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In memoriam: prof. dr. sc. Maja Štambuk (1947. – 2025.)

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A DUAL-APPROACH TO PROJECT TEAM OPTIMISATION: BALANCING THE 'SHACKLETON' AND 'WEAKEST-LINK' EFFECTS

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This study discusses executive cross-department project team performance in relation to team competency structures. Detailed market-oriented (MO) competencies of team members and performance data are investigated. The empirical analysis based on relationship marketing theory and applied psychology theories shows that for the achievement of budget and deadline goals, it is primarily static competencies that matter; whereas, for the achievement of quality goals, also dynamic competencies matter. Moreover, the role of the strength distribution of competencies is stressed by arguing that team members with strong MO competencies matter for budget and deadline goals (Shackleton principle), while the weakest member has a critical impact on quality goals (weakest-link-of-the-chain principle).

Keywords: group decisions, team performance, Shackleton principle, weakest-link-of-the-chain principle

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INTRODUCTION

Teams are responsible for a host of productive activities. The study of teams and their performance has accordingly been at the centre of research in various scientific disciplines. Research has grown from the IPO model depicting team inputs, processes, and outcomes, which dominated the research on teams for years, to building alternative theoretical explanations of the mixed empirical results (i.e., Jugdev & Müller, 2005). In this paper, we deal with the diversity of team members' competencies and how it impacts a team's performance. Here, the role of studies in applied psychology should be highlighted because this discipline has thus far paid the greatest attention to the topic (e.g., Mathieu et al., 2017).

Several researchers from the mentioned discipline have suggested that the key feature underlying the differences among team members refers to social category diversity and informational/functional diversity. The former examines team diversity and its impact on performance from the perspective of forming subgroups (categorisation processes) and a negative impact on team performance. The latter stresses a broader range of task-relevant knowledge, a larger pool of resources, and the positive effects of diversity of team competencies on team performance. Many studies consider these two contrasting phenomena (for meta-analyses, see Bell et al., 2011; van Dijk, 2022). In contrast, in our study we follow van Knippenberg et al.'s (2004) contention that each dimension of team diversity can function as both social category diversity and information/functional diversity. Although a team possessing a diversity of competencies is a fact of life in the business world, business teams are rarely studied from the above perspectives – a consequence of a lack of data. This paper relies on methodologically rigorously collected data regarding the performance of 1,400 cross-departmental executive project teams in the Slovenian construction company Trimo Trebnje for the period 2006–2012, detailing team members' market-oriented (MO) competencies and team performance over a period of 6 years.[1] It thus fills a gap with respect to the diversity of a team's competencies and their verification in corporate practice.

Using complex statistical and econometric techniques, team competencies are evaluated and linked to team results, examining which and how the MO (market-oriented) competencies in cross-departmental executive project teams are important for achieving various types of team goals.

The paper makes several important theoretical, but particularly empirical and practical contributions to the field, primarily extending the debate on complementarity between competencies and the importance of the structure of teams for firm performance. This debate can also be extended to the chal-

lenges of efficient organisation in both self-managing teams in profit-seeking organisations and teams in not-for-profit organisations, as well as the broader issues of ownership, politics and policymaking, including national development. Important practical contributions are provided, especially for HR managers, concerning human resource development and training.

LITERATURE REVIEW AND HYPOTHESES

Market-oriented competencies and team performance of cross-departmental executive project teams

Greater collaboration with customers in many business organisations (e.g., in the construction industry) calls for a high level of coordination, participation in joint programmes, and close communication links. For this reason, multifunctional and cross-departmental executive project teams are formed (Day, 1994; Lo & Kam, 2021). While the task positions and competencies held by the members of such teams are diverse (i.e., commercial manager, digital manager, project manager, assembly manager, design manager, product manager etc.), close communication and joint problem-solving affirm team-based mechanisms for the continuous exchange of information about their needs, problems, and emerging requirements, which is followed by the taking of action (e.g., Hu & Randel, 2014).

Further, a market orientation (MO) requires that cross-departmental executive project teams have and develop knowledge *(know-)* with a focus on the *how, what, why, where* and *when* or, in other words, building and strengthening their MO know-X (Garud, 1997; Madhavaram et al., 2014): (1) MO know-how involves knowledge concerning how to perform a task. It is related to knowledge about the market and the integration of this knowledge into production processes; (2) MO know-what includes knowledge about which tasks to perform. It is closely linked to knowledge of market participants (customers, competitors, suppliers) and the market environment (the social, cultural, legal and macroeconomic environments); (3) MO know-why chiefly answers questions about the need to do certain things and the principles of the processes being executed; (4) MO know-where focuses on obtaining information with respect to future markets and customer preferences; and (5) MO know-when focuses on the timing of adapting new knowledge and refers to the knowledge of adapting new technologies and new products. As regards measures of project success, definitions of project success include indicators like deadline, budget and scope (quality) (Atkinson, 1999; Lo & Kam, 2021). Still, Baccarini (1999) distinguishes two compo-

nents of project success: 1) project management success, which concentrates on the project's process(es') (efficiency); and 2) product success, which deals with the effects of the project's final products (effectiveness). Quality may be seen as an effectiveness measure since it reflects all the aspects needed: customer satisfaction, product success and innovation, and project management success, while budget and deadline are regarded as efficiency measures as they are related to project management success (Icmeli Tukel & Rom, 2001).

Linking the above to the MO know-X (where X here refers to how, what, why, where, and when) competencies held by executive cross-departmental executive project team members, the first hypothesis in our research states:

H1: The better the MO know-X competencies of the project team, the better its performance in terms of achieving the project's objectives, budget, deadline and quality.

Team member diversity perspectives

In the applied psychology literature, different views can be found on the diversity of team members and its impact on a team's performance. The most important are the informational/functional perspective and the social categorisation perspective. They represent opposite poles of the spectrum since the former predicts a positive impact of diversity on performance while the latter predicts a negative one. The information/decision approach claims that diversity is an information resource that leads to higher quality decision-making and better performance (Homan et al., 2007), whereas the social categorisation perspective assumes that people divide others into those who are like them (i.e., members of their own group) and those who are not (i.e., members of the other group). Categorisation processes can produce subgroups within the work group and cause problematic relationships between subgroups, resulting in the team's lower performance (van Knippenberg et al., 2004).

To some extent, both theories can be applied to the MO competencies possessed by multifunctional and cross-departmental executive project teams. The information/decision-making approach holds a preference for a variety of task and competencies information because of differences in knowledge and better information resources (Williams Phillips & O'Reilly, 1998). To achieve the quantitative goals (budget, deadline) that are essential for teams to be included in the corporate portfolio (higher profit), the planning and monitoring of the quantitative project goals is a primary activity, and the MO operational (standard) competencies held by team members are important (team efficiency).

In contrast, the provision of adequate product quality is a source of sustainable performance in the marketplace (team effectiveness), and operational (standard, static) and dynamic (non-standard) competencies are also important. Related to this, the social categorisation perspective states that in simple tasks performed by teams where only a limited number of strategies are available (i.e., routine tasks), accuracy, i.e., the degree to which members' mental models adequately represent a given body of knowledge (operational competencies), is more important for team performance than similarity, which describes the extent to which members' models are similar or overlap. In addition, it is more likely that team members will rely on stereotypes to anticipate how others will behave (Fiske et al., 2002). They might attribute a higher level of competence to a team member who is dissimilar from themselves if that person's attributes are stereotypically more aligned with those needed for the task (Eagly & Karau, 2002). Reducing uncertainty by relying on such competence stereotypes can be very helpful for members of diverse teams if the degree of uncertainty is not so high (van Dijk, 2022). Nevertheless, similarity is more important in complex and more uncertain environments with multiple possibly correct paths or effective strategies and more developed dynamic competencies among team members (LePine, 2005; Mathieu et al., 2017). Besides, if the level of uncertainty is high, all team members should be involved to reduce the uncertainty by gathering and evaluating information (Griffin & Grote, 2020).

Both theories are thus acceptable while considering the same processes as a composition of different phases. This leads to the position adopted by van Knippenberg et al. (2004) that it is necessary to consider processes in which all dimensions of diversity can give rise to the elaboration of task-relevant information as well as social categorisation processes. The integration of both theories is proposed by the same authors in the Categorisation-Elaboration Model (CEM), which shows how diversity in a team affects team performance through information/decision-making processes (i.e., elaboration processes) and social categorisation processes. The first phase of process analysis is to gather information about all tasks (competencies) and evaluate them. Gathering and evaluating information is critical for identifying the potential positive outcomes of diversity. This is followed by the contingencies of the social categorisation and similarity attraction processes that underlie the negative effect of diversity, the grouping of team members, whether it be by skin colour, religion, geographical origin, technical vs non-technical occupations, according to different profiles of technical people or any other criteria. The more complex the tasks, the more important the social cate-

gorisation perspective. Conversely, the core task of team leaders is to develop an accurate attitude to diversity (diversity mindsets) and to involve all members in finding solutions (van Knippenberg & van Ginkel, 2022). Namely, to achieve simple (standard) goals that rely on the operational competencies of team members, strong leadership and information gathering and assessment are vital. To achieve complex goals, operational and dynamic competencies are important, and defining an accurate diversity mindset, sharing among team members, and team reflexivity are crucial for avoiding negative consequences of team diversity (van Knippenberg et al., 2013).

