 17% of the variance in procrastination, $F(13, 377) = 5.67, p < .001$. The effect of empowering leadership on procrastination was not significant, $b = .13; SE = .15; p = .39$, while the interaction between empowering leadership and job security was significant, $b = -.03; SE = .01; p = .03$. Therefore, we explored this moderation by examining the effect of empowering leadership on procrastination at each level of job security. To this aim, we split the sample in three groups, i.e., low (participants scoring lower than $M - 1 SD$ on the job security measure), moderate (participants with job security scores between $M - 1 SD$ and $M + 1 SD$) and high

(above $M + 1 SD$). The same set of variables were controlled in these analyses as in the previous. Results (see Table 2) showed that in employees with low job security, empowering leadership was a significant and positive predictor of procrastination. In the moderate job security group, empowering leadership had a negative effect on procrastination, while in the high job security group, this effect was not significant.

Table 2. Regression model for workplace procrastination at each level of job security

Variables	Job Security								
	Low			Moderate			High		
	B	SE	β	B	SE	β	B	SE	B
Empowering Leadership	.66**	.19	.51*	-.51**	.16	-.44**	.34	.54	.26
Transformational leadership	-.18	.31	-.14	.13	.19	.12	-.47	.52	-.40
Transactional leadership	.18	.25	.13	.35*	.17	.27*	.30	.37	.23
Laissez-faire leadership	.01	.16	.01	.27*	.11	.21*	-.07	.29	-.04
Country	.16	.24	.07	-.09	.15	-.04	-.56	.33	-.24
Gender	-.27	.26	-.10	-.19	.17	-.07	-.86*	.41	-.31*
Age	-.03*	.01	-.30*	-.02**	.01	-.22**	-.02	.02	-.23
Education	-.02	.12	-.02	-.03	.09	-.02	-.33	.21	-.22
Tenure	-.17	.19	-.11	-.11	.10	-.09	.01	.25	.01
Employment status (full vs. part time)	-.06	.49	-.01	-.26	.30	-.06	-1.60	1.46	-.17
In-office vs. remote	.09	.34	.03	-.30	.17	-.12	-.01	.47	-.01
Hybrid vs. remote	-.72	.66	-.12	.05	.33	.01	-1.10	.94	-.20
Adjusted R ²		.38**			.15**			.11	

Note. * $p < .05$; ** $p < .001$.

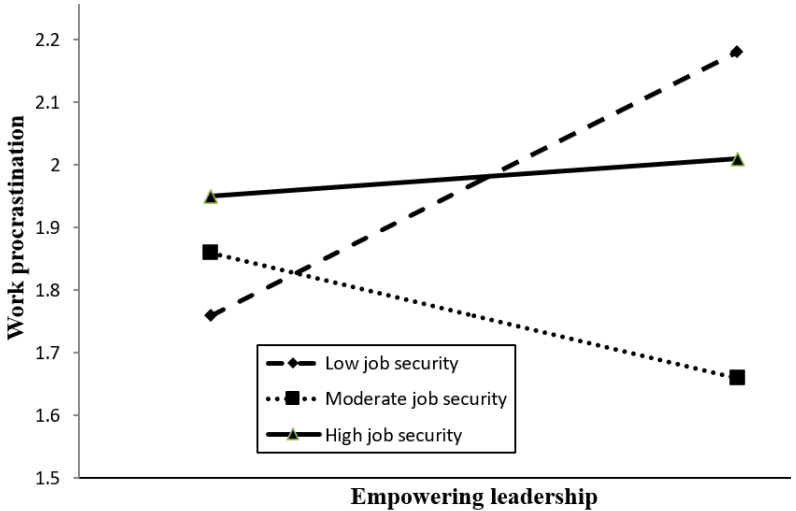


Figure 1 The relationship between empowering leadership and work procrastination in employees with low, moderate and high job security

Discussion

This study examined the impact of empowering leadership on procrastination at work and the role and job security in this relationship. Its main findings indicate that the relationship between empowering leadership and procrastination depends on employees' perceived job security. Specifically, we found that in employees with low job security empowering leadership had a positive association with procrastination, while the opposite relationship emerged in the moderate job security group. There was no effect of this leadership style on high job security employees' tendency to procrastinate at work.

Past research suggests that empowering leadership may decrease procrastination at work, mainly because it increases employees' work engagement, intrinsic motivation and work effort (Alotaibi et al., 2020; Amundsen & Martinsen, 2015; Zhang & Bartol, 2010), which are negatively related to workplace procrastination (Lin, 2018; Metin et al., 2018). Moreover, other studies found negative links between empowering leadership and specific aspects related to procrastination, such as time theft, involvement in unauthorized non-work-related activities during paid work hours and psychological withdrawal from work duties (Kim & Beehr, 2021; Lorinkova & Perry, 2017). Nevertheless, our findings suggest that this negative effect may emerge only in employees with moderate job security. Oppositely, employees who perceive their jobs as insecure procrastinate more when they are managed in an empowering manner. This effect may emerge because of several unintended consequences of empowering leadership that could foster procrastination under circumstances of low job security. First, the high autonomy that this leadership style offers employees can increase their role ambiguity (Lin et al., 2023), and this uncertainty about their job was found to induce cyberloafing, i.e., the use of the internet for nonwork purposes during working hours (Peng et al., 2023). Relatedly, Hen (2018) found professional role ambiguity to stimulate procrastination. In general, this effect is cancelled by an opposite influence of empowering leadership, that of increasing

organization-based self-esteem (Peng et al., 2023). But critically, this type of self-esteem is drastically affected by low job security, as suggested by the negative effect of job insecurity on organizational commitment (e.g., Haq et al., 2022), while the positive effect of empowering leadership on procrastination via role ambiguity may remain unaffected.

Moreover, job insecurity decreases job involvement (Cheng & Chan, 2008), therefore these employees may have lower expectations regarding job empowerment. When employees' empowerment expectations are overestimated by leaders, they experience high role ambiguity and low intrinsic motivation (Humborstad & Kuvaas, 2013), which were previously linked to procrastination (Lin, 2018). Consequently, this may represent another route by which implementing empowering leadership practices of delegating authority and encouraging autonomy in work environments where employees perceive their jobs as insecure may foster procrastination. Finally, job insecurity is a psychologically straining experience, which often creates emotional exhaustion, i.e., employees' sense of fatigue and overwhelming because of this continuous stress (e.g., Piccoli & De Witte, 2015). Therefore, employees perceiving their jobs as insecure may react to the autonomy offered by empowering leaders contrarily to their managers' expectations, by focusing on acts aimed at regulating their negative emotional state instead of their work duties and consequently procrastinating their tasks.

Our findings further suggest that in the group of employees with high job security empowering leadership has no effect on work procrastination. This may be because these employees may feel more confident in exercising the increased autonomy offered by this leadership style, which could paradoxically lead to increased procrastination. Furthermore, empowering leadership can increase role overload (Lin et al., 2023), which was found to be positively linked to work procrastination (Huang et al., 2022). Another unintended but potentially relevant effect of this leadership style is that of

increasing employees' job induced tension, as a consequence of the high autonomy and ambiguity that it entails and that can psychologically burden employees (Cheong et al., 2016). Employees who feel secure about their jobs may react to this tension by taking more time to carefully consider their decisions, feeling confident enough to delay their work tasks without any fear of negative consequences.

These somewhat paradoxical effects of empowering leadership in interaction with job security are consonant with past findings highlighting several boundary conditions limiting the amplitude of the benefits of this leadership style. In their review of research examining the influences of empowering leadership on work-related outcomes in general, Cheong and colleagues (2019) highlighted three categories of factors moderating these effects, i.e., contextual factors (e.g., team experience), leader factors (e.g., trust in leader), and employee factors (e.g., resistance to change). Our findings contribute to this body of knowledge by emphasizing job security as a critical factor of the valence and intensity of the effects of empowering leadership on workplace procrastination.

This study has several limitations, including its cross-sectional design that cannot test causality among the model variables and its use of a self-report measure of work procrastination instead of actual objective measurements. Also, the inclusion of only white-collar employees in its sample limits the generalizability of its findings, since they represent a specific category of employees in terms of their work location, type of duties and educational background (Lips-Wiersma et al., 2016). Moreover, further studies are needed to examine whether the pattern of relationships pinpointed by our findings adequately reflects the dynamics in employee samples from other countries. Also, the mediators we suggested as potentially intervening in the relationships between empowering leadership, job security and procrastination, such as role ambiguity or excessive empowerment relative to employee expectations, should be empirically examined by future research.

In terms of practical implications, our findings suggest that managers should

consider using empowering leadership depending on employees' job security, as this leadership style may foster procrastination in employees with insecure jobs. Furthermore, excessive empowerment at elevated levels of job security may result in diminished urgency and heightened procrastination. In general, managers must adapt their approach to guarantee that their empowerment practices foster employee motivation and effort instead of procrastination and guarantee that, while empowering employees, they nevertheless furnish adequate structure, guidance, and accountability. Practical measures may include establishing explicit objectives and timelines, consistent feedback or integrating performance indicators to ensure accountability, even for staff who perceive their employment as secure. Also, explicit communication to mitigate false apprehensions about job security is also recommended.

To conclude, the results of this study indicate that empowering leadership is negatively related to work procrastination in employees with moderate job security but has the opposite effect in those who perceive their jobs as insecure. In employees with high job security, empowering leadership emerged as unrelated to procrastination.

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RESEARCH ARTICLE

Applicant reactions to Artificial Intelligence-assisted selection: The moderating role of outcome favourability and job type

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Abstract

The present study investigates candidate perceptions on the use of AI-assisted selection interviews. It specifically explores the joint influence of the job type for which the applicant is evaluated (non-leadership role vs. leadership role) and the outcome favourability (rejected vs. accepted) on the relationship between trust in AI-assisted selection and perceived procedural justice of the selection method, on the one hand, and the intention to recommend the organization, on the other hand. The sample comprised 192 participants that were randomly assigned to one of the four alternative scenarios in an experimental design using vignettes. Each scenario simulated a specific AI-assisted selection interview. The four vignettes used resulted as a combination of job type (non-leadership role vs. leadership role) and outcome favourability (rejected vs. accepted) conditions. Data reveal that trust in AI positively related to the intention to recommend the organization under specific conditions defined by outcome favourability and the job type. Perceived procedural justice was positively associated with intention to recommend the organization. However, perceptions of procedural justice did not interact with outcome favourability or job type in explaining the examined outcome. These findings are consistent with prior research suggesting that procedural justice perceptions and trust in AI-related decisions play a different central role in shaping applicant intentions toward organizations.

Keywords

trust in AI-assisted selection; procedural justice of the AI-assisted selection, intention to recommend the organization; AI-assisted employment interview; applicant reactions

Introduction

In today's rapidly evolving economic and technological landscape, the adoption of

artificial intelligence (AI) in recruitment and personnel selection has become increasingly widespread. AI is actively used in tasks such as Curriculum Vitae screening, matching

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applicants to vacant positions, and conducting automated interviews, reflecting the global trend of digital transformation of human resource management (Randstad Canada, 2024). According to Society for Human Resources Management (2026), recruitment remains the most common Human Resources (HR) function in which AI is implemented, followed by HR technology and learning and development. Although this technology promises increased efficiency and a reduction in the subjective influences inherent to the human factor (Sivathanu & Pillai, 2018), its implementation has also raised concerns regarding the transparency and fairness of the personnel selection process (Babaei & Schank, 2025; Costa et al., 2025; Feldkamp et al., 2024; Langer & König, 2023; Malin et al., 2025). For instance, Gartner's (2025) survey of 2,918 job candidates found that only 26% trusted AI to evaluate them fairly, while 32% expressed concerns that AI could incorrectly reject their applications, highlighting the need to better understand applicants' perceptions of AI-assisted selection and their implications for organizational outcomes.

Understanding the interaction between applicants and AI technologies throughout selection process has become an important area of inquiry (Costa et al., 2025). AI-generated responses, particularly those conveying unfavourable selection outcomes, pose significant challenges regarding how they are perceived by applicants, as they can influence the perceived fairness in personnel selection (Hunkenschroer & Lütge, 2021). Applicants' reactions are an important consideration for organizations, particularly when designing and implementing selection processes (Bauer et al., 2024). These reactions influence not only the acceptance rates of job offers among successful candidates but also the organization's public image as an employer of choice (Wang et al., 2020). Organizational attractiveness is shaped to a large extent by applicants' word-of-mouth, making the promotion of positive applicant reactions throughout the selection process a strategic priority (Schinkel et al., 2016). Thus, organizations' ability to attract high-quality applicants depends not only on recruitment practices but also on applicants' willingness to

recommend the organization as a good employer (Kanwal & Van Hoye, 2026), both in traditional and electronic medium (Tsoni & Nikolaou (2026), particularly following unfavorable selection outcomes (Fijneman-Ghielen et al., 2026).

As one of the most widely used and extensively researched selection methods, the hiring interview enables organizations to obtain comprehensive and detailed information about applicants' competencies, experience, and fit with job requirements and organizational culture (Sackett et al., 2026; Wingate et al., 2025). Among the various interview formats, structured interviews emerged as the highest-ranking predictor of job performance, making them one of the most effective selection methods available (Sackett et al., 2022). Compared with traditional interviews, which facilitate dynamic interpersonal interaction between applicants and interviewers, AI-assisted interviews are often perceived as more impersonal and less flexible (Moon et al., 2026; Wang et al., 2025; Yu & Kim, 2026). These characteristics may reduce applicants' acceptance of AI technology in recruitment and selection processes (Acikgoz et al., 2020; Langer et al., 2019; Moon et al., 2026). Consistent with this view, the Greenhouse 2026 Candidate AI Interview Report, based on a survey of 2,950 active job seekers across the United States, the United Kingdom, Ireland, Germany, and Australia, found that 63% of respondents had already participated in an AI-conducted interview, representing a 13-percentage-point increase within six months. Despite this rapid adoption, the report also revealed substantial trust concerns, with 38% of candidates withdrawing from a recruitment process because it included an AI interview. Moreover, the lack of contextualized dialogue, applicants' feelings that they cannot adequately express their individual strengths and the limited opportunity to challenge algorithmic decisions may generate feelings of frustration and hesitation to accept the use of AI in selection processes (Hilliard & Guenole, 2022; Luo et al., 2025; Moon et al., 2026; Wang et al., 2025). Such concerns may be amplified in the context of recruitment and selection for strategic or senior-level

positions, where the perceived rigidity of AI systems and their limited capacity to perform qualitative evaluations of applicants may generate a low level of acceptance of this technology (Tambe et al., 2019). Empirical evidence further shows that AI is perceived as less appropriate for evaluating candidates for leadership positions or roles requiring a high level of interpersonal interaction, the AI are considered less capable of capturing the subtle nuances of leadership competencies and emotional intelligence (Biron et al., 2021). Regarding hiring interviews, Sackett et al. (2026) argue that this selection method remain indispensable for assessing leadership potential, interpersonal competencies, person–organization fit, contextual performance, which are more difficult to capture using automated assessments. By contrast, for technical or operational positions characterized by well-defined and standardized criteria, AI is perceived more favourable due to its ability to minimize subjective influences and ensure greater consistency in evaluation (Langer et al., 2019; Sackett et al., 2026; Wang et al., 2025). These differences in applicants' perceptions underscore the importance of the context in which AI is used and suggest that the effectiveness and appropriateness of AI depend on the characteristics and requirements of the positions being evaluated.

Positive experiences with the AI-assisted selection process can also strengthen organization's image and increase applicants' intention to recommend the organization to others (Fijneman-Ghielen et al., 2026; Kanwal & Van Hoyer, 2026; Köchling & Wehner, 2020). Consequently, favourable applicant experiences contribute to building organizational reputation and enhancing employer attractiveness. In contrast, unfavourable selection experiences characterized by rigidity, limited transparency, and perceptions of an unfair selection process, can substantially diminish an organization's attractiveness in the labour market (Babae & Shank, 2025; Binns et al., 2018; Luo et al., 2025). AI-based rejected decisions may elicit stress, frustration, and other negative affects among applicants (Kang, 2020; Luo et al., 2025). Together, these findings highlight the importance of

implementation AI responsible in recruitment and personnel selection to minimize adverse effects on applicants' perceptions and preserve organizations' employer reputation.

Prior research has preponderantly investigated separately the impact of AI-assisted selection procedures, particularly AI-assisted interviews, compared to human-assisted selection on various applicants' reactions, including procedural justice (Acikgoz et al., 2020; Costa et al., 2026; Hosain et al., 2025; Koch-Bayram et al., 2023; Köchling & Wehner, 2022; Low et al., 2026; Main et al., 2025; Luo et al., 2025; Wesche et al., 2024), trust in AI selection decision (Choung et al., 2024; Deriu et al., 2024; Feldkamp et al., 2024; Low et al., 2026), and various attitudes and behavioural intentions toward the organizations that used it (Babae & Shank, 2025; Low et al., 2026; Luo et al., 2025). Despite the growing body of research on AI-assisted recruitment and personnel selection, little is known about how perceived procedural justice and trust in AI jointly shape applicants' behavioural intentions. Moreover, existing research has largely overlooked that these relationships may vary as a function of on contextual characteristics of selection process, including outcome favourability, job type, and the combined effects of these conditions.

Existing literature underscores the need for further investigation of applicant reactions in non-Western, Educated, Industrialized, Rich, and Democratic contexts (Woznyj et al., 2024), highlighting the importance of extending this line of inquiry beyond traditionally studied settings.

Accordingly, our study investigates how applicants' perceptions of procedural justice in the AI-assisted selection process are related to their intention to recommend the organization as a good employer to others. Moreover, it focuses on the how the job type for which an applicant is evaluated (leadership vs. non-leadership position) interacts with the outcome favourability of the AI-assisted selection process (accepted vs. rejected) to moderate the relationships between trust in AI-assisted selection and perceived procedural justice, on the one hand, and the intention to recommend the organization to others, on the other hand. The research model proposed in presented in Figure 1.

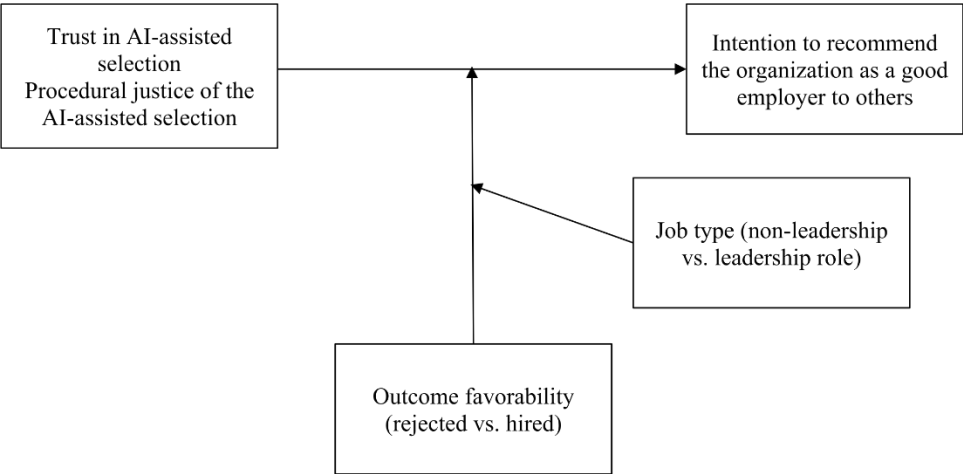


Figure 1. Research model with two interaction moderators

Theoretical framework

As technology has advanced, AI-assisted interviews have been increasingly integrated into selection procedures, offering the potential to improve evaluation efficiency and objectivity. These systems analyse applicants’ verbal content, voice tone, and facial expressions to determine their suitability for the position for which they are applying (Langer et al., 2019). As such, AI can help reduce human biases and contribute to a more equitable selection process (Acikgoz et al., 2020). At the same time, AI may also be perceived as lacking empathy and being difficult to contest (Li et al., 2024; Peng et al., 2022). These contrasting perceptions have stimulated growing scholarly interest in research in applicants’ perceptions of the social aspects of recruitment and selection (Fikrat-Wevers et al., 2023; Oostrom et al., 2023). Within this emerging literature, two related constructs have attracted particular attention: trust in AI and perceptions of procedural justice.

Trust in AI refers to users’ perceptions of the system’s ability to make accurate, ethical, and transparent decisions (Bryson, 2018; Höddinghaus et al., 2021). It reflects a willingness to rely on AI under uncertainty,

which develops from perceptions that the AI system is competent (accurate), fair, reliable, unbiased, and possesses integrity (Langer et al., 2023). Similarly, Everett et al. (2026) argued that trust in AI should be understood as a multidimensional construct involving beliefs about both performance (accuracy, competence, reliability), and morality (fairness, ethics, integrity) of the AI system. This from of trust is shaped by multiple factors, including characteristics of the user, characteristics of the AI system, and the context of human–AI interaction. Among these, AI-related attributes - particularly reliability, transparency, explainability, and perceived performance - were the strongest predictors of trust, while users’ prior experience and contextual characteristics also contributed to trust formation (Bigman & Gray, 2018; Kaplan et al., 2023).

Procedural justice, rooted in Greenberg’s (1990) Organizational Justice Theory and applied to personnel selection by Gilliland (1993), refers to individuals’ perceptions of the fairness of the procedures used to make decisions. In selection contexts, applicants judge fairness based on the equity of procedures (Dosilović et al., 2018). They evaluate not only the outcome of a decision but also the fairness of the process that led to

that decision. At the same time, applicants form rapid judgments about the fairness of events, such as selection procedure. The perceptions of fairness in a single episode can shape subsequent behaviours, attitudes, and intentions (Colquitt et al., 2013). Meta-analytic evidence indicates small to moderate positive relationships between perceived procedural justice of the selection process and outcomes such as perceived organizational attractiveness and applicants' intentions to recommend the organization (Hausknecht et al., 2004). In AI-assisted selection processes, perceptions of procedural justice are shaped by several factors including the consistent application of the selection criteria, the potential for providing fair justifications for the decision-making process, the opportunity of contesting the outcome (Gilliland, 1993), and the perceived use of AI in the hiring process (Hosain et al., 2025). Consequently, limited algorithmic transparency can significantly reduce applicants' perceptions of procedural justice, fostering skepticism toward AI-assisted selection and increasing perceptions that the selection process is unfair (Low et al., 2026; Niessen & Neumann, 2026).

Applicants' prior experiences with the selection process - both in terms of the fairness and transparency of the selection process and their overall relationship with the organization - shape their intention to recommend the organization to others. Applicant's intention to recommend the organization refers to their intention to recommend the organization either by speaking positively about its image or by encouraging others to apply for vacant positions (Feldman et al., 2006). When applicants perceive AI-assisted selection as fair, transparent, and adequately justified, they are more likely to recommend the organization to others (Köchling & Wehner, 2020). Such perceptions also foster greater accepting of AI-assisted selection and may even lead applicants to prefer AI-assisted selection over traditional interviews (Binns et al., 2018; Wang et al., 2025). In contrast, negative selection experiences, particularly those arising from the limited transparency in AI-driven decisions or the difficulty of contesting the selection outcomes - can considerably reduce an applicants' willingness to recommend the organization as an employer to

others (Babae & Shank, 2025; Luo et al. 2025; Rigotti et al., 2026).

Hypothesis development

Human-Computer Trust Theory (Madsen & Gregor, 2000) posits that people develop trust in computerized decision systems based on their perceptions of the system's technical competence, reliability, and understandability, complemented by affective dimensions such as faith and personal attachment. In the context of AI-assisted selection, this theory suggests that applicants who perceive the AI-assisted selection as reliable and fair are more likely to trust the technology and the technology-driven process. This trust, in turn, foster favourable applicant reactions including their intention to recommend the organization to others. Conversely, when AI-assisted selection is perceived as rigid indecision-making or incapable of accurately evaluating applicants' competencies and experience, trust in the system diminishes substantially (Arnestad et al., 2026; Lavanchy et al., 2023). Subsequently, reduced trust may negatively influence applicants' view of the organization. The negative views may, in turn, diminish the applicant's willingness to recommend the experience to prospective job seekers.

Furthermore, applicants' expectations play an essential role in shaping perceptions of the selection process. In line with Expectancy Theory (Vroom, 1964), individuals form expectations based on the benefits they anticipate and the extent to which a process meets their criteria for fairness and transparency. In the context of AI-assisted selection, when applicants perceive AI as a tool that enhances efficiency and eliminates the subjectivity associated with human counterparts, they are more likely to consider its use as an advantage for the organization and to develop a higher intention to recommend that organization to others. Alternatively, when AI technology in personnel selection fails to meet applicants' expectations of transparency and fairness inherent in the process, applicants are more likely to develop negative perceptions of the organization (Lavanchy et al., 2023), thereby reducing their intention to recommend the organization to others.

The relationship between applicants' trust in AI-assisted selection and their intention to recommend the organization may depend on contextual factors, including the favourability of the feedback received following the hiring interview and the characteristics of the position for which they are applying (Ahn et al., 2021). A favourable hiring decision that validates applicants' qualifications is likely to generate positive affective reactions, such as satisfaction, confidence, and gratitude toward the organization. The moderating role of outcome favourability can be explained by The Affective Events Theory (Weiss & Cropanzano, 1996), which posits that workplace events shape subsequent attitudes and behaviours through the affective responses they evoke. Accordingly, a favourable selection outcome acts is likely to evoke positive emotions that reinforce applicants' perceptions that AI can deliver fair and impartial evaluations. Consequently, favourable outcomes are likely to strengthen the positive relationship between trust in AI-assisted selection and applicants' willingness to recommend the organization to others. In contrast, unfavourable selection outcomes are likely to evoke negative emotions such as frustration and disappointment, particularly when applicants receive less transparent or inadequate explanations for AI-generated decisions. As a result, such experiences increase applicants' perceptions of the algorithmic opacity (Lee, 2018) and can weaken trust in AI-assisted selection. Ultimately, these may reduce favourable evaluations of the organization.

The type of position for which applicants are evaluated may shape both their perception of the selection process and their interpretation of selection outcomes in terms of favourability. Applicants for leadership positions are likely to hold higher expectations regarding the professionalism and transparency in the hiring process, reflecting the greater organizational responsibility and public visibility associated with these roles (Eagly & Karau, 2002). In this context, a favourable outcome may reinforce applicants' perceptions of both AI competence and organizational effectiveness, thereby strengthening the positive relationship

between trust in AI-assisted selection and their intention to recommend the organization to others (Lee, 2018). In contrast, unfavourable selection outcomes may be interpreted more critically by applicants for leadership positions. Applicant may react more negatively because they hold higher expectations regarding the ability of AI-assisted selection procedures to accurately assess complex leadership and interpersonal competencies. Such expectations make applicants more likely to question the appropriateness of AI-assisted selection for leadership roles, weakening the positive effects of trust in AI on their evaluations of the organization (Arnestad et al., 2025; Cheong et al., 2025; Lavanchy et al., 2023; Wang et al., 2025).

For non-leadership positions, applicants are expected to hold fewer demanding expectations regarding the use of AI in personnel selection, resulting in greater acceptance of AI-assisted hiring procedures (Langer et al., 2019). In line with Expectancy Theory (Vroom, 1964), when AI-assisted selection aligns with applicants' expectations for efficient, objective, and fair decision-making, they are more likely to evaluate the selection process favorably. Consequently, applicants for non-leadership roles may perceive AI-assisted selection as both more effective and fairer than conventional hiring methods, leading to more positive evaluations of the organization. Based on this reasoning, we advance the hypothesis that:

Hypothesis 1: The type of job for which an applicant is evaluated (leadership vs. non-leadership position) and the favourability of the selection outcome (accepted vs. rejected) received following an AI-conducted job interview moderate the relationship between applicants' trust in AI-assisted selection and their intention to recommend the organization as a good employer to other. Specifically, this positive relationship is expected to be strongest among applicants interviewed for non-leadership positions who received a favourable selection outcome following an AI-assisted job interview.

In line with Gilliland's (1993) model of perceived selection system fairness, applicants evaluate both the outcomes and the fairness of procedures and process used to reach those outcomes. Accordingly, applicants' reactions are shaped not only by what decision is communicated but also by how the selection process is conducted. Perceptions of procedural justice formed during AI-assisted selection directly shape applicants' post-interview reactions, including their trust in the organization and willingness to recommend it as an employer. Thus, in AI-assisted selection, applicants' perceptions of process fairness play a key role in shaping their willingness to recommend the employer, an important factor for organizational reputation (Langer et al., 2019).