Linking the above discussion to the MO know-X competencies possessed by cross-departmental executive project team members, the MO know-how, MO know-what and MO know--why competencies of the team members could be clearly defined as operational competencies determined by the project's proposed budget and deadline goals. They are expected to have a positive relationship (i.e., impact) on the budget and schedule objectives, provided by the most competent people in the team (included in the required planning and execution steps). Alongside the MO know-how, MO know-what and MO know-why competencies of team members, the achievement of quality-related goals depends on MO know-where and MO know-when, i.e., the dynamic competencies held by all team members because this knowledge is critical for adaptability in an unknown or only roughly known environment at the time the contract is signed. Quality-related goals accordingly require that team members possess: (1) sufficiently developed operational competencies for the consistent implementation of processes in line with defined customer needs (contracted product); and (2) sufficiently developed specific (dynamic) competencies (e.g., knowledge concerning how the quality offered might be perceived by their customers in a changing market environment, i.e., knowledge that is important for possible future changes in the market and adapting to technological novelties and shifts in preferences as well as other uncertainties with implementation). Based on the above, two more hypotheses are proposed.

H2: Achieving budget and deadline goals primarily depends on operational MO competencies, and team members who hold stronger competencies are 'more important' than members with weaker MO competencies (the 'Shackleton' principle).

H3: Project quality goals depend on all MO competencies (including dynamic competencies) and team members with weaker MO competencies determine the quality the project can achieve (the 'weakest-link' principle).

DATA AND ESTIMATION METHOD

The data

The Trimo company dataset comprises details concerning cross--departmental executive project teams and project outcomes for 1,400 construction projects completed between 2006 and 2012.

Our data include task descriptions for each member of the team, and an evaluation of their MO competencies. Competencies were evaluated using five market-oriented competence groups of indicators (MO groups of indicators) measuring customer focus (CF), team organisational agility (TOA), personal excellence (PE), innovations (INN), and permanent growth and development (PGD) (Table 1). Each competence group in the company contains several indicators (individual competencies), evaluated on a scale from 1 to 5. The actual competence assessment was based on a 270-degree assessment (self-assessment + colleagues + superior) or a 180-degree assessment (self-assessment + superior).

TABLE 1
The Trimo-Amitas original competence model

Customer focus (CF)	Organisational agility (OA)	Personal excellence (PE)	Innovations (INN)	Permanent growth and development (PGD)
Customer focus	Change management	Developing people's potential	Ideation	Vision
Networking	Project management	Self-development	Innovation management	Global perspective
Building relationships	Team building	Performance management	Creativity	Openness to new approaches
Empathy	Organisational skills	Individualisation	Curiosity	Strategic leadership
Negotiation skills	Adaptability	Learning	Conceptual thinking	Personal agility
Communication	Action-oriented	Motivating people	Solving problems	Achieving results
Professional attitude	Decision-making	Responsibility	Passion for technology	Planning
		Mentoring		Coaching

Source: Trimo/Amitas (2016).

In a study of customer focus competencies and team performance (Bole et al., 2016), the authors investigated the role played by customer focus (CF) competencies in the success of cross-departmental executive project teams in Trimo. Nonetheless, new insights from business research reveal the importance of other market-oriented competencies of executive

project team members for the success of their teams. Personal excellence, Permanent growth and development of each team member, Change adaptation and Passion for technology (digital technologies) belong to this set of competencies. Since the database of the Trimo company encompasses such data, in this paper the entire psychometric instrument (competency model) is tested using the Trimo dataset.

TABLE 2
Trimo-Amitas MO competence model in line with the MO know-X framework

Type of knowledge	MO knowledge	Often a result of learning by…	The Trimo and Amitas MO project team competencies set	Type of competencies
MO know-how: How to perform a task consistently?	Market knowledge and customer response competence	Doing	Customer focus (CF)	Operational competencies
MO know-what: Which tasks to perform?	Knowledge of customers, suppliers and competitors, and knowledge of market environments	Using	Customer focus (CF)	
MO know-why: Why care about the team's goals?	Knowledge of organisational culture	Studying	Organisational agility (OA)	
MO know-where: Where to look to supplement the existing knowledge base?	Knowledge of future markets and customer preferences	Networking	Personal excellence (PE) Innovations (INN) Permanent growth and development (PGD)	Dynamic competencies
MO know-when: When to adapt new knowledge?	Knowledge of the adaptation of new technologies and new products	Forgetting	Personal excellence (PE) Innovations (INN) Permanent growth and development (PGD)	

Sources: Adapted from Garud (1997), Madhavaram et al. (2014) and Trimo/Amitas (2016).

Table 2 provides details of the adaptation of the Trimo-Amitas competence model to the MO know-X framework. In the context of the Trimo strategy, MO know-how is largely incorporated in the customer focus (CF) group of competencies. Knowledge of competitors and suppliers and knowledge of the market environment was less important in the Trimo/Amitas (2006) model for cross-departmental executive project teams since these areas were being handled by other departments and teams in the company (e.g., the marketing and purchasing departments). However, the knowledge of customers was crucial for cross-departmental executive project team members

at Trimo. MO know-what is also incorporated in the customer focus (CF) group of competencies. MO know-why is included in the organisational agility (OA) group of competencies, which mainly concerns team organisation. The personal excellence (PE) competence group, the innovations (INN) competence group, and the permanent growth and development (PGD) competence group are more strongly related to MO know-when and MO know-where.

Achievement of the budget and deadline goals principally relies on the operational competencies closely linked with the ability to execute project-related tasks efficiently, assuming no unexpected changes occur in the production process. The customer focus (CF) and organisational agility (OA) groups can hence be the best representatives of operational competencies. They include customer focus, building relationships, negotiation skills, communication, professional attitude, team building, organisational skills, project management, and decision-making (see Table 1), which all directly contribute to the efficiency of execution. On the other hand, the (dynamic) quality goal is also closely related to the development potential of the team's members; i.e., competencies like developing people's potential, learning, self-development, ideation, creativity, passion for technology, vision, strategic leadership, and others that are crucial for adjusting to unexpected changes (see Table 1). These competencies, which were captured within the personal excellence (PE), innovations (INN) and permanent growth and development (PGD) groups of competencies (in the Trimo-Amitas classification), may thus be seen as dynamic competencies that assure higher quality, including the knowledge concerning the use of new materials and technology, and new markets, in turn allowing the production function to move outwards.

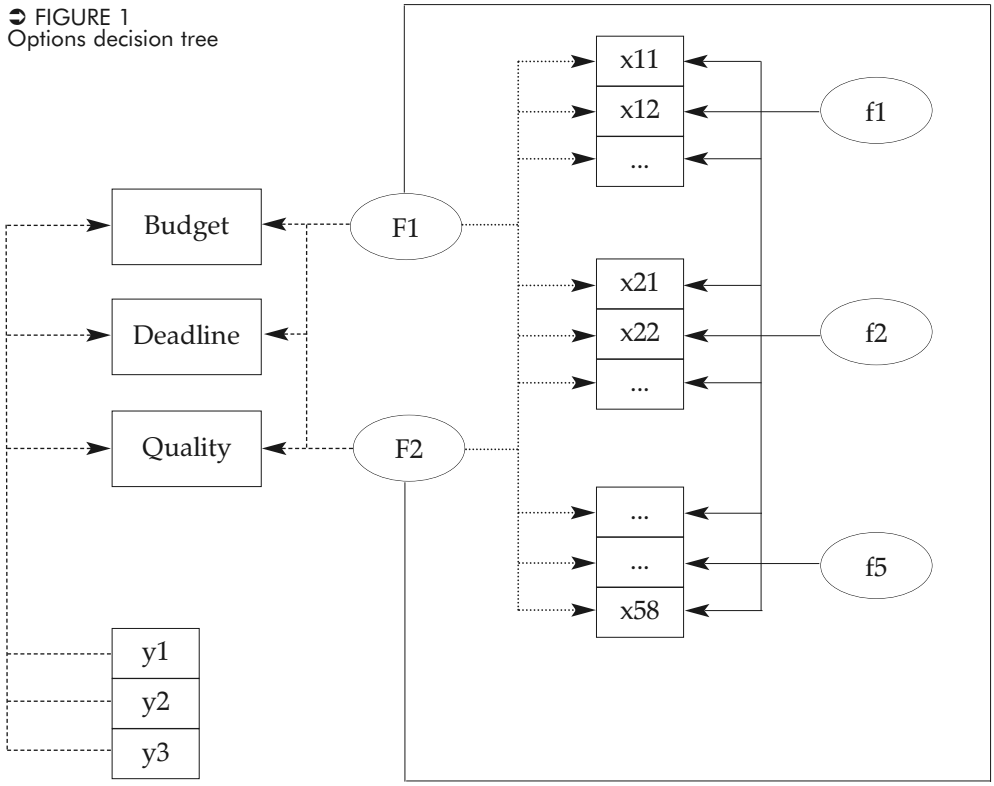
Estimation procedure

To explain the fulfilment of project goals in terms of large numbers of multicollinear competencies (and potential other variables), the estimating procedure entailed several steps. In Figure 1, the options decision tree (potentially important variables and relationships) is sketched in a hypothetical SEM scheme to reveal the logic of the modelling procedure.