This relationship between procedural justice and intention to recommend the organization is likely to depend on contextual characteristics of the selection process, particularly the outcome favourability of the selection process and the type of position for which applicants are evaluated (van Esch & Black, 2019). Applicants' perceptions of AI's ability to accurately assess their competencies, particularly in the light of the feedback they received following the selection process, play a central role in shaping post-selection reactions. Positive evaluations strengthen trust in the organization and enhance organizational attractiveness, whereas negative evaluations reduce willingness to recommend the organization to others (Lee, 2018).

When applicants receive favourable feedback/outcome that validates their competencies, there are more likely to be perceive the selection process as fair. Such feedback can strengthen trust in the AI-assisted selection, particularly when the AI system is seen as an impartial assessor (Langer et al., 2019). In contrast, negative or unfavourable feedback that is perceived as less transparent or insufficiently justified may undermine perceptions of procedural justice. Under these circumstances, applicants may feel the evaluation was superficial or that the automated system failed to capture relevant competencies, reducing the willingness to recommend the organization to others (Lee et al., 2018).

This relationship is further influenced by the type of position for which applicants are evaluated. Applicants seeking leadership positions, where interpersonal skills, leadership abilities, and strategic capacity are critical - may perceive the AI-assisted selection as less capable of accurately assessing these complex attributes. Research shows that applicants remain skeptical about AI's ability to accurately evaluate emotional intelligence, the ability to inspire teams, or strategic decision-making (Chamorro-Premuzic et al., 2016). This skepticism is likely to intensify when applicants receive an unfavourable selection outcome. In such cases, applicants may interpret an unfavourable selection outcome not only as a personal failure but also as evidence of the limitations of AI-assisted evaluation. As a result, applicants may question both legitimacy of the selection decision and the fairness of process through it was reached. Consequently, these perceptions are likely to undermine procedural justice increase, ultimately reducing applicants' willingness to recommend the organization as an employer. Moreover, diminished perceptions of procedural justice in selection may weaken organizational commitment, particularly among applicants for managerial/ leadership positions, who generally expect more nuanced, tailored, and context-sensitive assessment processes in selection (Berkelaar, 2014).

In contrast, applicants for non-leadership positions are likely to view AI-assisted selection more favourably because these positions are typically evaluated using clearly defined and highly standardized criteria, such as technical competencies and job-specific skills. In these contexts, AI may be perceived as an objective evaluator, and its use may even be seen as beneficial because it reduces the risk of human bias during selection -an essential condition for procedural justice (Duggan et al., 2019). Under such conditions, favourable selection outcomes strongly shape applicants' perceptions of procedural fairness by reinforcing the validity and accuracy of the selection process. As applicants become more confident that decisions are based on objective, transparent and consistently applied criteria, they are more likely to evaluate the organization favorably and express a greater

willingness to recommend it as an employer (Langer et al., 2019).

Moreover, unfavourable selection outcomes for non-leadership positions are likely to have a less detrimental effect on perceptions of procedural justice than comparable outcomes for leadership roles, because applicants are more likely to attribute such outcomes to external factors, process-related factors, including the competitiveness of the applicant pool or the AI system's consistent application of standardized evaluation criteria (Lee et al., 2018). However, when unfavourable evaluations are perceived as lacking transparency or as arbitrary, applicants are more likely to respond less favourably toward the organization, resulting in a lower willingness to recommend the organization as an employer. Nevertheless, this negative effect is expected to be less pronounced for non-leadership positions than for leadership roles, where applicants place greater emphasis on individualized and context-sensitive evaluation processes (Langer et al., 2019). Considering this reasoning, we propose the following hypothesis:

Hypothesis 2: The type of job for which an applicant is evaluated (leadership vs. non-leadership role) and the favourability of the selection outcome (accepted vs. rejected) received following an AI-conducted job interview moderate the relationship between applicants' perception of procedural justice and their intention to recommend the organization as a good employer to others. Specifically, this positive relationship is expected to be strongest among applicants interviewed for non-leadership positions and received a favourable selection outcome following an AI-assisted job interview.

Contributions

Building on the increasing importance of applicant reactions in personnel selection (Bauer et al., 2024), the current study deepens the understanding of applicants' perceptions in the context of AI-assisted selection by developing a more context-dependent account of applicants' reactions to algorithmic decision making.

Although previous research has primarily examined AI-assisted recruitment and personnel selection from a technical perspective, emphasizing efficiency gains and algorithmic fairness (Binns et al., 2018), far less is known about the contextual factors that shape applicants' responses to AI-enabled selection decisions. The present study addresses this gap by exploring the joint moderating role of the job type for which an applicant is evaluated (leadership vs. non-leadership position) and the favourability of the selection outcome (accepted vs. rejected) on the relationship between trust in AI-assisted selection and perceived procedural justice, on one hand, and applicants' intent to recommend the organization to others, on the other hand. This research topic aligns with recent AI research priorities that emphasize understanding trust, perceived fairness, and how these factors shape applicants' subsequent behaviours (European Commission, 2025).

The study further extends relational models of trust in technology, an emerging area in organizational behaviour (Acikgoz et al., 2020), by demonstrating that trust in AI-assisted decision making is not uniformly translated into favorable applicant reactions but instead depends on the context in which AI is deployed. By identifying job type and outcome favorability as key boundary conditions, the findings will contribute to a more context-sensitive understanding of trust in organizational AI. Furthermore, our study provides inputs for future research to examine whether these contextualized effects generalize to other personnel decision contexts, such as promotions or performance appraisals, that are conducted partially or entirely by AI evaluators and decision-makers.

Our study can inform best practices in AI-assisted selection procedures design by highlighting the factors that shape applicants' reactions. Focusing on the relational aspects of AI, such as trust and procedural justice, findings of this study can encourage developers and researchers to prioritize fairness and applicant experience, promoting AI projects that mitigate the negative impact of automated feedback on applicants' reactions that have a relevance for organizations. AI-

generated favourable outcomes that build trust - particularly among applicants for non-leadership positions- can enhance organizational reputation. In this context, our findings offer valuable input for managing employer brands in the digital era, where applicants' perceptions of fairness increasingly shape public opinion (Köchling & Wehner, 2020). Subsequently, negative perceptions of AI in selection could fuel distrust and anxiety among job seekers, reducing their willingness to engage in AI-assisted selection processes. By identifying job type and selection outcome favorability as key boundary conditions of the relationship between applicant AI trust and procedural justice and their intention to recommend the organizations, our study offers practical guidance for organizations to implement AI systems into selection processes while considering the specific job type. Although AI-assisted selection may be perceived as particularly appropriate for non-leadership positions because of its standardization and objectivity, its use to leadership selection may be most effective when it complements, rather than replaces, human judgment. This approach is likely to mitigate the risk of negative perceptions and supports an ethical, human-centred strategy aligned with organizational values and applicant expectations (Babae & Schank, 2026; Leszczyński et al., 2026). As AI continues to reshape organizational practices, the challenge is not merely to improve algorithmic performance but to develop context-sensitive selection systems that foster trust and procedural justice by aligning technological capabilities with the demands of specific job types and applicants' expectations.

From a managerial perspective, understanding how job type and outcome favourability shape applicants' responses to AI-assisted selection, particularly their intentions, has important implications for organizational effectiveness. Favourable selection outcomes can motivate applicants to recommend the employer, strengthening the employer brand, increasing attractiveness, and reducing recruitment costs. Prior research shows that applicants who perceive AI-assisted selection as fair are more likely to reapply for future positions and to recommend the organization to other, thereby

strengthening employer attractiveness and contributing to more effective recruitment outcomes (Acikgoz et al., 2020).

Our study will provide findings that suggest that organizations may benefit from investing in AI-assisted selection systems that are procedurally fair, particularly for non-leadership positions where favorable outcomes appear to have the strongest influence on applicants' organizational evaluations. Such practices may increase acceptance of AI in hiring, strengthen employer attractiveness, and improve recruitment effectiveness by encouraging favorable word-of-mouth and attracting a broader pool of potential candidates (Duggan et al., 2019). In the long term, organizations that adopt applicant-centered AI systems may benefit from more engaged employees, as trust in AI during hiring is linked to positive attitudes toward other technology-based organizational processes (Revillod, 2025).

Method

Research design

This study employed a quantitative, multifactorial experimental between-subjects design (Edmonds & Kennedy, 2017). Unlike classic experimental designs, which offer strong control and causal inference, a quasi-experimental between-subjects design provides distinct advantages. It allows greater methodological flexibility, enabling the study of variables that cannot be directly manipulated, such as trust in AI or perceived procedural justice. It also offers higher ecological validity, meaning results better reflect real organizational contexts rather than artificial experimental settings (Bärnighausen et al., 2017; Shadish et al., 2002). Additionally, this design supports the analysis of complex interactions between manipulated and measured variables (Rohrer & Arslan, 2021), yielding in our case a more nuanced understanding of how AI influences applicants' perceptions and reactions in selection processes.

Two predictor variables (measured only) were included: trust in AI-assisted selection (i.e., the applicant's perception of the AI system's competence, impartiality, and

transparency in making selection decisions) and perceived procedural justice of the AI-assisted selection (i.e., the extent to which participants view the AI-assisted selection process as fair, clear, and transparent).

The criterion variable was the intention to recommend the organization as a good employer to others (i.e., the applicant willingness to recommend the organization as a good employer to others).

The manipulated variables were treated as moderators: the outcome favourability of the AI-assisted selection and the job type for which an applicant is evaluated. Outcome favourability was manipulated in two experimental conditions representing the interview outcome: a favourable outcome condition (acceptance) and a non-favourable outcome condition (rejection). The job type for which an applicant is evaluated was presented as either a leadership position or a non-leadership position.

We conducted manipulation checks to verify that participants correctly perceived both the assigned job type (leadership vs. non-leadership) and the outcome favorability condition (accepted vs. rejected). Each participant responded to the following three questions: (1). I read the scenario carefully and understood the applicant role I was asked to assume – yes or no; (2). In the scenario above, I was interviewed by: My future supervisor, An Artificial Intelligence (AI) system or Someone else, and (3). In the scenario above, the organization's hiring decision was: I was offered the position, I was not offered the position, and Other. The results confirmed that participants accurately interpreted the experimental scenarios as intended, indicating that the manipulations were successful and that the experimental conditions were perceived consistently across participants.

Participants

The minimum sample size was determined using G*Power software (Faul et al., 2007), which indicated a minimum of 103 participants to ensure adequate statistical power for the tests. The input data included F test – Linear multiple regression, Fixed model,

R^2 deviation from zero, $f^2 = .15$, $\alpha = .05$, $(1 - \beta) = .80$, and 7 predictors.

Following convenience sampling, we obtained a total of 192 participants, of whom 164 were female and 28 were male. Respondents' ages ranged from 20 to 54 years ($M = 26.31$, $SD = 8.48$). Regarding previous experience with AI, 171 participants (89.06%) reported having used AI in various contexts, while 21 participants (10.94%) had no such experience. Only 8 participants (4.17%) stated that they had been evaluated by an AI system in a personnel selection process, and 2 respondents (1.04%) reported feeling discriminated against based on AI evaluations. A number of 47 participants (24.48%) attended a course on recruitment and selection, and 14 respondents (7.29%) had taken a course specifically about AI. The remaining participants had no formal training in these areas. Participants' status fell into two main categories: solely students (63.20%) and combined student with employment status (36.80%).

Instruments

This study employed an experimental vignette methodology (EVM) using instrumentally constructed scenarios. This experimental technique is well-established in literature and is valued for providing a balance between experimental control and ecological validity (Aguinis & Bradley, 2014). Participants were exposed to four structured scenarios designed to realistically simulate interaction with an AI-based recruitment system. The integrated vignettes reflected an authentic selection process in which participants received AI-generated feedback regarding the organization's hiring decision (accepted vs. rejected) and the type of position for which they were evaluated (leadership vs. non-leadership). This approach offers a significant advantage over simple self-report methods, as it simulates a real selection context and enables measurement of reactions and perceptions in a more authentic manner (Hughes & Huby, 2004). Participants were randomly assigned to one of four scenarios simulating an AI-assisted selection process

that involved structured interview as a selection method.

Participants were instructed to assume the role of a job applicant undergoing an AI-assisted selection process and to evaluate the experience based on the feedback generated from AI in what regards the hiring decision (accepted vs. rejected). Each vignette described the AI-enabled interview, including how the system conducted the interview and communicated the hiring decision. The scenario mirrors real AI interviews to create a realistic context that helps participants immerse themselves in the simulated situation. The vignettes were developed as narrative accounts depicting a participant's journey through an AI-assisted selection process (an example is provided in Appendix 1).

Following exposure to one of the four scenarios, participants completed a set of scales measuring the study variables. All variables were measured using seven-point Likert scales (1 = *Strongly disagree*, 7 = *Strongly agree*). The use of seven-point response format allows for greater response granularity and discrimination among participants' perceptions (Krosnick & Presser, 2010).

Trust in AI-assisted selection was measured using four items adapted from Höddinghaus et al. (2021). An example item is: "*I trust that the Artificial Intelligence evaluated my responses accurately and thoroughly*" ($\alpha = .90$, $r_{SB} = .82$).

Procedural justice was assessed using a two-item scale adapted from Bauer et al. (2001). An example item is: "*The process used by this selection method is fair in selecting candidates for this position*" ($\alpha = .90$, $r_S = .80$).

Intention to recommend the organization was measured using two items adapted from Feldman et al. (2006). An example item is: "*I would encourage others to apply for a job at this organization*" ($\alpha = .96$, $r_S = .92$).

Procedure

Participants were recruited through online platforms associated with their faculties. Data was collected via Google Forms in January 2025. All participants were informed about the study and completed informed consent and confidentiality agreements in accordance with

data protection regulations (GDPR, 2022). Participants were assured that their data would remain confidential and be used only for research purposes.

We randomly assigned participants to one of four experimental conditions resulting from the combination of two controlled factors: outcome favourability (accepted vs. rejected) and the job type for which the applicant is evaluated (leadership vs. non-leadership position). This procedure was implemented to prevent structural imbalances within the study groups and to minimize the risk of systematic biases that could compromise the accuracy of the findings and weaken inferential validity. By ensuring maximal comparability across conditions and maintaining a high control over extraneous factors, the study strengthens the robustness of the causal inferences derived from the analyses (Aguinis & Bradley, 2014).

Data analysis

The data was analyzed using IBM SPSS Statistics v 24 (IBM Corp., 2016). Initially, univariate descriptive statistics were computed, including measures of central tendency (i.e., mean) and variability (i.e., standard deviation).