Due to the considerable number of relevant variables and high multicollinearity among the 37 MO know-X variables, the number of variables was reduced using exploratory factor analysis. The high KMO and the size of the eigenvalues (Kaiser criteria) show that one latent variable is common to the indicators of *each group* of MO know-X indicators. Each group of competencies is therefore efficiently summarised by one factor (Table 3).

High collinearity is additionally observed among the constructed latent variables. Consequently, all indicators (37 competencies) were simultaneously embraced also by two latent factors generated from those indicators. Competence variables x_{ij} (i denoting group and j competence) are embraced by factors F1 and F2. In Figure 1, the corresponding relationships are dotted. The factors are orthogonal and, given the absence of the multicollinearity problem (see Table 3), could be directly used for specifying the model of competencies' effects on the team performance (for budgeting, timing and quality) together with two other (non-competencies) types of variables y_k (the size and business environment variables). In Figure 1, the corresponding relationships are dashed.

➲ FIGURE 1
Options decision tree



If factors F1 and F2 were to have a theoretical meaning (which could be checked/achieved by orthogonal rotations), we would be able to simply continue with the existing factors F1 and F2 as explanatory variables.[2] However, neither factor F1 nor F2 has a clear theoretical meaning even after several rotation procedures. This made it impossible to construct testable relations (regarding competencies) for such a specification of team performance models.

Groups of competencies	No. of competencies	No. of factors	KMO	Cronbach alpha	Names and abbreviations of factors
Customer focus (CF)	7	1	0.875	0.887	Factor (CF), f_1
Organisational agility (OA)	7	1	0.848	0.875	Factor (OA), f_2
Personal excellence (PE)	8	1	0.928	0.947	Factor (PE), f_3
Innovativeness (INN)	7	1	0.879	0.886	Factor (INN), f_4
Permanent growth and development (PGD)	8	1	0.887	0.928	Factor (PGD), f_5
Overall (total) evaluation	37	2	0.918	0.963	Factor 1, F_1 Factor 2, F_2

TABLE 3
Groups of competencies, number of factors, KMO sampling adequacy, and Cronbach's alpha

The fact that we were unable to find a rotation of F1 and F2 enabling a meaningful interpretation, the disentangling of the estimated competencies' impacts (in impacts of analysed groups of competencies CF, OA, PE, INN and PGD) led us to make such a separation in two steps. In step one, we find, heuristically speaking, 'aggregated' effects of factors F1 and F2 on the corresponding goal variable, while in step two these estimated 'aggregated' effects of factors F1 and F2 are disentangled on the contributions of factors f1, f2, ...f5 of the analysed groups of competencies CF, OA, PE, INN and PGD. This two-step procedure is based on the following trivial corollary of the factor model representation of the competencies.

If the vector of competencies is denoted by $X = (X_1^t, X_2^t, \ldots X_5^t)^t$ ($X = 37x1$), where X_i are vector columns of subsets of competencies (i.e., CF, OA, PE, INN and PGD), then the basic relations of the factor model are as follows (see, e.g., Rao, 2001).

$$X = AF + U \; var(F) = I \; cov(F,U) = 0 \; and \; var(U) = \\ = diag(\omega_j) \; and \; var(X) = \Delta = AA^t + diag(\omega_j) \qquad (1)$$

where A (37x2) is a matrix of factor loadings, U (37x1) is a vector of individual effects and $F = (F_1, F_2)^t$ is the vector of latent variables (factors). If the latent variables of the theoretical competencies' impact on the quantitative and qualitative goals is denoted by $\alpha^t F = (\alpha_1^t F, \alpha_2^t F, \alpha_3^t F)^t$ (where α_i^t for goal i, $i = 1, 2, 3$ is vector 1 x 2), then the conditional expectation of $\alpha^t F$ given any vector of linear combinations of competencies ΦX (Φ is n *x 37*) is given by

$$E(\alpha^t F X^t \Phi^t)(\Phi \Delta \Phi^t)^{-1} \Phi X = (\alpha^t A^t \Phi^t)(\Phi \Delta \Phi^t)^{-1} \Phi X \qquad (2)$$

In a special case, when Φ is a matrix of coefficients for one linear combination for each subset (CF, OA, PE, INN and PGD) of competencies (i.e., $\Phi = (\Phi_1^t, \Phi_2^t, \ldots \Phi_5^t)^t$ where vector row Φ_j, $j = 1, \ldots 5$ corresponds to subset j of competencies), equation

(2) enables the disentangling and comparison of the impacts of different subsets of competencies for each specific goal function. Namely, the impact of competencies from subset j j = 1, ... 5 on goal function i (i = 1, 2, 3) is equal to

$$(\alpha^t_i A^t \Phi^t) (\Phi \Delta \Phi^t)^{-1} \Phi_j \quad (3)$$

where Φ_j denotes the j-th segment of columns of matrix Φ corresponding to subset j of competencies and α^t_i denotes the impact of factors F on goal i.

The theoretical impact (3) may be evaluated using the delta method or artificial (formal) regression in which the competencies' impacts estimated in the basic model (step one) are regressed on factors f_1, f_2, f_3, f_4, f_5 extracted from each of the competencies' subsets (CF, OA, PE, INN and PGD). We used the second alternative. The results are presented in Table 6.

RESULTS

Table 4 presents summary statistics for the model's key variables in three separate columns: first, for the entire period 2006–2012, and then separately for the pre-financial crisis period 2006–2008 and the Great financial crisis period 2009–2012. Projects were classified into sub-periods by year of completion. While before the financial crisis (2006–2008) the company had 293 projects (and project teams) on average per year, during the crisis the annual number fell significantly to just 129 projects. The median project team consisted of five or six team members.

Table 4 also presents data on the key performance indicators. To assess performance, the difference between planned and actual performance was compared using the following transformations:

$$\text{deadline goal} = \frac{\text{actual duration} - \text{planned duration}}{\text{actual duration}}$$

$$\text{budget goal} = \frac{\text{actual budget} - \text{planned budget}}{\text{actual budget}}$$

$$\text{quality goal} = \frac{\text{no. of quality projects}}{\text{all projects,}},$$

$$\text{where quality} = \begin{cases} 0, \text{ when no additional costs were caused due to a droping quality,} \\ 1, \text{ otherwise)} \end{cases}$$

On average, the actual duration of a project was shorter than its planned duration, indicating efficiency in terms of duration. Still, on average, the actual budget exceeded the planned budget. As regards the quality-related goals, close to 75% of the projects were within budget, indicating that the (feasible) quality goal was achieved. Beyond-budget costs usually arose be-

cause of the low quality of materials used. The median values of the actual and planned budget grew from the pre-crisis to the crisis period, the median planned project duration became shorter, whereas the actual duration became longer. The share of projects reaching the contracted level of quality was larger in the pre-crisis period.