Hypothesis testing was conducted using the PROCESS macro-Model 3 (Hayes, 2025). This model permits to identify both main effects and interaction effects among variables. Specifically, each regression analysis examined the direct and conditional effects of the predictors (i.e., trust in AI - assisted selection and perceived procedural justice) on the outcome variables (i.e., intention to recommend the organization). Outcome favourability (accepted vs. rejected) and the job type (non-leadership vs. leadership role) were included as moderators. Controls were age, gender, AI use, and previous experience with AI-assisted selection.

Following the identification of significant global interaction effects, we examined how the relationships between the predictor and criterion variables varied across specific combinations of the moderator levels (i.e., outcome favourability and job type) by estimating conditional effects using simple slope analyses.

Results

Results of the univariate data analysis are included in Table 1.

Table 1. Mean, standard deviation, minimum, and maximum of the main variables (N = 192)

Variables	Minimum	Maximum	Mean	Standard deviation
1. Trust in AI-assisted selection	1.00	6.25	3.16	1.43
2. Procedural justice of the AI-assisted selection	1.00	7.00	3.59	1.46
3. Intention to recommend the organization	1.00	7.00	3.46	1.63
4. Outcome favourability (rejected vs. accepted)	.00	1.00	-	-
5. Job type (non-leadership vs. leadership)	.00	1.00	-	-
6. AI usage experience (0 = yes, 1 = no)	.00	1.00	-	-
7. Previous experience with AI-assisted selection (0 = yes, 1 = no)	.00	1.00	-	-
8. Age	20.00	54.00	25.33	7.71
9. Gender (0 = female, 1 = male)	.00	1.00	-	-

Hypothesis testing

Results of the regression analyses conducted with PROCESS macro v.5 - Model 3 (Hayes, 2025) are included in Table 2-4.

Hypothesis 1

The full regression model, including the three-way interaction between trust in AI-assisted selection, outcome favourability, and job type, explained a significant proportion of variance in intention to recommend the

organization, $R^2 = .32$, $F(11, 180) = 7.80$, $p < .001$. The main effect of trust in AI-assisted selection on intention to recommend was not significant, $b = -.13$, $p > .05$. However, the three-way interaction term accounted for a significant incremental increase in explained variance, $\Delta R^2 = .05$, $F(1, 180) = 13.10$, $b = -1.06$, $p < .001$, indicating that the relationship between trust in AI and intention to recommend the organization depends on outcome favourability and job type.

Table 2. Results of the regression analysis having trust in AI-assisted selection as predictor (N = 192)

Model	B	se	95%CI
1. Trust in AI-assisted selection	-.13	.13	[-.38; .13]
2. Outcome favourability	-2.68***	.65	[-3.95; -1.40]
3. Trust in AI-assisted selection x outcome favourability	.90	.19	[.53; 1.27]

Model	B	se	95%CI
4. Job type	-3.11***	.69	[-4.47; -1.75]
5. Trust in AI-assisted selection x Job type	.89***	.20	[.49; 1.29]
6. Outcome favourability X Job type	3.50***	1.03	[1.47; 5.53]
7. Trust in AI-assisted selection x Outcome favourability x Job type	-1.06***	.29	[-1.64; -.48]
8. Previous experience with AI-assisted selection (0 = yes, 1 = no)	.49	.50	[-.49; 1.47]
9. AI usage experience (0 = yes, 1 = no)	.41	.30	[-.19, 1.00]
10. Age	.02	.01	[-.01; .04]
11. Gender (0 = female, 1 = male)	.05	.28	[-.50; .61]

Specifically, under conditions of unfavourable outcome and evaluation for a non-leadership position, the effect of trust in AI-assisted selection on intention to recommend the organization was not statistically significant ($b = -.13$, $p > .05$). In contrast, when the outcome was unfavourable and the evaluation was conducted for a leadership position, higher trust in AI-assisted selection was associated with a stronger

intention to recommend the organization ($b = .76$, $p < .001$). Under favourable outcome conditions, this pattern was similar. Specifically, trust in AI-assisted selection positively predicted intention to recommend the organization both for evaluations targeting non-leadership positions ($b = .77$, $p < .001$) and leadership positions ($b = .60$, $p < .001$). These findings support Hypothesis 1.

Table 3. *Conditional effects for the model with the three-way interaction between trust in AI-assisted selection, outcome favourability (0 = rejected, 1 = accepted), and job type (leadership vs. non-leadership).*

Outcome favourability	Job type	B	SE	95%CI
0	0	-.13	.13	[-.38, .13]
0	1	.76***	.16	[.45, 1.06]
1	0	.77***	.14	[.50, 1.03]
1	1	.60***	.17	[.27, .92]

Hypothesis 2

The full regression model including the three-way interaction between procedural justice of AI-assisted selection, outcome favourability, and job type explained a significant proportion of variance in intention to recommend the organization, $R^2 = .41$, $F(11, 180) = 11.37$, $p < .001$. Procedural justice of AI-assisted selection exhibited a strong positive main effect on intention to recommend the organization, $b = .74$, $p < .001$.

However, this relationship did not vary significantly as a function of the outcome favourability, job type or their interaction. The three-way interaction term was not statistically significant, $\Delta R^2 = .00$, $F(1, 180) = .01$, $b = .02$, $p > .05$ (see Table 5). Given the lack of significant higher-order interaction, conditional effects were not probed. Accordingly, these results do not support Hypothesis 2.

Table 4. Results of the regression analysis having procedural justice of the AI-assisted selection process as predictor (N = 192)

Model	b	Se	95%CI
1. Procedural justice of the AI-assisted selection	.74***	.12	[.51; .98]
2. Outcome favourability	.92	.64	[-.34; 2.18]
3. Procedural justice of the AI-assisted selection x outcome favorability	-.16	.16	[-.48; .17]
4. Job type	-.26	.71	[-1.65; 1.14]
5. Procedural justice of the AI-assisted selection x Job type	.02	.18	[-.34; .37]
6. Outcome favourability X Job type	.08	1.07	[-2.02; 2.19]
7. Procedural justice of the AI-assisted selection x Outcome favourability x Job type	.02	.28	[-.52; .57]
8. Previous experience with AI-assisted selection (0 = yes, 1 = no)	.20	.46	[-.60; 1.29]
9. AI usage experience (0 = yes, 1 = no)	.28	.28	[-.28; .84]
10. Age	.02	.01	[-.004; .05]
11. Gender (0 = female, 1 = male)	.06	.26	[-.83; .57]

Discussion

The present study investigated the extent to which outcome favourability of the AI-assisted selection process and the job type for which an applicant is evaluated (non-leadership vs. leadership role) moderated the relationship between trust in AI-assisted selection and the procedural justice of the selection process, on the one hand, and, intentions to recommend the organization to others, on the other hand.

The results of testing Hypothesis 1 indicate substantial variability in intention to recommend the organization, depending on the decision context defined by the specific combination of outcome favourability, job type, and participants' trust in AI-assisted selection. Although we did not identify a general positive linear association between trust in AI and intention to recommend the organization, as reported in prior research (e.g., Lee, 2018), our findings show that this relationship is highly context dependent. When outcomes were favourable, trust in AI-assisted selection was positively associated

with the intention to recommend the organization for both non-leadership and leadership roles. Similarly, under less favourable conditions, specifically when applicants received an unfavourable outcome for a leadership position, but not for a non-leadership role, higher trust in AI was associated with a stronger intention to recommend the organization. These findings are consistent with prior literature suggesting that positive feedback reinforces favourable organizational images and contributes to perceiving AI-based evaluators as fair and legitimate (Bigman & Gray, 2018; Köchling & Wehner, 2020; Van den Bos & Lind, 2002). Furthermore, they extend previous research by demonstrating that trust in AI does not operate independently of contextual cues but is interpreted through the lens of applicants' selection experiences.

The context-dependent effect of trust in AI-assisted selection on intention to recommend the organization are also consistent with by Expectancy Theory (Vroom, 1964). In line with this theory, individuals evaluate decision-making systems

more positively when outcomes align with their expectations. When AI-generated evaluations meet applicants' expectations, particularly in favourable outcome conditions, trust in AI is reinforced and translates into positive organizational advocacy.

These findings provide a nuanced understanding on the role of AI in the applicant–organization interactions during personnel context. Rather than functioning solely as a technological decision aid, AI appears to serve as an actor whose evaluations are interpreted through cognitive and social lenses. This interpretation aligns with prior research showing that individuals attribute intentionality and responsibility to algorithmic agents, particularly when such systems influence decisions intervene in processes with high personal stakes or high-impact domains such as healthcare and justice (Araujo et al., 2020; Lima, 2020). Consequently, applicants' evaluations of AI-assisted selection extend beyond assessment of algorithmic performance to encompass broader judgements about organizational norms, social interactions, and cultural expectations (Binns et al., 2018). These perceptions, in turn, shape organizational image and applicants' subsequent reactions to selection, such as intention to recommend the organization as a good employer. Together, these findings suggest that the effectiveness of AI-assisted selection depends not only on the technical quality of algorithmic decisions but also on how AI systems are embedded within the broader social and organizational context. This understanding highlights the inherent complexity of AI-based selection systems and underscores the importance of designing and implementing AI-selection systems that acknowledge applicants' social and cognitive reactions alongside technological performance (Shrestha et al., 2019).

Contrary to our expectations, the positive linear relationship between perceived procedural justice and intention to recommend the organization was not moderated by outcome favourability, job type or their interaction. These findings suggest that the relationship between perceived procedural justice and intention to recommend the organization is robust across AI-automated selection contexts and does not depend on the

specific decision circumstances experienced by applicants. One possible explanation is that procedural justice perceptions represent a relatively stable, overarching evaluation of the social treatment provided by the organization (Colquitt et al., 2001; Colquitt & Zipay, 2015), which develop over time, rather than a function of a particular decision-making system. Consequently, once applicants form judgments that the selection process is procedurally fair, these evaluations appear to shape organizational endorsement irrespective of whether the outcome is favorable or unfavorable or whether the position involves leadership or non-leadership responsibilities.

Our study contributes to the growing literature on the integration of emerging technologies, such as AI, into personnel decision-making, particularly within employee selection (Tambe et al., 2019). Although prior research has largely emphasized the operational benefits of AI such as greater efficiency, faster processing, and reduced costs, our findings highlight its broader organizational implications. Specifically, the adoption of AI-assisted selection systems transforms the nature of applicant–organization interactions by altering how applicants interpret organizational decisions, evaluate procedural fairness, and develop trust in organizational decision-making (van Esch & Black, 2019). Moreover, it realigns the roles of the parties involved in the selection process, and, at a more fundamental level, redefines the core principles that govern final hiring decisions (Shrestha et al., 2019).

Our findings also contribute to extending Gilliland's (1993) fairness in selection model to AI-assisted selection contexts by demonstrating that perceived procedural justice remains a central determinant of applicants' intention to recommend the organization. This suggests that the theoretical principles underlying applicant reactions to traditional selection procedures continue to apply when personnel decisions are supported by algorithmic systems. At the same time, these findings reinforce the emerging perspectives on "algorithmic fairness" by indicating that applicants evaluate AI-assisted selection not only in terms of technical accuracy but also through a holistic approach

centred on fair interface design and perceived control (Binns, 2018; Fenwick et al., 2024; Nørskov et al., 2022).

More broadly, our findings call for a fundamental reconfiguration of the role of Human Resource (HR) professionals in AI-assisted personnel selection. As organizations increasingly integrate AI into operational environment, HR professionals are likely to assume responsibilities that extend beyond traditional assessment and or interviewing functions and become essential mediators between algorithms and applicants by interpreting algorithmic recommendations, contextualizing AI-generated decision, and communicating these decisions effectively to applicants (Meijerink & Bondarouk, 2021; Tambe et al., 2019; van den Broeck et al., 2024; Wiblen & Marler, 2021). This transformation in HR professionals' responsibilities requires the development of specific competencies through continuous professional training focused on digital literacy, technology ethics, and empathetic communication (Cascio & Montealegre, 2016; Reicho et al., 2026; van den Broeck et al., 2024; Wiblen & Marler, 2021). HR practitioners should be able to interpret AI-generated decision, contextualize them appropriately, and communicate them in a manner that is sensitive to applicants' emotional and cultural needs. Rather than diminishing the importance of human involvement, the increasing adoption of AI appears to redefine the HR role toward facilitating transparent, legitimate, and applicant-centred interactions between organizations and AI-enabled decision systems (Meijerink et al., 2021; Strohmeier & Piazza, 2015). This evolving role is further supported by recent evidence from the HRxAI European Survey 2026 (European Association for People Management, 2026), which highlights that HR professionals across Europe view human accountability, AI literacy, transparent governance, and responsible implementation as essential prerequisites for the successful integration of AI into HR practices.

A major implication of this investigation is that AI-assisted selection functions not only as a technological innovation but also as a

cultural signal communicated by organizations to prospective applicants (Binns et al., 2018; Langer et al., 2019; Ziewitz, 2016). Our findings that applicants evaluate the use of AI not solely in terms of its technical capabilities but also as an indicator of the organization's commitment to fairness, transparency, and responsible decision-making. Thus, the organizational consequences of AI adoption depend not only on algorithmic performance but also on the consistency between AI-assisted selection practices and the values the organization seeks to project (Leicht-Deobald et al., 2019). When AI is integrated as part of an organizational culture oriented toward responsible innovation, fairness, and transparency, its impact on employer branding may be significantly positive (van Esch & Black, 2019).

The present study has several limitations. First, the research design constrains the formulation of robust causal inferences. In this regard, future research could adopt experimental designs that allow for the manipulation of independent variables or longitudinal designs that enable the examination of the evolution and the temporal dynamics of variables/ perceptions over time.

Another limitation pertains to the operationalization of outcome favourability of the selection process which was manipulated dichotomously (accepted vs. rejected). Although this approach facilitated experimental control, it overlooks other characteristics of AI-generated decision that may shape applicants' reactions such as the perceived clarity, empathy, personalization, and transparency of the communication. Prior studies show that when negative feedback in selection is clearly formulated and accompanied by coherent and relevant justifications, it exerts a reduced influence on the applicants' willingness to recommend the organization to others (Binns et al., 2018; Gilliland, 1993). Thus, quality of feedback, regardless of its valence, can significantly shape the applicants' intention to recommend the organization to other (Lavanchy et al., 2023). Providing clear, structured and well-justified feedback may not only mitigate applicants' negative reactions but also

preserve favourable perception of the organization, thereby strengthening its employer image (Bauer et al., 2001; Fijneman-Ghielen et al., 2026; Truxillo et al., 2004). Hence, future research should examine these qualitative attributes of AI-assisted selection, as well as the role of cognitive and affective mediation processes in the relationship between AI system design and user or stakeholder reactions. Moreover, recent research on digital selection procedures suggests that applicants' reactions are shaped not only by the characteristics of the selection process but also by individual psychological differences (Costa et al., 2025). Specifically, personality traits, such as openness to experience, positively influence perceptions of procedural justice, whereas privacy concerns undermine procedural justice perceptions. These perceptions, in turn, affect organizational trust, person–organization fit, and behavioral intentions toward the organization. Accordingly, future research should further investigate how additional individual-level characteristics, such as need for control and other personality traits, contribute to interindividual variability in the acceptance of AI-assisted decisions and applicants' responses to automated selection processes.