		Whole sample	Pre-crisis (2006–2008)	Crisis (2009–2012)
Key goal data	Number of projects	1,400	884	516
	Actual duration (days): mean value; Median and Standard deviation in brackets	157 (100, 167.5)	151 (99, 147.8)	167 (102, 196.5)
	Planned duration (days): mean value; Median and Standard deviation in brackets	211 (121, 265.9)	218 (135, 234.0)	198 (101, 312.8)
	Actual budget (in €): mean value; Median and Standard deviation in brackets	39,868 (11,453, 111,638)	34,228 (9,137, 88,194)	49,532 (15,159, 142,728)
	Planned budget (in €): mean value; Median and Standard deviation in brackets	38,240 (11,453, 107,747)	32,186 (8,327, 86,229)	48,612 (14,085, 136,447)
	Share of high-quality projects	0.732	0.758	0.687
Size	Number of team members: mean value; Median and Standard deviation in brackets	5.35 (5, 0.727)	5.23 (5, 0.685)	5.56 (6, 0.745)
Competencies' assessment	Actual MO competencies' assessment – factor CF: median; Standard deviation in brackets	2.87 (0.205)	2.87 (0.206)	2.89 (0.202)
	Actual MO competencies' assessment – factor OA: median; Standard deviation in brackets	2.83 (0.153)	2.86 (0.150)	2.78 (0.157)
	Actual MO competencies' assessment – factor PE: median; Standard deviation in brackets	2.43 (0.138)	2.43 (0.136)	2.44 (0.141)
	Actual MO competencies' assessment – factor INN: median; Standard deviation in brackets	2.63 (0.147)	2.62 (0.149)	2.64 (0.143)
	Actual MO competencies' assessment – factor PGD: median; Standard deviation in brackets	2.63 (0.110)	2.63 (0.109)	2.62 (0.161)
	Actual MO competencies' assessment – factor 1: median; Standard deviation in brackets	2.53 (0.147)	2.53 (0.143)	2.55 (0.154)
	Actual MO competencies' assessment – factor 2: median; Standard deviation in brackets	2.87 (0.228)	2.87 (0.233)	2.89 (0.218)

TABLE 4
Summary statistics for the variables used for estimating team performance measures based on project goals (budget, deadline, quality)

The median team assessments of the CF and INN competencies (their corresponding factor values, ranging from 1 to 5) increased, the median team OA competencies' assessments decreased, while the median PE and PGD competencies' assessments remained on the same level during the two periods under observation. Two latent orthogonal variables were generated to capture the information from all the specific competencies (bottom two factors, Table 4). In both cases, the median team assessments of MO competencies increased from the pre-crisis to the crisis period.

Table 5 (first step results) reveals the impact of the variables of interest on the project teams' performance in terms of budget and deadline goals and the quality-related goal. While modelling the impact of the independent variables on the project's budget and deadline goals, OLS regression was applied. To model the impact of the variables of interest on the achievement of the quality-related goal, logistic regression was applied due to the nature of the dependent variable (0 and 1). For each model, MO competencies' assessments were captured by two orthogonal latent variables (namely, F1 and F2) acquired from the factor analysis of all MO indicators.

TABLE 5
Models of performance measure estimations

	Quantitative goals		Quality-related goal
	Model A: budget performance (current budget – planned budget) / current budget	Model B: deadline performance (current deadline – planned deadline) / current deadline	Model C: quality performance 0 = high quality 1 = low quality
	third quartile (75th per.) competencies	third quartile (75th per.) competencies	first quartile (25th per.) competencies
MO competencies' overall assessment – factor value 1	-1.401 (1.186)	-4.712 (6.265)	-2.542** (1.023)
MO competencies' overall assessment – factor value 2	-3.971** (1.756)	-12.865* (6.689)	-1.503** (0.752)
Standard deviation of competencies' assessment	2.149 (2.365)	19.431* (11.079)	-0.83 (0.588)
Crisis (2009–2012)	-0.033 (0.046)	1.123*** (0.184)	0.003 (0.115)
Number of team members	-4.337 (2.932)	56.972*** (13.008)	0.669 (0.709)
Planned deadline			0.555*** (0.084)
Planned budget			0.513*** (0.059)
Constant	25.374*** (8.705)	-93.841** (6.565)	0.985 (0.383)

Note: Model A and model B are estimated by linear regression and model C by logit regression (Huber-White sandwich estimator); in the model for budget and deadline performance, the third quartile of competence factor values is used, while the first quartile of competence factor values is used in the model for quality performance; the number of team members, planned budget, and planned duration are in logs; crisis activity is a fraction of project activity after 2008; standard errors are in parentheses; ***, ** and * represent statistical significance at 1%, 5% and 10%, respectively.

The results (Table 5) confirm that the stronger the MO competencies, the better the team performance in terms of the project's budget goal, deadline goal, and quality-related goal. The estimated coefficients of the MO competencies (embraced by F1 and F2) are, namely, negative and statistically significant when the quality model (C) is addressed, while those for achieving the budget goal (model A) and deadline goals (model B) are also negative, albeit significant only for the second factor.

These estimates also confirm that the distribution characteristics of crucial team competencies vary among project goals. For instance, they show that for each performance measure a specific quartile of the team's competence distribution is critical. For each project goal, we estimated five alternative models for five different characteristics of the distribution of the team's competence assessments (min, p 25, p 50, p 75, max). For the budget and deadline goals, the third quartile gives the best result. Achieving these two project goals accordingly depends to a stronger extent on the more competent team members in terms of MO competencies' assessments. On the other hand, the first-quartile versions of the models are appropriate for the quality-related goal since the regression coefficient is negative and statistically significant only in the model with first-quartile MO competencies' assessments.[3]

Model results show that lower dispersion (standard deviation) of the team competencies adds to the likelihood of achieving both quantitative goals as well as the quality-related goal, although the effect is significant only for the deadline goal. Obviously, the effects of the distribution of team members' competencies on project goals should be specified using not only the parameters of the central tendency but also those of the quartiles of the team competencies' distribution.

The model for the quality-related goal (model C, Table 5) also incorporates the planned project duration and the planned budget as two important variables. In a customer-oriented environment, the client would evaluate the 'quality of the customised product', which includes steps from design to maintenance, as being dependent on duration as well as any deviation from the budget. Both have a 'survival'-type specification in the (logit) quality model equation, implying that the probability of quality deteriorating in any project phase is independent of the other project phases. The cumulative probability of a quality drop in any project phase depends on the logs of the project size (duration, budget) variables.

To control for other relevant impacts, two further variables were included: team size and financial crisis impact. The results imply that: (1) the size of the team increased the difference between actual (current) and planned project deadline. The coefficient of team size (the number of team members) in the equation of the model for the deadline goal (model B) is, namely, positive and significant. In the main model (third quartile of competence assessment) for the budget goal (model A), the team size coefficient is negative and not significant. Size coefficient in the quality model (model C) is also not significant, albeit positive, indicating that larger teams could lead to lower quality. Concerning the Great financial crisis,

the results show that it significantly increased the difference between actual (current) and planned deadline goal (model B), whereas the impact was non-significant for the other goals. Even though the Great financial crisis did not impact the budget and the quality goals, it did impact the deadline goals, potentially due to the higher number of employees in teams.

The lack of appropriate data meant we were unable to check data on competencies for potential biasedness since the evaluation process also includes self-assessment. Still, it is necessary to note that given that only quantile variables of competencies (with a fixed five-point scale) are used in the model, potential biasedness caused by self-assessment would only change the constant in the model and not the factor variables' effects under study.

TABLE 6
Models of project goal measures estimations

	Quantitative goals		Quality-related goal
	Model A: budget performance	Model B: deadline performance	Model C: quality performance
	third quartile (75th per.) competencies	third quartile (75th per.) competencies	first quartile (25th per.) competencies
	Conditional measure of MO competencies as a dependent variable	Conditional measure of MO competencies as a dependent variable	Conditional measure of MO competencies as a dependent variable
CF assessment	2.116*** (0.174)	6.894*** (0.565)	0.527*** (0.072)
OA assessment	2.410*** (0.212)	7.875*** (0.689)	0.966*** (0.053)
PE assessment	-0.097 (0.157)	-0.271 (0.514)	0.762*** (0.109)
INN assessment	0.085 (0.140)	0.309 (0.457)	0.422** (0.185)
PGD assessment	-0.098 (0.167)	-0.283 (0.547)	0.511*** (0.099)
Constant	2.818*** (0.391)	8.966*** (-1.271)	-1.882*** (0.544)
Imputation	20	20	20
Observation	1399	1393	1399
Average relative variance increase (RVI)	10.368	10.558	13.304
Model F-test (p)	184.43 (0.0000)	187.88 (0.000)	176.29 (0.000)

Note: Models are estimated by linear regression; the dependent variable is conditional competence (a linear combination of factors F1 and F2 using coefficients from Table 5); CF represents the factor summarising the customer focus group of competencies, OA the organisational agility factor, PE the personal excellence factor, INN the innovations factor, and PGD the permanent growth and development group of competencies factor; standard errors are in parentheses; ***, ** and * represent statistical significance at 1%, 5% and 10%, respectively.

The models presented in Table 6 (second step results) disentangle the estimated conditional project goal effect of all competencies (embraced by both factors F1 and F2) on the effects of operational and dynamic competencies. This conditional effect is quantified by a linear combination of factors F1 and F2 in which goal-specific coefficients from Table 5 are used. For the conditional competence effect estimated for the budget goal (model A) and the deadline goal (model B), the CF and the OA competence group factors are positive and statistically significant, whereas the regression coefficients for the PE, INN and PGD competence group factors are not statistically significant. This reveals that operational competencies matter for the achievement of quantitative goals. In the case of the common competence effect on the quality goal, the regression coefficients of each of the five competence group factors are positive and statistically significant. Both operational and dynamic competencies are thus shown to contribute to the accomplishment of the quality-related goal.

DISCUSSION AND CONCLUSION

Contributions

The paper makes several contributions to scientific literature. By finding that better MO competencies lead to better project team performance, the study sheds light on relationship marketing and networking. By showing that in a less complex environment operational competencies chiefly contribute to the achievement of simpler goals (budget, deadline), while operational and dynamic competencies are important for the achievement of more complex goals (quality), the study confirms the theoretical discussion on the need to include both prevailing theories of team members' diversity (see, van Knippenberg et al., 2004) while explaining the performance of teams. Furthermore, the study highlights the role of the distribution of competency strengths by showing that team members who possess stronger MO competencies influence the budget and deadline goals, while the weakest member has a decisive influence on achievable quality-related goals.

How can these findings be explained while considering functioning teams in a business environment? Diversified teams in a business need to work in a focused way. For example, the company's business results depend on the success of cross-departmental executive project teams in the construction industry. Strong leadership concerns the implementation of quantitative goals (budget, deadline). No company will be happy with a team leader if the cross-departmental executive team

mostly shows higher actual (current) goals than the planned goals. Although the participation of all members of the cross-departmental executive team is required, the constant review of the actual and planned quantities and alignment with the corporate goals (profit) lies in the hands of employees with demonstrated MO competencies. This application is labelled in our work as the 'Shackleton principle', after Ernest Shackleton who set out to cross the Antarctica along with 27 men, but because of the severe cold saw their ship stuck in the ice for 10 months. Firm leadership was essential for achieving the team's project goals. It is therefore not surprising that, according to our estimates, teams with better operational MO competencies achieved better results.

Still, the effectiveness of Shackleton team leadership involves another component: the flexibility of the leader. The 'open door policy', long before that term was coined, allowed Shackleton's team to survive in the difficult conditions. Inclusive leadership (to give all team members a sense of belonging and uniqueness) and leadership in diversity mindsets (managing information processing for routine and non-routine tasks, synergistic outcomes) in terms of modern team leadership theories (see, e.g., van Knippenberg & van Ginkel, 2022) best circumscribe Shackleton's crucial intentions. In the context of corporate teams, more specifically cross-departmental executive projects teams in the construction industry, the achievement of a quality-related goal (the highest quality) is a basic requirement for the survival of a company in the market (see, e.g., Baccarini, 1999). The involvement of all team members (the principle of the 'weakest-link-in-the-chain') and the elaboration of team results by the whole team is an important mediator for achieving long-term team effectiveness. The empirical results of our study support this interpretation: team effectiveness is greater the higher the operational and dynamic competencies possessed by team members in the lowest quartile of members' MO competencies.

Implications

The results hold relevant implications for both academia and industry. First, from a managerial standpoint, the 'Shackleton principle' stresses the strategic advantage of identifying and empowering those team members who possess the strongest operational competencies for budget and deadline objectives. Concurrently, the 'weakest-link principle' reminds decision-makers that overall quality hinges on ensuring that even the least-skilled members have sufficient dynamic competencies, particularly in complex or rapidly changing environments. Firms could incorporate these principles into their HR poli-

cies by tailoring training, recruitment and professional development programmes that add to both sets of competencies. Further, adopting 'diversity mindset' leadership training may help managers balance the need for strong operational leadership with the inclusive collaboration required for innovative, high-quality results. In this way, companies can optimise their cross-departmental executive teams to thrive amid shifting market demands and tighter project constraints.

From the research perspective, the paper highlights the importance of examining multiple theoretical aspects of team diversity (e.g., the effectiveness, firm performance, decision-making, team (social) structure and others). It also shows the relevance of studying complex interdisciplinary topics, which bridge economics and business, using a rigorous econometric and modelling approach. The discussion is also relevant for the study of self-managing teams in a flatter organisation, but in particular also for studying teams in a small company where ownership and management are typically not separated (see e.g., Prašnikar et al., 2017). Besides, as the management philosophies, strategies, and operations of not-for-profit and profit organisations are becoming increasingly intertwined (e.g., Gee et al., 2023), our study could be pivotal for analysing teams in a not-for-profit organisation. Similarly, the analysis can hold relevant implications for politics and its impact on development where cooperation between groups can impact social equilibria (e.g., Acemoglu & Robinson, forthcoming).

Limitations and future research guidelines

The nature of this paper and the data used also bring some challenges, which indicates potential for future research. First, the paper relies on a wide dataset, detailing team structure and results between 2006 and 2012. Although most results focus on exploring the fundamental relationships between competencies and performance, which should not be very time-specific, and the results should largely be generalisable across time, the pre-crisis and crisis periods were separated largely due to the impact of the 2008 Great financial crisis on the construction industry. While principles such as the 'Shackleton principle' and 'weakest-link-in-the-chain principle' are likely to remain applicable given that they constitute fundamental principles of team dynamics and goal achievement, their relative role across different types or origins of crisis could add value to the field. Second, the paper relies on data from only one sector. Accordingly, future empirical work would benefit from a comparative study testing the relative importance of both the 'Shackleton principle' and the 'weakest-link principle' across sectors. Future studies could study whether the interplay of opera-

tional and dynamic competencies holds in other industries or cultural contexts, potentially revealing new drivers of project team performance. Moreover, researchers might explore longitudinal designs to observe how team competency distributions evolve over time and how leadership practices influence both routine (quantitative) and adaptive (quality-related) outcomes.

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NOTES

[1] Trimo, recently purchased by Recitel from Belgium, produces prefabricated steel structures for a range of purposes, mainly facades, roofs and containers for modular space solutions, yet also soundproofing systems (Trimo, 2019).

[2] Whether F1 and F2 have theoretical meaning after rotation is judged according to a meaningful interpretation of variables with the highest factor loadings.

[3] The results of other regressions are available upon request from the authors.

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Dvostruki pristup optimizaciji projektnoga tima: uravnoteženje učinaka "Shackletonova" načela i načela "najslabije karike"

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Ova studija raspravlja o učinku izvršnoga međuodjelskog projektnog tima u odnosu na timske kompetencijske strukture. Istražuju se detaljne tržišno orijentirane (TO) kompetencije članova tima i podaci o izvedbi. Empirijska analiza, temeljena na teoriji marketinga odnosa i teorijama primijenjene psihologije, pokazuje da su za postizanje proračunskih i vremenskih ciljeva prije svega važne statičke kompetencije, dok su za postizanje ciljeva kvalitete važne i dinamičke kompetencije. Štoviše, uloga distribucije snage

kompetencija naglašena je tvrdnjom da su članovi tima s jakim TO kompetencijama važni za proračunske i vremenske ciljeve (Shackletonovo načelo), dok najslabiji član ima ključan utjecaj na ciljeve kvalitete (načelo najslabije karike u lancu).

Ključne riječi: grupne odluke, timski učinak, Shackletonovo načelo, načelo najslabije karike u lancu

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COMPARATIVE ANALYSIS OF STUDENT ENGAGEMENT IN TRADITIONAL VS AI-ASSISTED LEARNING USING UWES-9S

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In this study, we empirically investigate the impact of AI--assisted learning environments versus traditional teaching methods on student engagement at the University of Montenegro. Using the Utrecht Work Engagement Scale for Students (UWES-9S) and a qualitative survey, we assessed three core dimensions of engagement: vigour, dedication, and absorption. A total of 82 undergraduate students (age range 19–27; 59% female, 41% male) participated in a semester-long comparative analysis using a pre-and-post intervention design. Sixty students from the Faculty of Science and Mathematics were assigned to the AI-assisted group due to logistical and course scheduling constraints, while twenty-two students from the Faculty of Metallurgy continued with traditional instruction, forming the control group. Our analysis employed a mixed ANOVA to explore interactions between time and instructional type, revealing significant improvements when the group switched to AI-assisted instruction for vigour ($F(1,80) = 22.35$, $p < 0.001$, $\eta p^2 = 0.218$), dedication ($F(1,80) = 24.48$, $p < 0.001$, $\eta p^2 = 0.234$), and absorption ($F(1,80) = 20.11$, $p < 0.001$, $\eta p^2 = 0.201$). Elevated Cohen's d values indicated large effect sizes, demonstrating both statistical and practical significance in these enhancements.

Keywords: UWES-9S, engagement, vigour, dedication, absorption, AI-assisted classroom

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INTRODUCTION

The role of AI in education

AI technologies have the potential to transform traditional teaching methods, offering innovative ways to enhance both teaching effectiveness and student learning experiences. For a comprehensive review of how AI may reshape higher education, see Zawacki-Richter et al. (2019). Similarly, Luckin (2018) highlights the potential of machine learning to personalise educational content, thereby improving student engagement. From personalised learning paths to automated assessments, AI applications are increasingly becoming integral components of modern education systems. ChatGPT, a conversational AI agent capable of personalised feedback and explanations, and Quizizz, a quiz-based platform with adaptive features, each introduce different AI-driven enhancements to the learning experience. ChatGPT, an AI-driven conversational agent, offers personalised tutoring and assistance, enabling interactive learning experiences that adapt to individual student needs. Quizizz, an AI-powered platform, uses gamified quizzes and real-time feedback to engage students and reinforce learning through an interactive and competitive format (Francis et al., 2025). These tools exemplify the broader movement towards incorporating adaptive learning platforms and automated feedback systems in education, aiming to elevate student engagement and improve educational outcomes.