In the present study, we examined a series of moderation relationships within the context of simulations involving an AI-conducted interview and the communication of the hiring decision by AI. Future research could extend this work by examining hybrid selection decisions that involve both AI systems and human agents (Coombs et al., 2021; Dellermann et al., 2019; Raisch & Krakowski, 2021; Shrestha et al., 2019), as collaboration between human and algorithmic decision-makers raises complex questions related to coordination, delegation, and the ethics of shared responsibility (Gomez et al., 2026; Mittelstadt et al., 2016). Accordingly, the present study opens a fertile avenue for inquiry at the human–technology interface, underscoring the need for an integrative paradigm that simultaneously addresses individual, contextual, and technological variables to fully understand the impact of AI on selection decisions, and personnel decisions more broadly.

We considered in our study only the intention to recommend the organization as a good employer to others. Future studies could expand the range of applicant reactions, including affective reactions. For instance, Kang (2020) highlighted that AI-based hiring rejections are experienced as socially evaluative events, not merely technical decisions. When AI decisions lack transparency and explanation, perceptions of procedural justice and trust in the system decline, amplifying negative emotional reactions. Conversely, fair and transparent AI processes can help preserve trust and mitigate adverse applicant responses.

The sample used in the present study limits the generalizability of the findings to other organizational and cultural contexts. Our sample consisted predominantly of only university students. Specifically, 63.20% of participants were students without employment, whereas 36.80% were simultaneously students and employees, indicating that most participants had relatively limited labor market experience and, according to their self-reports, minimal prior exposure to AI-assisted selection. Although this sample is appropriate for examining initial perceptions of AI-enabled personnel selection, it may not fully capture the experiences, expectations, and decision-making processes of applicants participating in actual organizational AI-assisted selection procedures. Individuals with more extensive work experience or previous exposure to AI-assisted selection may evaluate algorithmic decision making differently, particularly with respect to trust, procedural justice, and behavioral intentions and in high stake situations. Consequently, the generalizability of the present findings to broader applicant populations should be interpreted with caution. Future research should replicate these findings using more diverse samples of active job seekers and experienced professionals across industries and organizational contexts. Moreover, emerging evidence suggests that acceptance of AI is deeply culture-dependent, and cultural dimensions such as collectivist orientation may shape how individuals and groups perceive automated decisions, including personnel selection contexts (Gupta et al., 2022; Ma & Deng, 2022). Accordingly,

cross-cultural comparative investigations could further refine the proposed theoretical model and provide better understanding how cultural and contextual factors influence responses to automated selection decisions following a structured employment interview.

Conclusion

This study investigated the extent to which interaction between the outcome favourability of the selection process and the job type for which an applicant is evaluated (leadership vs. non-leadership role) moderated the relationship between, on the one hand, trust in AI-assisted selection and the procedural justice of the selection process and, on the other hand, intentions to recommend the organization to others.

The results indicate that trust in AI positively influences intention to recommend the organization under specific conditions defined by outcome favourability and the job type for which applicants are evaluated. Perceived procedural justice was positively associated with intention to recommend the organization to others. However, perceptions of procedural justice did not interact with outcome favourability or job type in explaining the examined outcomes. These findings are consistent with prior research suggesting that procedural justice perceptions and trust in AI-related decisions play a different central role in shaping applicant intentions toward organizations.

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Appendix 1

Example of scenario

Participants were asked to place themselves in the role of a candidate applying for a job position and to go through the following base scenario, designed to reflect in an authentic and detailed manner the dynamics of an automated interview:

"We invite you to go through a short scenario that describes the process of applying for a job position. As you read the text, we encourage you to imagine yourself in the position of the candidate and to reflect on how you would react in this situation. After you have finished reading, please answer a few questions regarding your perceptions and reactions to this experience.

Read the following scenario:

Imagine that you are applying for a job you are very interested in and that DOES involve a leadership role. Following your application, the automated recruitment system sends you an email inviting you to a virtual interview, conducted through an artificial intelligence program that uses your computer's webcam.

During the structured interview, the artificial intelligence program asks you a series of situational and behavioral questions, such as: «Describe a situation in which you had to adapt your work style to meet the requirements of a diverse team» or «Give an example of a difficult decision you had to make and explain the reasoning behind it». Your responses are recorded, and the artificial intelligence program analyzes both the verbal content and non-verbal elements, such as tone of voice, facial expressions, and response time.

At the end of the interview, the AI system thanks you for your participation and informs you that the organization will communicate its decision within two weeks, based on the recommendation generated by the artificial intelligence and validated by the Human Resources Department."

RESEARCH ARTICLE

Resilience and Burnout in Healthcare Professionals: The Mediating Role of Dispositional Mindfulness and the Role of Grit Among a Hungarian Minority in Romania

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Abstract

Burnout among healthcare professionals represents a critical organizational challenge, yet limited research has examined how personal psychological resources jointly operate in minority work contexts. This study investigated the combined roles of resilience, dispositional mindfulness, and grit in predicting burnout and examined the mediating role of mindfulness in the resilience–burnout relationship among healthcare professionals from a Hungarian minority in Romania. A sample of 152 employees from state hospitals (mean age = 44.18 ± 10.89 years) completed validated Hungarian-language measures of burnout, resilience, grit, and mindfulness between November 2023 and March 2024. Hierarchical regression analyses indicated that resilience, dispositional mindfulness, and grit each contributed uniquely to lower burnout. Resilience was most strongly associated with personal accomplishment, whereas mindfulness was primarily related to reduced emotional exhaustion and depersonalization. Mediation analyses showed that dispositional mindfulness partially mediated the relationship between resilience and burnout, while grit exerted a direct but modest effect. These findings highlight the importance of integrating multiple personal resources into organizational burnout prevention strategies in healthcare settings.

Keywords

burnout, mindful awareness, resilience, grit, healthcare professionals, minority

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Conflicts of Interest

The authors declare no conflict of interest.

INTRODUCTION

The *phenomenon of burnout* was originally identified and described in the field of human services, especially health care (Freudenberger, 1974; Maslach, 1976). The World Health Organization (WHO, 2025) has defined three dimensions in the assessment and diagnosis of the phenomenon: energy depletion, mental detachment, and reduced professional effectiveness. Burnout or professional exhaustion syndrome develops because of prolonged exposure to chronic stressors (Maslach et al., 2001; Hillert et al., 2020), during which the individual becomes mentally and physically exhausted (Ádám et al., 2006). The depletion of personal resources occurs gradually and leads to long-term suffering and a decrease in work performance, although it is possible that the individual only shows signs of the syndrome emotionally, while objective performance may remain unchanged (Csehák & Papp, 2006; Fülöp, 2016; De Hert, 2020). Burnout syndrome is defined as “a prolonged response to chronic emotional and interpersonal stressors at work” (Maslach, 2008, p. 68), during which the individual experiences suffering and loses the capacity for meaningful work.

Health professionals are exposed to significant psychological strain in their daily work, given that they constantly bear the burden of responsibility for human life and health (De Hert, 2020). At least 40% of health workers show symptoms indicative of burnout (Galanis et al., 2021; Györffy & Girasek, 2015). Györffy and Girasek (2015) found that the prevalence of burnout among Hungarian healthcare professionals ranges between 30–35%, which is consistent with European data. Burnout syndrome is also a significant challenge globally. Research from many countries and continents shows similarly high rates of professional exhaustion, and all segments of health workers are at risk of burnout.

Healthcare workers are frequently exposed to substantial pressure, given the immense responsibility they bear for the preservation of life and health in their daily practice. These conditions highlight the importance of prevention. The relevance of our study lies in the recognition that the overall quality of the

Romanian healthcare system is linked to the mental health and psychological well-being of its workforce, as well as to the support they receive in providing high-quality care (De Hert, 2020; Galanis et al., 2021).

The present study is conceptually grounded in the *Job Demands–Resources (JD–R)* model, which provides a comprehensive framework for understanding burnout in occupational settings (Bakker & Demerouti, 2017; Lesener et al., 2019). According to this model, burnout develops when job demands exceed the individual’s available resources, resulting in prolonged strain and emotional exhaustion (Bakker & Demerouti, 2017).

In contrast, personal resources such as resilience, dispositional mindfulness, and grit can buffer the negative effects of job demands and support adaptive functioning (Xanthopoulou et al., 2007; Mazzetti et al., 2018). Recent research has further highlighted the role of personal resources in promoting well-being and reducing burnout in healthcare and other high-demand professions (Han et al., 2019; Saks, 2022). Within this framework, resilience may enhance individuals’ capacity to cope with stress, dispositional mindfulness may facilitate emotional regulation and present-moment awareness, and grit may support sustained effort under challenging conditions. Thus, the JD–R model provides a useful integrative perspective for examining how these psychological resources, both individually and collectively, contribute to the prevention of burnout among healthcare professionals.

Grit reflects perseverance and sustained effort toward long-term goals, persistent, and goal-oriented since it is linked to perseverance, enthusiasm, diligence, and dedication toward long-term objectives (Duckworth et al., 2007). Resilience enables individuals to effectively adapt to and cope with stress, challenges, and adversity, allowing them to regain balance and move forward after difficulties or trauma (Györffy & Girasek, 2015; Duckworth et al., 2020; Miller-Matero et al., 2018). Prior studies have revealed several important relationships among the constructs under investigation. Miller-Matero et al. (2018) found that

individuals with higher levels of grit performed better in demanding medical courses and were more likely to complete their studies within six years of medicine. By contrast, students with lower grit scores were twice as likely to drop out of medical school. Furthermore, research conducted both in healthcare contexts and among student populations more broadly has demonstrated that grit can mitigate levels of burnout. Hewitt et al. (2022) provided detailed evidence regarding the significance of grit for the well-being of healthcare workers, showing that grit scores were inversely related to burnout, contemplation of leaving the profession, and the occurrence of suicidal ideation. Among internal medicine specialists, higher grit scores were associated with a significant reduction in emotional exhaustion. A Romanian study further indicated that grit emerged as an independent predictor of burnout and partially mediated the relationship between occupational stress and burnout (Brateanu et al., 2020). Additional findings reinforce the protective role of grit. Lower grit scores significantly predicted higher levels of post-traumatic stress disorder symptoms, including denial, substance use, detachment, and self-blame (Musso et al., 2019). This correlation was also supported by research done on dentists (Al-Zain & Abdulsalam, 2021).

Dispositional mindfulness, understood as the deliberate and attentive presence in the current moment, fully observing and accepting thoughts, emotions, bodily sensations, and external stimuli as they arise - has been shown to reduce stress, enhance emotional stability, improve attention and concentration, and foster overall well-being and life satisfaction (Blanke et al., 2018; Rowland et al., 2020; Khoury, 2023). Differentiating between dispositional mindfulness and mindfulness practice is important. Regardless of formal training, dispositional mindfulness is a reasonably consistent individual inclination to pay attention to present-moment experiences with awareness and nonjudgment (Baer et al., 2006; Brown & Ryan, 2003). The goal of mindfulness practice, on the other hand, is to gradually develop this capacity through structured interventions like meditation or

mindfulness-based programs (Kabat-Zinn, 1994; Creswell, 2017). While mindfulness-based therapies are intended to improve these skills via methodical training, recent research highlights that dispositional mindfulness represents naturally occurring individual differences (Goldberg et al., 2018; Lindsay & Creswell, 2019). In order to investigate naturally occurring individual differences in mindfulness, the current study focuses on dispositional mindfulness as a personal resource rather than the impacts of mindfulness-based therapies.

According to the review by Jaworska-Burzyńska et al. (2016), mindfulness-based interventions reduce burnout among healthcare professionals, with effects observed particularly in the domains of emotional exhaustion and personal accomplishment. The effectiveness of self-focused methods is illustrated by an eight-week mindfulness and breathing exercise program studied among physicians, which demonstrated significant improvements in emotional exhaustion, professional efficacy, and perceived stress (Pflugeisen et al., 2016). In a meta-analysis involving 2,101 healthcare workers, Lomas et al. (2018) examined studies targeting two broad categories of well-being outcomes: (a) “negative” mental health indicators, such as anxiety, depression, and stress; and (b) “positive” well-being indicators, including life satisfaction and emotional intelligence. Overall, the interventions were associated with positive outcomes - though with moderate effect sizes - and the evidence suggests that mindfulness enhances healthcare professionals’ well-being, thereby reducing the risk of burnout. Fendel et al. (2021) examined studies involving 925 physicians and found that established versions of mindfulness-based interventions demonstrated greater effectiveness in reducing stress than alternative MBI formats or mindfulness applications. Emerging research suggests that dispositional mindfulness not only directly relates to lower burnout but may also function as a mechanistic process linking personal resources to reduced burnout. Mindfulness is associated with increased emotional regulation and self-awareness, enabling

individuals to observe stressors without excessive reactivity, thereby supporting adaptive coping under pressure (Zhang & Fathi, 2024).

Resilience is a trait that can lower overall levels of burnout in nurses, according to research by Arrogante & Aparaña-Zaldivar (2017). This is especially true for workers working in specialized care units like intensive care. Subsequent studies reinforced these associations, including research by Purvis and Saylor (2019) among neuroscience critical care staff, and by Wang (2022) among palliative care providers. Studies targeting both nurses and physicians have similarly confirmed the relationship between resilience and burnout (Buck et al., 2019; Wang et al., 2022). Abram and Jacobowitz (2021) examined the relationship between resilience and burnout among inpatient psychiatric nurses working in high-responsibility settings and among medical students. Their results revealed a significant inverse association between resilience and burnout in both groups. Notably, students reported much higher levels of burnout than inpatient psychiatric nurses. Nevertheless, the nurse group did not show greater resilience than the student group when age was statistically adjusted. This shows that age did not account for differences in burnout among groups but rather emerged as a greater predictor of resilience than the professional or academic environment. These results suggest that resilience may be more significantly influenced by life experience (as indicated by age) than by psychological adjustment to stress at work alone. Studies conducted during the COVID-19 pandemic have further underscored the importance of resilience in reducing burnout, both among nurses (Jose et al., 2020) and physicians (Di Monte et al., 2020), as well as in healthcare workers more broadly (Duarte et al., 2022).

Personal resources, including dispositional mindfulness, resilience, and grit, have been identified as important factors in burnout prevention, both overall and across specific dimensions of burnout. Evidence indicates that higher levels of resilience are associated with greater mindfulness and are linked to improved psychological outcomes via these self-regulatory capacities (Pangngay, 2024). Although studies directly examining

grit and mindfulness are sparse, research on related personal resources and psychological functioning suggests that traits involving sustained effort and goal orientation, such as grit, may bolster mindful attentional control and non-judgmental engagement with stress (Calo, 2024). However, empirical evidence directly linking grit to dispositional mindfulness remains limited, suggesting that grit may operate through alternative pathways rather than mindfulness-based self-regulation. In healthcare education contexts, cross-sectional findings show that students with higher dispositional mindfulness exhibit lower levels of burnout (Zúñiga et al., 2025), supporting the putative role of mindfulness in mitigating job-related exhaustion and disengagement. Mindfulness also enhances adaptive emotion regulation, which has been linked to reduced occupational stress and burnout in high-demand professions (Hidajat et al., 2023; Canu et al., 2019). Collectively, these findings provide a theoretical basis for conceptualizing dispositional mindfulness as a mediator that transmits the protective effects of grit and resilience to reduced burnout among healthcare professionals, forming the basis for the hypothesized mediation model.

Possible mediation pathways linking personal resources to burnout have increasingly attracted attention in recent research, as they may help clarify the mechanisms through which protective factors exert their effects. Although both resilience and dispositional mindfulness have been independently associated with lower levels of burnout (Arrogante & Aparicio-Zaldivar, 2017; Lomas et al., 2018), the processes linking these constructs remain insufficiently specified. Given that mindfulness supports emotional regulation and adaptive responses to stress (Kabat-Zinn, 1994; Zhang & Fathi, 2024), it may represent a pathway through which resilience exerts its protective effect. Accordingly, dispositional mindfulness may function as a mediating mechanism in the relationship between resilience and burnout.

Although grit has also been associated with reduced burnout (Hewitt et al., 2022; Brateanu et al., 2020), it primarily reflects perseverance and sustained effort toward long-term goals (Duckworth et al., 2007). At the same time, emerging evidence suggests

that goal-directed persistence and attentional control may be linked to mindfulness-related processes (Calo et al., 2024). This raises the possibility that mindfulness may also contribute to explaining the relationship between grit and burnout. Therefore, dispositional mindfulness is examined as a potential mediating mechanism in the relationships between grit and burnout.

Linguistic minority healthcare workers may face additional workplace stressors such as cultural incongruence, less institutional representation, and communication needs (e.g., Schouten & Meeuwesen, 2006; Karliner et al., 2007). By concentrating on Hungarian-speaking medical personnel in Romania, the current study expands on previous findings to an understudied cultural and linguistic setting. The study provides contextually grounded findings that may guide future cross-cultural and comparative research on burnout and psychological resources in healthcare settings, even while it does not seek to isolate impacts unique to minorities.

The study's motivation stems from the fact that although burnout and its psychological effects have been extensively studied, there are still a number of important knowledge gaps.

First, previous research has mostly examined grit, resilience, and mindfulness separately, which has limited knowledge of their combined and relative contributions within a single model. Looking at these three personal resources at the same time, the current study fills this gap and enables a more comprehensive evaluation of their distinct and common impacts on burnout.

By testing dispositional mindfulness as a mediator between resilience and burnout, this study contributes to clarifying the psychological processes through which protective factors operate. Second, there has not been as much empirical study on dispositional mindfulness's potential as a mediation mechanism between burnout outcomes and more comprehensive personal resources, even though it has been generally associated with lower levels of burnout. Third, the study provides a differentiated analysis of burnout dimensions, demonstrating that personal resources may exert domain-specific

effects rather than uniform protective influence. This advances our understanding of burnout as a multifaceted concept, and the current study tackles these facets.

Research Objectives

Based on prior findings, we expected that grit, resilience, and mindfulness (conceptualized as dispositional present-moment awareness) would work as protective factors against burnout. An additional, practical purpose was also formulated: if grit, resilience and mindfulness are confirmed as protective variables against perceived burnout, this would underline the need to focus and improve these capacities among healthcare personnel. The primary aim of the study was to examine the joint and differential roles of resilience, dispositional mindfulness, and grit in burnout, with a specific focus on the mediating role of mindfulness, in a Transylvanian Hungarian healthcare population. The research may aid in identifying physicians and nurses who are sensitive to burnout, as well as influence the development of viable management measures. Finally, the study aimed to examine how these psychological factors operate jointly within a mediation framework.

Hypotheses

In line with the theoretical framework, prior research, and the aims of the present study, we formulated the following hypotheses:

- **H1:** Grit will be negatively associated with burnout, such that higher levels of grit are expected to correspond with lower levels of burnout among healthcare professionals.
- **H2:** Resilience will be negatively associated with burnout among physicians and nurses.
- **H3:** Dispositional mindfulness will be negatively associated with burnout among physicians and nurses.
- **H4:** Dispositional mindfulness is expected to mediate the relationships between (a) resilience and burnout, and (b) grit and burnout.

Because of the distinct linguistic and cultural background of Hungarian-speaking healthcare personnel in Romania, these assumptions were examined with particular focus to the function of individual psychological resources in mitigating burnout.

METHOD

Design and Procedure

A cross-sectional, correlational research design was employed using an online questionnaire survey. Eligibility criteria required participants to be currently employed within the healthcare system. Data collection targeted healthcare professionals from a Hungarian-speaking minority in Romania. The participants worked at state healthcare facilities in Transylvania, a part of Romania where Hungarian-speaking people are highly concentrated and frequently make up the local majority. A convenience sample was obtained through snowball sampling, and full anonymity was ensured. Participation was voluntary, and informed consent was obtained prior to data collection.

The questionnaire package was administered online and required approximately 20 minutes to complete. No extreme outliers were identified in the dataset. Raw data were processed using IBM SPSS Statistics (Version 26.0). Descriptive statistics (means, standard deviations, and percentage distributions) were used to characterize the sample. To test the study hypotheses, tests of normality (skewness and kurtosis indices), Spearman's rank-order correlations, hierarchical multiple regression analyses, and mediation analyses using the PROCESS macro for SPSS were conducted (Pallant, 2020; Tabachnick & Fidell, 2019).

An a priori power analysis conducted using *GPower* (Faul et al., 2009) indicated that a minimum sample size of 102 participants

was required to detect a medium effect size ($r = .30$) with a significance level of $\alpha = .05$ and statistical power of .80 for correlational analyses. For the regression analyses, *GPower* indicated that, with four predictors, a minimum of 77 participants was required to detect a medium effect size ($f^2 = .15$) with .80 power. Accordingly, the final sample size of 152 participants was sufficient to test the proposed hypotheses.

This study was conducted in accordance with the ethical standards of the Declaration of Helsinki. Participation was voluntary and anonymous, and informed consent was obtained from all participants prior to data collection. No identifying information was collected, and participants were informed of their right to withdraw at any time without penalty.

Participants

The study sample consisted of 152 healthcare professionals (average age 44.18 ± 10.89 years), including 65 physicians (42.8%) and 87 nurses (57.2%). Women made up more than two thirds of the participants. Participants represented a wide range of medical specializations, with the largest proportions working in pediatrics (19.1%), intensive care (13.6%), surgery (11.1%), and family medicine (8.0%), while other specialties were represented in smaller numbers. Most participants were employed as non-managerial staff (67.3%), followed by middle managers (18.5%) and senior managers (8.2%). 30.2% had more than 20 years of experience, and the remaining participants were relatively evenly distributed across earlier career stages. The majority worked 40–45 hours (35.2%) or 45–50 hours (34.0%) per week. In terms of marital status, 59.9% were married or cohabiting, and 45.7% reported having no children. More details are found in Table 1.

Table 1. Demographic characteristics of the sample (N = 152)

Categories	Total (n)	Distribution %
Occupation		
Physician	65	42.8
Nurse	87	57.2
Specialization		
Internal Medicine	10	6.2
Dermatology, Radiology	7	4.3
Physiotherapy, Otolaryngology, Traumatology, Urology	2	1.2
Pediatrics	31	19.1
Infectious Diseases, Dentistry	3	1.9
Epidemiology, Neurology, Oncology, Psychiatry, Ophthalmology, Pulmonology, Pathology	1	0.6
Cardiology	5	3.1
Gynecology	6	3.7
Surgery	18	11.1
Family Medicine	13	8.0
Intensive Care	16	13.6
Emergency Medicine	9	5.7
Position		
Senior Manager	13	8.0
Middle Manager	30	18.5
Non- managerial employee	106	67.3
Years of Professional Experience		
0–5 years	24	14.8
5–10 years	23	14.2
10–15 years	27	16.7
15–20 years	29	19.7
More than 20 years	49	30.2

Categories	Total (n)	Distribution %
Weekly Working Hours		
30–40 hours	33	20.4
40–45 hours	57	35.2
45–50 hours	55	34.0
More than 50 hours	7	4.3
Marital Status		
Single	36	22.2
Married, cohabiting	97	59.9
Married, living separately	8	4.9
Divorced	9	5.6
Widowed	2	1.2
Number of Children		
0	74	45.7
1	58	38.5
2 or more	20	12.3

Instruments

In addition to demographic data, the study employed validated, objective self-report questionnaires with established internal reliability. All instruments were administered in Hungarian using previously validated versions. The scales have demonstrated adequate psychometric properties in prior research, and internal consistency coefficients obtained in the present sample are reported in Table 2. The *Maslach Burnout Inventory – Human Services Survey* (MBI-HSS; Maslach et al., 1996) is specifically designed to assess burnout among professionals working in the human services sector. The *Maslach Burnout Inventory – Human Services Survey* (MBI-HSS; Maslach et al., 1996) comprises 22 items assessing three dimensions of burnout: Emotional Exhaustion (9 items; e.g., feeling emotionally drained or fatigued by work), Depersonalization (5 items; e.g., developing

detached or impersonal responses toward service recipients), and Personal Accomplishment (8 items; e.g., feeling competent and effective in one's professional role). Items are rated on a 7-point frequency scale ranging from 0 (*never*) to 6 (*every day*), with higher scores on Emotional Exhaustion and Depersonalization and lower scores on Personal Accomplishment indicating greater burnout. Burnout prevalence categories were determined using the standard cutoff scores of the *Maslach Burnout Inventory – Human Services Survey* (MBI-HSS; Maslach et al., 1996), whereby Emotional Exhaustion scores of 0–16 were classified as low, 17–26 as moderate, and ≥ 27 as high; Depersonalization scores of 0–6 as low, 7–12 as moderate, and ≥ 13 as high; and Personal Accomplishment scores of ≥ 39 as high, 32–38 as moderate, and ≤ 31 as low, with lower Personal Accomplishment scores indicating greater burnout (Maslach et al., 1996).

Grit Scale is one of the most frequently used measures of grit is the 12-item developed by Duckworth (2009). The scale assesses the degree to which respondents persist in working toward long-term goals, maintaining effort and interest over years despite failures, setbacks, or plateaus in progress. The instrument evaluates grit across two dimensions: (1) Perseverance of Effort: The willingness and ability to sustain effort toward long-term goals, even when facing difficulties or failure (e.g., “I have achieved a goal that took years of work.”). (2) Consistency of Interest: The tendency to maintain enduring commitment and passion for long-term objectives (e.g., “I overcame setbacks to conquer an important challenge.”).

Connor–Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) is a widely used measure of psychological resilience, reflecting the ability to successfully cope with stress and adversity. The 10-item version was administered, allowing individuals to evaluate their internal resources and capacities to recover from difficulties (e.g., “I tend to

bounce back after illness, injury, or other hardships.”).

The *Five Facet Mindfulness Questionnaire* (FFMQ; Baer et al., 2006; Szekeres et al., 2024) assesses multiple dimensions of mindfulness as a dispositional trait. It consists of five subscales: observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience. Items are rated on a 5-point Likert-type scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*), with higher scores indicating greater levels of dispositional mindfulness. Example items include “I notice the smells and aromas of things” (observing), “I’m good at finding words to describe my feelings” (describing), “I find myself doing things without paying attention” (acting with awareness; reverse scored), “I criticize myself for having irrational or inappropriate emotions” (nonjudging; reverse scored), and “I perceive my feelings and emotions without having to react to them” (nonreactivity)

Table 2. Reliability coefficients of the instruments (N = 152)

Instruments	Min.-Max,	Mean	SD	Cronbach’s α
Maslach Burnout Inventory	.73-5.55	2.52	0.81	.845
Duckworth’s Grit Scale	2.47-3.82	3.20	0.25	.658
Connor–Davidson Resilience Scale	1.33-4.00	2.98	0.64	.776
Five Facet Mindfulness Questionnaire	2.22-4.52	3.38	0.42	.865

Results

Normality was assessed using the Kolmogorov–Smirnov test, as well as skewness and kurtosis indices (Table 3). Although the Kolmogorov–Smirnov test indicated significant deviations from normality for all variables ($p < .05$), this test is known to be overly sensitive in samples of moderate to large size and may detect trivial deviations from normality (Ghasemi & Zahediasl, 2012). Examination of skewness

and kurtosis values, together with graphical inspection, indicated that most variables approximated normal distributions. Spearman’s rank-order correlations were therefore used for bivariate analyses as a conservative approach given minor deviations from normality. Regression and mediation analyses were conducted using methods robust to such deviations, including bias-corrected bootstrap confidence intervals implemented with the PROCESS macro for SPSS (Hayes, 2018; Preacher & Hayes, 2008).

Bootstrapping is a non-parametric resampling procedure that does not assume normality of the sampling distribution of indirect effects and has been shown to provide more accurate confidence intervals and greater statistical power than traditional parametric approaches under conditions of non-normality (MacKinnon et al., 2004). Accordingly, the applied statistical procedures were considered methodologically appropriate and robust for testing the hypothesized mediation model despite deviations from normality in the observed variables.