The relationship between AI usage and student engagement

Despite the increasing integration of AI technologies, recent systematic reviews note a relative scarcity of studies that directly link the adoption of AI tools to concrete measures of student engagement, such as vigour, dedication, and absorption (Zawacki-Richter et al., 2019). Student engagement is a critical factor in academic success, encompassing the energy, enthusiasm, and immersion students exhibit in their learning processes. These dimensions are effectively measured by the Utrecht Work Engagement Scale for Students (UWES-9S), a tool originally developed to assess work engagement but aptly adapted for educational contexts. Understanding the relationship between AI usage and student engagement is essential for educators and policymakers aiming to enhance teaching strategies and integrate technology effectively. Although AI's potential to boost student motivation has been well-documented (Holmes et al., 2019), further empirical research is needed to clarify how AI-driven feedback and personalisation affect in-depth engagement over longer periods. There is a pressing need to investigate how AI-assisted classrooms, utilising tools like ChatGPT and Quizizz, influence these engagement dimensions compared to traditional learning environments.

Open research questions

Building upon the research gap identified in the previous section, this study aims to investigate the effects of AI-assisted learning environments on student engagement compared to traditional classroom settings. Earlier work (Luckin, 2018; Zawacki-Richter et al., 2019) has underscored the importance of establishing more precise links between AI functionalities and engagement outcomes, highlighting the need for targeted research. To achieve this goal, we have formulated specific research questions and hypotheses to guide our investigation.

RQ1: How does the use of AI-assisted learning tools affect the three dimensions of student engagement – vigour, dedication, and absorption – compared to traditional teaching methods?

RQ2: Which specific features of AI tools – such as personalisation, interactivity, and feedback mechanisms – most effectively enhance student engagement?

RQ3: Is there a significant correlation between increased student engagement facilitated by AI tools and improved academic performance?

Hypotheses

To address these research questions, we propose the following hypotheses:

H1: Students exposed to AI-assisted learning environments will exhibit statistically significantly higher levels of vigour, dedication and absorption compared to those in traditional classroom settings.

H2: Specific features of AI tools, such as personalisation, interactivity, and immediate feedback, have a significant positive impact on enhancing student engagement.

H3: There is a positive correlation between increased student engagement in AI-assisted learning environments and improved academic performance.

These hypotheses echo calls from prior studies (Holmes et al., 2019; Luckin, 2018) to more rigorously verify how AI-driven interventions can enrich students' learning experiences and performance metrics. By systematically evaluating these hypotheses, this study aims to provide empirical data that can inform educational stakeholders about the effectiveness of AI tools in enhancing student engagement. The outcomes are expected to contribute to curriculum development, teaching strategies, and technology integration, fostering improved educational practices and student learning experiences.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The present study is grounded in the theoretical framework of work engagement as conceptualised by Schaufeli et al. (2006), which defines engagement through three core dimensions: vigour, dedication, and absorption. Originally developed to understand workplace engagement, this framework has been effectively adapted to educational settings, highlighting the universal nature of engagement across diverse types of work, including academic pursuits (Schaufeli et al., 2002). According to this group of authors, vigour, in the educational context, is characterised by elevated levels of energy and mental resilience during learning, where students exhibit persistence and effort in overcoming academic challenges. Dedication refers to the sense of significance, enthusiasm, inspiration, and pride that students feel towards their studies. Absorption denotes a state of deep immersion and concentration in academic activities, where students are fully engrossed in their tasks. To measure these core dimensions, our study employs the Utrecht Work Engagement Scale for Students (UWES-9S). It is a nine-item self-report instrument designed to measure these three dimensions of student engagement, with each dimension assessed by three items (Schaufeli et al., 2002; Schaufeli et al., 2006).

In recent years, the integration of Artificial Intelligence (AI) in education has been increasingly explored, with studies highlighting its potential to enhance student engagement and learning outcomes. AI technologies, such as adaptive learning platforms and intelligent tutoring systems, offer personalised learning experiences by adjusting content difficulty and providing immediate feedback based on individual student performance (Holmes et al., 2019). These features are designed to cater to diverse learning styles and needs, potentially increasing vigour by sustaining students' energy levels through appropriate challenges, fostering dedication by aligning learning activities with personal goals, and enhancing absorption by maintaining consistent engagement through interactive and immersive content (Ivanović, 2024). Despite the promising potential of AI in education, empirical research explicitly linking AI-assisted learning environments with the dimensions of student engagement as measured by the UWES-9S remains limited. Previous studies have primarily focused on the general benefits of AI technologies, such as improved academic performance and increased motivation (Chen et al., 2020) but have not extensively examined their impact on specific engagement dimensions. This gap underscores the need for research that integrates the theoretical framework of work

engagement with the practical application of AI tools in educational settings. This study seeks to address this gap by applying Schaufeli et al.'s (2006) engagement theory to examine how specific features of AI-assisted learning tools impact student engagement.

RESEARCH DESIGN

This study employed a quasi-experimental mixed-methods research design to investigate the effects of AI-assisted learning environments on student engagement at the University of Montenegro.

Participants

The participant group comprised 82 second-year undergraduate students from the University of Montenegro. The intervention group consisted of 60 students from the Faculty of Science and Mathematics, while the control group included 22 students from the Faculty of Metallurgy. All participants had completed their first three semesters studying General English under the same traditional classroom settings (same teacher, course materials, class duration, etc.). Participants ranged in age from 19 to 27 years old, with an average age of 21.3 years ($SD = 2.2$). The sample included 48 females (59%) and 34 males (41%), reflecting a reasonable gender distribution representative of the university's student population within these faculties. All students were enrolled in programmes requiring similar levels of proficiency in General English, ensuring homogeneity in prior language exposure and learning experiences. The selection was based on convenience sampling due to logistical considerations, yet efforts were made to maintain diversity and control for potential biases.

Instruments

The primary instrument used in this study was the Utrecht Work Engagement Scale for Students (UWES-9S), a self-report questionnaire designed to measure student engagement across three dimensions: vigour, dedication, and absorption (Schaufeli et al., 2006). Studies across diverse cultural contexts have reported well-developed psychometric properties of the UWES-9S, consistently validating its three-factor structure and internal reliability. For instance, Carmona-Halty et al. (2021) found Cronbach's alpha values above 0.85 in their Chilean undergraduate sample, while Loscalzo & Giannini (2019) confirmed strong factorial validity in Italian university students. Similarly, Lovakov et al. (2017) reported satisfactory reliability and a clear three-dimensional structure in Russia, and comparable results were observed by Nerstad et al. (2010) in

Norway. These studies collectively reinforce the UWES-9S as a universal instrument capable of capturing the levels of student engagement globally. The UWES-9S comprises nine items, with three items dedicated to each engagement dimension. For the purpose of this study, our participants rated each item on a seven-point Likert scale ranging from 0 ("never") to 6 ("always/every day").

Sample items from the UWES-9S include "When I study, I feel like I am bursting with energy" for vigour, "I am enthusiastic about my studies" for dedication, and "I get carried away when I am studying" for absorption. In this study, the UWES-9S demonstrated high internal consistency, with Cronbach's alpha coefficients of 0.85 for vigour, 0.88 for dedication, 0.83 for absorption, and 0.90 for the overall scale. These reliability values align with the broader literature, where Cronbach's alphas for the UWES-9S typically range from 0.80 to 0.92 across various cultural contexts (Carmona-Halty et al., 2021; Loscalzo & Giannini, 2019; Lovakov et al., 2017; Nerstad et al., 2010; Petrović et al., 2017; Portalanza-Chavarria et al., 2017; Sánchez-Cardona et al., 2016; Tayama et al., 2019). Additionally, confirmatory factor analyses in these studies have consistently supported a three-factor structure – vigour, dedication, and absorption – reinforcing the scale's validity in measuring engagement. To complement the quantitative data, a supplementary survey with open-ended questions was administered to the intervention group. This survey aimed to gather detailed feedback on students' experiences with the AI-assisted learning environment. It focused on their perceptions of the effectiveness of AI tools, specific features that influenced their engagement, and suggestions for improvement. The qualitative data obtained provided deeper insights into the "why" and "how" behind the quantitative results, enriching the understanding of the impact of AI-assisted learning on student engagement.

Procedure

Participants were briefed about the study's purpose and procedures, ensuring transparency and informed consent. Ethical considerations were rigorously maintained throughout the study. All participants provided written informed consent after being informed about the study's aims, procedures, potential risks, and benefits. Data were anonymised to protect participant identity, with unique codes assigned to link pre- and post-intervention data without revealing personal information. Participants were assured that their involvement was voluntary and that they could withdraw from the study at any time without penalty.

The intervention involved integrating AI-assisted learning tools into the curriculum of the intervention group over a

semester of approximately 15 weeks. The control group continued with traditional teaching methods during the same period, allowing for a comparative analysis of the two instructional approaches. In the AI-assisted learning environment, the study employed tools such as ChatGPT – an AI-driven conversational agent providing personalised tutoring and assistance, and Quizizz – an AI-powered platform offering gamified quizzes and real-time feedback. Classes were held twice a week, each lasting 90 minutes. Students actively used ChatGPT during class for interactive exercises (learning English through translation, grammar, reading, writing, etc.), problem-solving tasks and receiving immediate feedback. They also utilised ChatGPT for homework assignments, fostering continuous engagement beyond classroom hours. The teacher facilitated the use of AI tools by designing activities that required student interaction with ChatGPT and Quizizz. The teacher's role included monitoring progress, providing guidance, and using Quizizz to create competitive quizzes that reinforced learning objectives. Integration into the curriculum included personalised learning paths, with assignments that were tailored based on individual student performance (Accommodations). This approach allowed for differentiation and addressed specific learning needs. Interactive sessions were conducted using Quizizz, enhancing engagement through gamification and competition. Immediate feedback was provided by ChatGPT and Quizizz, enabling students to understand and correct mistakes promptly, thereby accelerating the learning process.

In contrast, the traditional learning environment employed in the control group consisted of teacher-centred instruction with a lower level of student interaction. Teaching methods included lectures and standard exercises and readings from prescribed textbooks without much technological enhancement. Technology use was limited to standard presentation tools such as PowerPoint, without the integration of AI applications. Student engagement activities focused on individual work and traditional assessments, such as written exams and essays, lacking the interactive and personalised elements present in the AI-assisted environment.

Data collection followed a structured procedure. In the pre-intervention phase during Week 1, all participants completed the UWES-9S to establish baseline engagement levels. Demographic data – including age, gender, and academic major – were collected to assess the sample's diversity and control for potential biases.

During the intervention period from Weeks 2 to 15, the intervention group engaged with AI tools during classes and

for assignments, while the control group continued with traditional teaching methods. The consistent use of AI tools in the intervention group aimed to create a sustained impact on engagement levels, allowing for an assessment of changes over time. In the post-intervention phase in Week 16, all participants retook the UWES-9S to measure changes in engagement levels. The intervention group also completed the supplementary survey with open-ended questions, providing qualitative data on their experiences with the AI-assisted learning environment. Academic performance data, including exam scores and course grades, were collected for correlation analysis to explore the relationship between engagement levels and academic outcomes.

DATA ANALYSIS

The data analysis phase of the study was structured to evaluate the impact of AI-assisted versus traditional teaching methods on student engagement. Our initial analysis used descriptive statistics to summarise the baseline characteristics of the participants and their initial engagement levels. This step provided a clear understanding of the sample's composition and the starting state of engagement across both groups.

Descriptive results

Prior to conducting these analyses, we confirmed that the data met all the necessary assumptions for ANOVA (normality, homogeneity of variances, and sphericity for repeated measures), ensuring the validity of our results. Shapiro-Wilk tests confirmed normality, and Levene's tests verified homogeneity of variances.

Descriptive statistics were calculated to summarise the engagement levels of participants in both the AI-assisted and traditional teaching groups, measured before and after the intervention. The means and standard deviations for each dimension of the Utrecht Work Engagement Scale for Students (UWES-9S) – vigour, dedication, and absorption – are presented in Table 1.

TABLE 1
Means and standard deviations of engagement scores pre- and post-intervention

Dimension	Group	Pre-intervention mean (*SD*)	Post-intervention mean (*SD*)
Vigour	AI-assisted	4.05 (1.20)	5.53 (1.10)
	Traditional	4.11 (1.30)	4.36 (1.20)
Dedication	AI-assisted	4.25 (1.10)	5.71 (1.00)
	Traditional	4.38 (1.20)	4.48 (1.10)
Absorption	AI-assisted	4.31 (1.30)	5.64 (1.20)
	Traditional	4.46 (1.20)	4.57 (1.30)

The AI-assisted group exhibited substantial increases in all three engagement dimensions post-intervention. In contrast, the traditional group showed only marginal improvements. These descriptive results suggest a positive impact of the AI-assisted learning environment on student engagement. Figure 1 presents a visual comparison of pre- and post-intervention engagement scores for both groups.

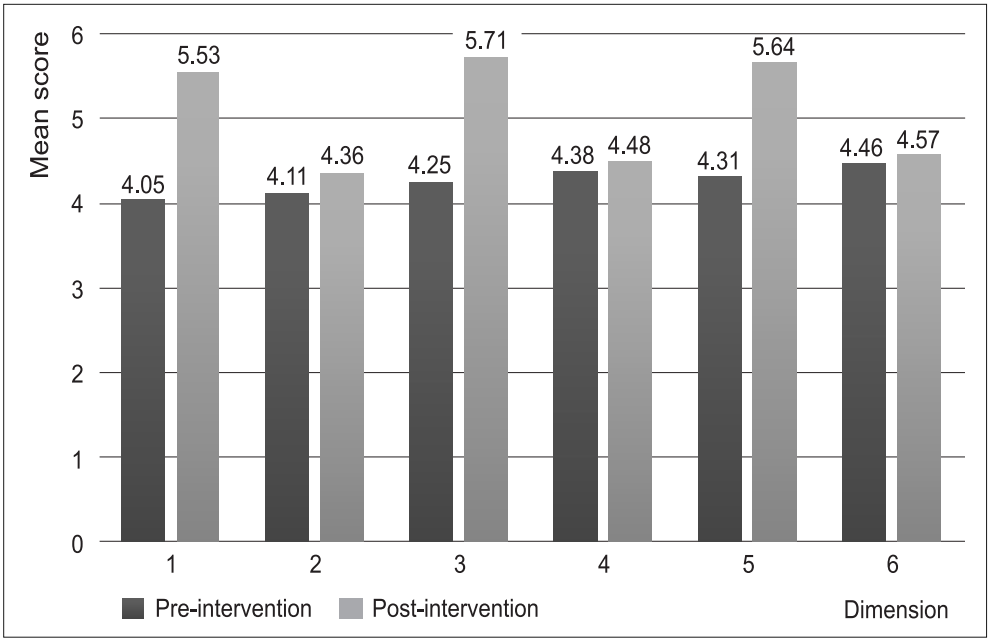


FIGURE 1
Pre- and post-intervention engagement scores comparison

In Figure 1, each dimension – Vigour, Dedication, Absorption – is represented by two bars: one for the AI-assisted group and one for the traditional group. These bars are labelled 1 through 6. Specifically, bars 1 (AI-assisted) and 2 (Traditional) show Vigour scores, bars 3 (AI-assisted) and 4 (Traditional) show Dedication scores, and bars 5 (AI-assisted) and 6 (Traditional) show Absorption scores. Within each bar, the darker portion indicates the Pre-intervention mean, while the lighter portion represents the Post-intervention mean, illustrating that the AI-assisted group experienced more substantial increases in all dimensions than the traditional group.

Correlation analysis

In addition to summarising engagement levels, we examined the associations between engagement and academic performance. Correlation analyses assessed both pre- and post-intervention engagement dimensions in relation to students' exam scores and overall course grades.

Pearson correlation coefficients were calculated to assess the relationships between engagement dimensions and aca-

demic performance (exam scores and course grades) post-intervention. Academic performance was measured via final exam scores and overall course grades. These objective evaluations were administered by an independent faculty member uninvolved in the intervention design.

➲ TABLE 2
Correlations between engagement dimensions and academic performance

Dimension	Correlation with academic performance (r)	p-value
Vigour	0.62	< 0.001
Dedication	0.68	< 0.001
Absorption	0.59	< 0.001

A strong positive correlation was found between dedication and academic performance ($r = 0.68$, $p < 0.001$), indicating that higher levels of dedication are associated with better academic outcomes. Vigour and absorption also showed significant positive correlations with academic performance. We further examined pre-intervention engagement correlations with academic performance, which were comparatively weaker (vigour: $r = 0.24$, $p = 0.03$; dedication: $r = 0.28$, $p = 0.01$; absorption: $r = 0.21$, $p = 0.05$), suggesting that the increase in engagement post-intervention may be a more reliable predictor of academic outcomes.