Table 3. *Data distribution results (N=152)*

Variables	Kolmogorov-Smirnov		Skewness	Kurtosis
		<i>p</i>	<i>df</i>	<i>p</i>
Maslach Burnout Inventory	.065	.002	.478	.590
Duckworth- Grit Scale	.082	.004	.091	-.222
Connor–Davidson Resilience Scale	.092	.003	-.387	-.526
Five Facet Mindfulness Questionnaire	.084	.014	.436	.297

Using the standard cutoff values of the Maslach Burnout Inventory–Human Services Survey (MBI-HSS; Maslach et al., 1996), burnout prevalence was evaluated separately for the three burnout dimensions. Emotional Exhaustion scores between 0–16 were considered low, 17–26 moderate, and scores of 27 or above high. For Depersonalization, scores between 0–6 indicated low levels, 7–12 moderate levels, and scores ≥ 13 high depersonalization. In the case of Personal Accomplishment, scoring is reversed: scores ≥ 39 reflect high personal accomplishment, scores between 32–38 moderate levels, and scores ≤ 31 reduced personal accomplishment. According to these criteria, 32.9% of participants showed high levels of emotional exhaustion, while 39.5% fell within the moderate range. For depersonalization, 21.7% of participants scored in the high range and 34.9% in the moderate range. Reduced personal accomplishment was particularly pronounced, with 92.8% of the sample scoring within the low personal accomplishment category, whereas 6.5% fell within the

moderate range and only 0.7% demonstrated high personal accomplishment. Overall, while the mean burnout score remained below the midpoint of the scale, elevated burnout symptoms were evident across several dimensions, especially in relation to personal accomplishment. Spearman’s rank correlation analysis detected significant, negative associations between burnout and the examined constructs. Burnout showed a weak negative correlation with grit ($r_s(150) = -0.202, p < 0.05$), and a moderate negative correlation with resilience ($r_s(150) = -0.427, p < 0.001$) and mindfulness ($r_s(150) = -0.485, p < 0.001$). Based on the results of the correlation analyses, after verifying the prerequisites of the linear regression, we implemented a hierarchical regression model, where grit, resilience and mindfulness were included as predictors, and burnout was included as a criterion variable (see Table 5 for the results).

Table 4. Correlations between Burnout, Grit, Resilience, Mindfulness, and Demographic variables among healthcare professionals

Variables	1	2	3	4	5	6	7	8	9
1. Burnout	—								
2. Grit	-.202*	—							
3. Resilience	-.427**	-.004	—						
4. Mindfulness Scale	-.485**	-.019	.585**	—					
5. Gender	.133	.036	.018	-.097	.036	—			
6. Age	-.078	.398**	.000	.073	.047	-.046	—		

Note. M = Mean; SD = Standard Deviation.
p < .05. * p < .01. **

According to the results of the hierarchical regression analysis, all three models showed significant predictive value regarding burnout in healthcare workers. In the first step, grit alone explained 4.5% of the variance ($R^2 = 0.045, p < 0.01, \beta = -0.211$). In the second step, the inclusion of resilience resulted in a significant increase in the explanatory power ($\Delta R^2 = 0.183, p < 0.01$), so that the two

constructs together determined 22.7% of the variance ($R^2 = 0.227, p < 0.001$). In the third step, the inclusion of mindfulness resulted in an additional 7.5% increase ($\Delta R^2 = 0.075, p < 0.01$), so the final model explained 30.2% of the variance in burnout ($R^2 = 0.302, p < 0.001$) (Table 5).

Table 5. Predictive power of Grit, Resilience, and Mindfulness on Burnout

Step	Variables	B	95% CI LL	SE B UL	β	R^2	ΔR^2
Step 1						.045	.045
Constant	4.664***	3.062	6.265	.811			
Grit	-.668**	-1.16	-.17	.252	-.211**		
Step 2						.227***	.183
Constant	6.109***	4.580	7.630	.771			
Grit	-.615**	-1.06	-.165	.220	-.194**		
Resilience	-.541***	-.721	-.361	.091	-.428**		
Step 3						.302***	.075
Constant	7.631***	5.990	9.260				
Grit	-.634**	-1.00	-.204	.210	-.200**		
Resilience	-.289**	-.500	-.077	.100	-.229**		
Mindfulness	-.653**	-.970	-.329	.160	-.338**		

Note. CI = Confidence Interval; LL = lower limit; UL = upper limit, β = standardized coefficients.
***p < .001. **p < .01. *p < .05.

The hierarchical regression model in all three steps proved to be significant in predicting burnout in healthcare workers. The variance explained by the model increased significantly with the second variable entered, and increased with the third. Grit explains 4.5% of the variance in the burnout of healthcare workers. Grit and resilience together explain 22.7% of the variance, and grit, resilience and mindfulness together explain 30.2%. Based on the results, it can be said that the level of grit, resilience, and mindfulness negatively predicts burnout in healthcare workers (Table 5) and all three have significant contribution. During the dimensional analysis of burnout, the examined constructs showed differential predictive value. In the dimensions of emotional exhaustion and depersonalization, mindfulness proved to be the primary protective factor, while in the performance decline component, resilience showed a dominant predictive value (21%), followed by mindfulness with a more moderate (5%) explanatory power.

Table 6. Predictive power of Grit, Resilience, and Mindfulness on Burnout dimensions

Step	Variables	Emotional Exhaustion			Depersonalization			Reduced Personal Accomplishment		
		B	R ²	ΔR ²	B	R ²	ΔR ²	B	R ²	ΔR ²
1	Constant	42.428***			24.91***			29.189***		
	Grit	−6.36*	.031	.031	−5.26**	.057	.057**	−1.827	.008	.008
2	Constant	56.262***			31.88***			38.932***		
	Grit	−5.855*			−5.02**			−1.46		
	Resilience	−5.174***	.016	.129	−2.42***	.131	.075***	−3.64***	.209	.201***
3	Constant	74.149***			41.92***			40.31***		
	Grit	−6.078**			−5.15**			−1.48		
	Resilience	−2.221*			−.677*			−3.41***		
	Mindfulness	−.653***	.024	.080	−4.52***	.205	.073***	−.959	.211	.002

Note. B = unstandardized coefficient; R² = explained variance; ΔR² = change in explained variance. ***p < .001. **p < .01. *p < .05.

We included the three main variables constructs with the three dimensions of burnout in a single common model, and we observed a diversity in predictors, i.e. mindfulness is protective in the emotional exhaustion and depersonalization dimensions, but loses its predictive power in the performance decline dimension, here resilience has a predictive power of more than 21%, followed by mindfulness with a predictive power of 5% (see Table 6 for the results).

Table 7. Mediation analysis of the effect of resilience on burnout through dispositional mindfulness

Path	Predictor → Outcome	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI [LL, UL]	β
a	Resilience → Mindfulness	0.384	0.043	8.89	< .001	[0.299, 0.470]	.588
b	Mindfulness → Burnout (controlling for Resilience)	−0.642	0.168	−3.82	< .001	[−0.974, −0.311]	−.333
c'	Resilience → Burnout (direct effect)	−0.303	0.110	−2.76	.006	[−0.521, −0.086]	−.240
c	Resilience → Burnout (total effect)	−0.550	0.093	−5.93	< .001	[−0.734, −0.367]	−.436
a × b	Indirect effect via Mindfulness	−0.247	0.071 (BootSE)	—	—	[−0.391, −0.110]	−.195

Note. Unstandardized coefficients (*b*) are reported. Confidence intervals for the indirect effect are based on 5,000 bootstrap samples. CI = confidence interval; SE = standard error.

Table 7 displays the mediation results for the model in which dispositional mindfulness was tested as a mediator between resilience and burnout. The overall model was significant, $F(2, 149) = 26.47, p < .001, R^2 = .26$. Resilience positively predicted mindfulness, $b = 0.38, SE = 0.04, t(150) = 8.89, p < .001$. Mindfulness negatively predicted burnout when controlling for resilience, $b = -0.64, SE = 0.17, t(149) = -3.82, p < .001$. The direct effect of resilience on burnout remained significant, $b = -0.30, SE = 0.11,$

$t(149) = -2.76, p = .006$, but was smaller than the total effect, $b = -0.55, SE = 0.09, t(150) = -5.93, p < .001$. The indirect effect through mindfulness was significant, $b = -0.25, BootSE = 0.07, 95\% CI [-0.39, -0.11], \beta = -.20$, indicating partial mediation. Higher resilience was associated with greater mindfulness, which in turn was related to lower burnout (Figure 1). No significant indirect effect was observed for grit in exploratory mediation analyses.

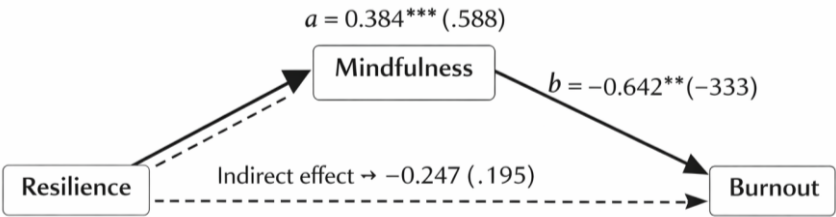


Figure 1. Dispositional Mindfulness as a Mediator between Resilience and Burnout

Discussion

Our study aimed to elucidate the protective roles of grit, resilience, and dispositional

mindfulness in relation to burnout among healthcare professionals. In our sample, 32.9% of participants demonstrated high emotional exhaustion, 21.7% high

depersonalization, and 92.8% reduced personal accomplishment according to the standard MBI-HSS cutoff criteria (Maslach et al., 1996). While the prevalence rates for emotional exhaustion and depersonalization were lower than those reported in Central European healthcare samples during the COVID-19 pandemic (Štěpánek et al., 2023), reduced personal accomplishment appeared markedly elevated in the present sample. These values indicate elevated burnout symptoms across several burnout dimensions within the investigated population. The particularly high prevalence of reduced personal accomplishment should be interpreted cautiously as cultural or contextual factors may influence the normative interpretation of this dimension.

Correlation analyses indicated that burnout was significantly and negatively associated with grit, resilience, and mindfulness (Lomas et al., 2018). Exploration of associations among the constructs revealed a strong positive correlation between resilience and mindfulness. Sociodemographic variables (sex, age) did not show significant associations with the constructs under study. Hierarchical regression analyses identified resilience as the dominant protective factor for both the Maslach Burnout Inventory total score and the reduced personal accomplishment dimension (22% and 20% of explained variance, respectively), corroborating observations by Arrogante and Aparicio-Zaldivar (2017) and Wang et al. (2022). Our first hypothesis - that grit is negatively correlated with burnout - was supported, aligning with conclusions reported by Duckworth et al. (2020) and by Hewitt et al. (2022). The significant negative predictive potential of resilience (Arrogante & Aparicio-Zaldivar, 2017; Purvis et al., 2019; Southwick et al., 2014; Wang et al., 2022) and dispositional mindfulness (Fendel et al., 2021; Harrington et al., 2016; Lomas et al., 2018; Lundwall et al., 2019; Rowland et al., 2020;) was likewise confirmed, underscoring the salient role of these personality characteristics in the prevention of burnout.

A dimensional analysis of burnout revealed a differentiated pattern: in the emotional exhaustion and depersonalization components, the predictive potential of

resilience was attenuated, whereas mindfulness and grit persisted as significant protective factors - findings that are congruent with prior meta-analytic and empirical work (Harrington et al., 2016; Lomas et al., 2018). The heterogeneity detected across subdimensions likely reflects cultural and moderating effects (Brateanu et al., 2020; Ferreira & Gomes, 2021). Taken together, these findings point to the multidimensional nature of burnout and to the differentiated mechanisms through which protective factors exert their effects.

In our study, alongside grit (Al-Zain & Abdulsalam, 2021; Lee et al., 2021; Miller-Matero et al., 2018; Musso et al., 2019; Park & Kim, 2023) and mindfulness (Fendel et al., 2021; Harrington et al., 2016; Lundwall et al., 2019), resilience exhibited the most pronounced protective potential with respect to overall burnout, a pattern consistent with conclusions from studies conducted during the COVID-19 pandemic (Di Monte et al., 2020; Jose et al., 2020). Our first three hypotheses were supported, and the results were consistent with former findings.

The fourth hypothesis, which proposed that dispositional mindfulness would mediate the relationships between personal resources and burnout, was partially supported. Specifically, dispositional mindfulness significantly mediated the relationship between resilience and burnout, whereas the indirect effect involving grit was not supported. This finding suggests that resilience may be associated with lower burnout partly through higher dispositional mindfulness and adaptive self-regulation. Resilient individuals may be better able to maintain psychological balance and observe stressful experiences without becoming emotionally overwhelmed, which in turn reduces vulnerability to burnout. This interpretation is consistent with theoretical frameworks emphasizing the conservation and effective deployment of personal resources under chronic stress (Maslach et al., 2001). The mediating role of dispositional mindfulness in the resilience–burnout relationship aligns with prior empirical evidence demonstrating that mindfulness functions as a psychological mechanism linking resilience to improved mental health

and well-being outcomes (Pangngay, 2024). Mindfulness promotes nonjudgmental awareness and emotion regulation, enabling individuals to respond more adaptively to occupational stressors rather than react automatically, thereby reducing emotional exhaustion and disengagement (Kabat-Zinn, 1994; Liu et al., 2024). Similar mediation models have been supported in related occupational contexts, where mindfulness transmitted the effects of psychological resources to reduced stress and burnout (Zhang & Fathi, 2024).

In contrast, dispositional mindfulness did not mediate the relationship between grit and burnout. This pattern supports the conceptual distinction between grit as a motivational resource and resilience as an adaptive self-regulatory capacity. Whereas resilience is closely associated with emotional regulation, recovery, and flexibility in the face of adversity, grit primarily emphasizes perseverance and sustained effort toward long-term goals (Duckworth et al., 2020). Although grit has been shown to protect against burnout directly (Hewitt et al., 2022), it may operate through alternative pathways—such as work engagement or achievement motivation—rather than through mindfulness-based self-regulatory processes. Thus, mindfulness appears to be a more central mechanism through which resilience, but not grit, buffers against burnout in healthcare professionals.

Main Findings

The results indicate that resilience and dispositional mindfulness are the strongest protective factors against burnout among healthcare professionals, both showing significant negative associations. Resilience explained the largest proportion of variance in burnout, while mindfulness contributed additional explanatory power and was particularly relevant for emotional exhaustion and depersonalization. Grit showed weaker but consistent negative associations. Mediation analyses further demonstrated that mindfulness partially mediates the relationship between resilience and burnout, whereas no mediating effect was found for

grit. Overall, these findings highlight the complementary role of resilience and mindfulness as key psychological resources in reducing burnout.

The present findings can be interpreted within the framework of the Job Demands–Resources (JD–R) model, which proposes that burnout develops when job demands exceed the individual’s available resources (Bakker & Demerouti, 2017; Demerouti et al., 2001). In line with this perspective, resilience, dispositional mindfulness, and grit functioned as personal resources that were negatively associated with burnout, supporting their protective role in high-demand healthcare settings (Xanthopoulou et al., 2007). The results also suggest that these resources operate in different ways. Resilience emerged as the strongest predictor of overall burnout and professional efficacy, indicating its importance for maintaining functioning under chronic stress. In contrast, dispositional mindfulness was more strongly related to emotional exhaustion and depersonalization, pointing to its role in emotional regulation (Lomas et al., 2018). The observed partial mediation effect further suggests that resilience may reduce burnout partly through increased mindfulness, highlighting the role of self-regulatory processes (Pangngay, 2024). Overall, these findings support the assumption of the JD–R model that personal resources buffer the impact of occupational stress, while also suggesting that different resources may contribute through distinct psychological pathways. In addition, the burnout profile observed in the sample was characterized by particularly elevated levels of reduced personal accomplishment, suggesting that diminished professional efficacy may represent a central aspect of burnout among healthcare professionals in the present study.

Theoretical and Practical Implications

From a theoretical perspective, the findings support a multidimensional model of burnout prevention, demonstrating that psychological protective factors operate through distinct yet complementary mechanisms. Resilience emerged as a key resource for sustaining

professional efficacy and overall burnout resistance, while dispositional mindfulness played a central role in buffering the affective components of burnout, particularly emotional exhaustion and depersonalization. The observed mediation further suggests that resilience may exert its protective influence partly through enhanced present-moment awareness and adaptive self-regulation, underscoring mindfulness as a critical psychological mechanism rather than merely an outcome.

From a practical standpoint, these results indicate that burnout prevention efforts in healthcare settings should prioritize resilience- and mindfulness-focused interventions. Programs aimed at strengthening resilience may be particularly effective in supporting long-term professional functioning, whereas mindfulness-based interventions appear especially relevant for reducing affective strain and emotional disengagement. Although grit demonstrated a more modest contribution and did not operate through mindfulness, fostering perseverance and goal commitment may still complement broader prevention strategies, particularly early-career healthcare professionals.

Limitations and Future Directions

Several limitations must be noted. First, the study employed a cross-sectional design, preventing causal inferences about the relationships among grit, resilience, mindfulness, and burnout. Longitudinal or experimental studies are needed to determine the directionality of these effects and to assess whether interventions targeting these constructs directly reduce burnout over time. Second, all measures relied on self-report questionnaires, which may be subject to social desirability bias or inaccuracies in self-perception. Third, the sample was limited to healthcare professionals from a specific geographical and cultural context; therefore, caution should be exercised in generalizing the findings to other populations or settings. The internal consistency of the grit scale was modest in the present sample, which may have attenuated its associations with burnout and contributed to the weaker effects observed.

An additional limitation concerns the reliance on a convenience sampling strategy, which may restrict the representativeness of the sample. Healthcare professionals experiencing particularly high or low levels of burnout may have differed in their likelihood of participation, potentially introducing selection bias. Moreover, although the statistical approach employed was robust, future research could benefit from longitudinal mediation designs to more clearly establish the temporal ordering of resilience, mindfulness, and burnout. Incorporating objective or multi-informant indicators, such as supervisor ratings or organizational records, may further strengthen the validity of future findings. An additional limitation concerns the use of a convenience sampling strategy within a linguistic and cultural minority population, which may limit the generalizability of the findings beyond Hungarian-speaking healthcare professionals in Transylvania. Despite being a linguistic minority at the national level, several of the participants worked in areas where Hungarian speakers constitute the local majority. Therefore, depending on the particular sociocultural environment, minority-related occupational stressors, resource availability, and coping strategies may vary. When analyzing the results, this variability should be considered. As a result, the correlations between burnout, grit, resilience, and mindfulness that have been found may not apply to healthcare professionals in different organizational or cultural contexts. The internal consistency of the grit scale was below the conventional threshold, which may have attenuated the strength of the observed associations and contributed to the weaker effects found for grit.

To improve causal inference and external validity, future research should use longitudinal and multi-method designs in addition to attempting to reproduce these results in majority populations and culturally diverse samples. The present study did not control statistically for potentially relevant covariates, such as professional experience or weekly working hours, which may influence burnout levels. While the primary aim was to examine the role of psychological personal resources, the absence of these control

variables may limit the precision of the observed relationships. Future research should incorporate occupational and contextual factors to provide a more comprehensive understanding of burnout. Since burnout is influenced by both individual characteristics and systemic circumstances, future research should examine the relationship between these psychological elements and organizational variables (such as workload, institutional culture, and leadership support). It would also be beneficial to investigate whether resilience and mindfulness work together to lessen burnout in an experimental intervention setting.

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PUBLISHING STANDARDS

Psychology of Human Resources – guide for authors

THE EDITORS

This document represents the “Guide for Authors”. It covers the format and language to be used for manuscripts submitted to Human Resources Psychology. Also, this document can be found on the webpage of the Romanian Association of Industrial and Organizational Psychology (www.apio.ro).

This “Guide for Authors” follows the 7th APA Publication Manual.

Manuscript Submission and Format

All manuscripts for the journal Human Resources Psychology should be submitted to the following e-mail address: revista@apio.ro.

To edit the manuscript please use Times New Roman 12-point type, 1.5 line spacing and the A4 page setting. Each page will be numbered in the upper right corner. The top and side margins should be left of at least one inch or 2.54 cm. A full example of a manuscript can be found in the 7th APA Publication Manual.

Publications

Accepted papers are copy-edited and retyped. Authors have to review edits and proofread their work. The editor of Human Resources Psychology will contact the corresponding author after the editor assigns your work to an issue.

If your work is accepted, please keep the editor informed of changes in your contact information and of long absences.

Front Page

The first page of the manuscript should include the following information:

1. Title

The title should be a concise statement of the main topic and should identify the variables or theoretical issues under investigation and the relationship between them. It should be typed in sentence case, centered between left and right margins, and positioned in the upper half of the page.

2. Author name(s) and institutional affiliation(s)

Author name(s) will be presented in the following form: first name, middle initial(s), and last name.

Institutional affiliation should reflect the institution/location where the author(s) were when the research was conducted. When an author has no institutional affiliation, the city and state of residence below the author's name should be specified. The institutional affiliation should be centered under the author's name, on the next line.

3. Author's note

This section should include the following:

- First paragraph should include the departmental affiliations at the time of the study for all authors as follows: name of the author as it appears in the byline, comma, department name, comma, university name, semicolon, next author name, and so on, and end with a period.
- Second paragraph should include any changes in author affiliation subsequent to the time of the study as follows: [author's name] is now at [affiliation].
- Third paragraph should include acknowledgments (only for grants or other financial support, any special agreements concerning authorship, thanks for personal assistance) and special circumstances (disclose them before the acknowledgements in this paragraph).
- Fourth paragraph should include information about the person to contact in terms of mailing address and e-mail.

Place the author note on the title page, below the title, byline, and affiliation. Center the label *Author Note*. Start each paragraph of the note with an indent, and type separate paragraphs for the authors' names and current affiliations, changes in affiliations, acknowledgments, and special circumstances, if any, along with the person to contact. The author note is not numbered or cited in the text.

Abstract Page

The abstract as well as the title of the work go on page 2. The abstract should be no longer than 150 words. The label *Abstract* should appear in sentence case, centered, at the top of the page. Type the abstract itself as a single paragraph without paragraph indentation. Place a running head (short title).

The abstract will be written in English. It is necessary to include 3-5 key words after each abstract, in all these three languages.

Main body text pages

In preparing your manuscript, begin the introduction on page 3. Type the title of the manuscript in sentence case centered at the top of the page, and then type the text. The remaining sections of the article follow each other without a break; do not start a new page when a new heading occurs.

This section should include the following:

- Introduction of the problem. This section will present the specific problem under the study and describe the research strategy. There is no need to label this section as Introduction.
- Explore importance of the problem. This section states why the problem deserves new research. State explicitly this problem according to the type of the study (empirical study, literature review and meta-analysis, methodological paper and case study).
- Describe relevant scholarship by discussing the relevant related literature and demonstrating the logical continuity between previous and present work.
- State each tested hypothesis clearly and provide a theoretical argument for how it was derived from theory or is logically connected to previous data and argumentation.

Method

This section describes in detail how the study was conducted, including conceptual and operational definitions of the variables used in the study. Authors should include the following:

- Sample description, by describing the main characteristics with particular emphasis on characteristics that may have bearing on the interpretation of results.
- Sampling procedure by describing the procedures for selecting participants in terms of sampling method, the percentage of the sample approached that participated,

the number of participants who selected themselves into the sample.

- Sample size, power and precision.
- Measures and covariates by describing the methods used to collect data and to enhance the quality of the measurements.
- Research design.
- Experimental manipulations or procedures.
- Task description.

Results

This section summarizes the collected data and the analysis performed on the data to test the proposed hypotheses. Report the data analysis in sufficient detail to justify your conclusions. For more information please consult the 6th APA Publication Manual.

Discussion

This section evaluates and interprets the implications of the results, especially with respect to original hypotheses. Examine, interpret, and qualify the results and draw inferences and conclusions from them. Emphasize any theoretical or practical consequences of the results.

Also, the limits of the study and possible future studies can be considered in this section.

References

References are your entries in the *alphabetical list at the end* of your article or research note. This list should include all the works you have cited throughout the manuscript. The references should be formatted as follows:

1. Periodicals (selective examples)

- Author, A.A, Author, B. B., & Author, C. C. (year). Title of article. *Title of Periodical*, xx, pp-pp. doi: xx.xxxxxxxx
- Author, A. A., Author, B. B., Author, C. C., Author, D. D., Author, E. E., Author, F.F., ... Author, Y.Y. (year). Title of article. *Title of Periodical*, xx, pp-pp. doi: xx.xxxxxxxx

- Author, A.A, Author, B. B., & Author, C. C. (year). Title of article. *Title of Periodical*, xx, pp-pp.
- Author, A.A., & Author, B.B. (in press). Title of article. *Title of Periodical*. Retrieved from <http://cogprints.org/5780/1/ECSRAP.F07.pdf>

2. Books

- Author, A. A. (year). *Title of work*. Publisher.
- Author, A. A. (year). *Title of work*. Retrieved from <http://www.xxxxxxx>
- Author, A. A. (year). *Title of work*. doi: xxxxx
- Editor, A. A. (Ed.) (year). *Title of work*. Publisher.

3. For chapters in a book or entry in a reference book (selective example)

- Author, A.A., & Author, B.B. (year). Title of chapter or entry. In A. Editor, B. Editor, & C. Editor (Eds.), *Title of book* (pp. xxx-xxx). Publisher.
- Author, A.A, & Author, B.B. (year). Title of chapter or entry. In A. Editor & B. Editor (Eds.), *Title of book* (pp. xxx-xxx). Retrieved from <http://www.xxxxxxx>
- Author, A.A., & Author, B.B. (year). Title of chapter or entry. In A. Editor, B. Editor, & C. Editor (Eds.), *Title of book* (pp. xxx-xxx). Publisher. doi: xxxxxxxx

4. Meeting and symposia (selective examples)

- Contributor, A.A., Contributor, B.B., Contributor, C.C., & Contributor, D.D. (Year, Month). Title of contribution. In E.E. Chairperson (Chair), *Title of symposium*. Symposium conducted at the meeting of Organization Name, Location.
- Presenter, A.A. (Year, Month). *Title of paper or poster*. Paper or poster session presented at the meeting of Organization Name, Location.

5. Unpublished works (selective examples)

- Author, A.A. (Year). Title of manuscript. Unpublished manuscript [or "Manuscript submitted for publication," or "Manuscript in preparation"].

For a detailed description of the procedure related to the citation of other types of work than those listed above, consult the 6th APA Publication Manual.

Footnotes

Footnotes are used to provide additional content or to acknowledge copyright permission status.

Appendices

The appendices of the manuscript (labeled APPENDIX A, APPENDIX B etc.) contain materials that supplements article content such as lengthy methodological procedures, calculations of measures, scales etc.

Tables and Figures

The author should number all tables and figures with Arabic numerals in the order in which they are first mentioned in the text, regardless of whether a more detailed discussion of the table or figure occurs later in the paper. The author should label them as Table 1, Table 2, and so on or Figure 1, Figure 2, and so on. List all tables first followed by figures. Place tables and figures after appendices at the end of the manuscript, and indicate the position of each in the text as follows:

Insert Table 1 about here

Each table or figure needs an introductory sentence in your text. The format agreed is the standard (canonical) one. Each table should report one type of analysis (which is identified in the title), and each vertical column and horizontal row should contain only one type of data.

Citation

It is important to put in the Reference section every work you have cited throughout the manuscript. The author can cite in-text as follows:

1. One author

Name and year: It has been found that X is associated with Y (Author, year)
Year only: Author (year) has found that

2. Two authors

When a work has two authors, the author should cite both names every time the reference occurs in the text.
When a work has three, four, or five authors, you should list only the first author’s name followed by “et al.” (et al., year) in every citation, even the first, unless doing so would create ambiguity between different sources.

3. Two or more cited works

The author should order citations *alphabetically*. Designate two or more works by one author (or by an identical group of authors) published in the same year by adding “a,” “b,” and so forth, after the year.

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When a work has no identified author, the author should cite in text the first few words of the reference list entry (usually the title) and the year. Use double quotation marks around the title of an article, a chapter, or a web page and italicize the title of a periodical, a book, a brochure, or a report:
on organizational commitment
 (“Study Report”, 2011)
the book *Motivational Outcomes*
(2011)

5. Page numbers in citations

To cite a specific part of a source, the author should indicate the page, chapter, figure, table, or equation at the appropriate point in text. Always give page numbers for quotations.
(Johnny, 2011, p. 13)

6. Secondary sources

When the original work is out of print, unavailable through usual sources, the author should give the secondary source in the reference list and in the text you should name the original work and give a citation for the secondary source

Minnie's report (as cited in Smith, 2011).

Thank you for paying attention to the conventions outlined in this guide – it will help the work of everyone involved in the publication of this journal.