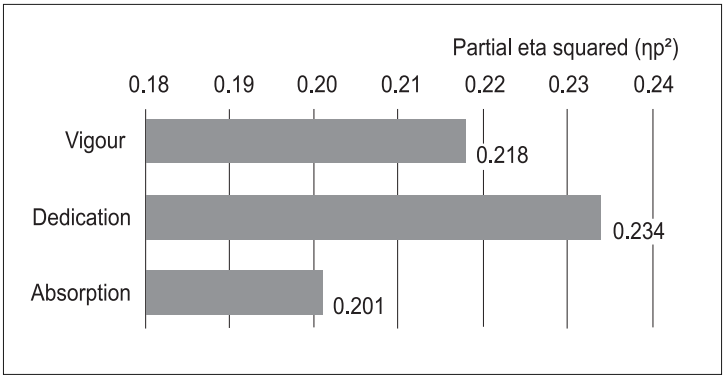
ANOVA results

As already mentioned, this study employed mixed Analysis of Variance (ANOVA) to evaluate the effects of instructional method (AI-assisted vs. traditional) and time (pre- and post-intervention) on student engagement dimensions. The interaction effects between instructional method and time were of primary interest.

❥ TABLE 3
ANOVA results and effect sizes for engagement dimensions

Dimension	F-value (1, 80)	p-value	Partial eta squared (ηp^2)	Effect size interpretation
Vigour	22.35	< 0.001	0.218	Large
Dedication	24.48	< 0.001	0.234	Large
Absorption	20.11	< 0.001	0.201	Large

The mixed ANOVA revealed significant interaction effects between instructional method and time for all three engagement dimensions. These large effect sizes indicate that a sizeable proportion of variance in engagement scores can be attributed to the interaction between instructional method and time. Figure 2 illustrates the partial eta squared values for the three engagement dimensions, reinforcing the quantitative analysis.



➲ FIGURE 2
Effect sizes by dimension

The bars represent the partial eta squared (ηp^2) for each engagement dimension, highlighting the strong influence of the AI-assisted intervention on vigour, dedication, and absorption.

This statistical narrative is further supported by the application of Tukey's Honestly Significant Difference (HSD) post-hoc tests. Following the detection of significant differences by the mixed ANOVA, Tukey's HSD was employed to confirm which specific pairwise comparisons are statistically significant while controlling for type I errors across multiple tests. This method corroborated the large effect sizes observed, affirming the uplift in engagement within the AI-assisted group, with all dimensions yielding p-values less than 0.001.

To further quantify the magnitude of the differences observed between the AI-assisted and traditional teaching groups, Cohen's d was calculated for each engagement dimension. Cohen's d is a measure of effect size that expresses the difference between two means in terms of standard deviation units, allowing for the assessment of practical significance alongside statistical significance (Cohen, 1988). According to Cohen's (1988) benchmarks, effect sizes of 0.2 are considered small, 0.5 medium, and 0.8 or above large. The calculated effect sizes exceeding 1.0 for all three engagement dimensions indicate that the differences are not only statistically significant but also of considerable practical importance.

The effect sizes for the changes in engagement dimensions are as follows:

Vigour: The AI-assisted group exhibited a large effect size with Cohen's $d = 1.29$, indicating a substantial increase in vigour compared to the traditional group.

Dedication: A large effect size was also observed for dedication, with Cohen's $d = 1.39$, suggesting a significant enhancement in students' dedication within the AI-assisted learning environment.

Absorption: The effect size for absorption was large as well, with Cohen's $d = 1.06$, reflecting a notable improvement

in the level of absorption among students using AI-assisted tools.

These substantial effect sizes corroborate the results of the mixed ANOVA, emphasising the meaningful impact of AI-assisted learning environments on enhancing student engagement across vigour, dedication, and absorption.

THEMATIC ANALYSIS

To gain a more profound insight into how AI-assisted learning environments affect student engagement, additional qualitative data were collected beyond the quantitative measures provided by the Utrecht Work Engagement Scale for Students (UWES-9S). Recognising the need for a broader dataset, a supplementary survey composed of open-ended questions was administered to the intervention group at the end of the semester. This approach was intended to gather data about the students' firsthand experiences and insights into the specific features of AI tools and their influence on the engagement aspects of vigour, dedication, and absorption. All 60 students in the intervention group participated in the qualitative survey, ensuring consistency between the quantitative and qualitative datasets. These students had also completed the UWES-9S, allowing for a comprehensive analysis of their engagement levels. The open-ended questions invited students to reflect on their experiences with the AI-assisted learning environment, focusing on aspects such as personalisation, interactivity, immediate feedback, and any other features they found impactful. The thematic analysis began with an exhaustive review of the narrative responses collected from these students. Responses were initially coded based on the descriptions of student experiences, particularly emphasising their perceptions of personalisation, interactivity, and real-time feedback. The coding process involved identifying meaningful patterns or phrases that succinctly captured the students' sentiments. As the analysis progressed, codes were aggregated into broader themes using a constant comparative method to refine and define these themes until saturation was reached. Saturation was considered achieved when additional data no longer introduced new insights or themes, ensuring that the analysis comprehensively represented the students' experiences. Two independent researchers coded the responses, achieving an inter-rater reliability (Cohen's κ) above 0.80, ensuring the trustworthiness of the thematic analysis.

Six main themes emerged from the data, each encapsulating distinct aspects of student engagement driven by AI features:

1. *Enhanced personal engagement (35.6%)*: This theme captures how personalised interactions with AI tools, especially ChatGPT, fostered a deeper connection between students and the learn-

ing material. Students frequently noted that customising content to their learning needs made the material more accessible and relatable, thereby enhancing their intrinsic motivation.

2. *Motivation through competition (32.2%)*: Many responses highlighted the motivational boost provided by the competitive elements of AI tools within Quizizz. Students appreciated the gamified aspects, which transformed learning into a dynamic and enjoyable challenge. This competitive spirit was particularly noted to increase students' dedication to mastering the content.

3. *Accelerated learning curve (16.7%)*: The immediate feedback provided by AI tools was repeatedly mentioned as a critical factor in enhancing the absorption aspect of engagement. Students valued the ability to receive instant feedback, enabling them to quickly understand and rectify mistakes, thereby maintaining a prominent level of focus and effectively speeding up the learning process.

4. *Collaborative learning enhancements (7.7%)*: Apart from competition, AI tools facilitated greater collaboration among students through shared quizzes or projects, fostering a community learning environment and enhancing communication and teamwork among peers. Interestingly (cf. Theme no. 2), the data revealed that more students attributed greater value to competitive elements than to collaborative aspects in their learning environments. This preference underscores a distinctive inclination towards competitive engagement strategies, which may stimulate motivation and drive academic performance more effectively than cooperative methods.

5. *Emotional engagement (3.9%)*: This theme revolves around how AI tools affected the emotional aspects of student engagement, such as reducing anxiety associated with assessments or increasing confidence through progressive learning modules. Emotional engagement is crucial for motivation and long-term educational success.

6. *Technological literacy skills (3.9%)*: Emphasising the role of AI tools in enhancing students' technological skills, this theme covers how frequent interaction with these tools helped students become more proficient with digital technologies, an essential skill in today's tech-driven world.

To explore the relationship between the qualitative themes and the quantitative engagement dimensions measured by the UWES-9S, we quantified the presence of themes in individual students' responses. Each student's response was coded for the presence (1) or absence (0) of each theme. This process resulted in a dataset where each student had both quantitative engagement scores and binary indicators for each qualitative theme. Point-biserial correlation analysis to examine the associations between the presence of each theme and the cor-

responding engagement dimension scores was then conducted. Each student's qualitative response was binary-coded for theme presence to quantify relationships. Although such an approach reduces thematic richness, it allows preliminary statistical linkage between engagement scores and emergent qualitative patterns. We acknowledge this as an exploratory step. The point-biserial correlation is appropriate when one variable is dichotomous (presence or absence of a theme), and the other is continuous (engagement scores). We focused on post-intervention UWES-9S scores here, reflecting engagement after exposure to AI activities. However, to address potential changes from baseline, we also calculated correlations with pre-intervention engagement scores, which yielded weaker and non-significant relationships (r_{pb} range = 0.10–0.15, $p > 0.05$). This suggests that the themes identified in the qualitative data aligned more closely with the higher engagement levels reported after students experienced AI-assisted learning.

The results revealed significant correlations between the three most prominent themes and engagement dimensions (Table 4):

Enhanced personal engagement and Vigour: A significant positive correlation was found between the presence of the enhanced personal engagement theme and vigour scores ($r_{pb} = 0.43$, $p < 0.001$). This suggests that students who reported enhanced personal engagement tended to have higher levels of energy and mental resilience in their studies.

Motivation through competition and Dedication: There was a significant positive correlation between the motivation through competition theme and dedication scores ($r_{pb} = 0.46$, $p < 0.001$). This indicates that students who highlighted competitive elements as motivating factors exhibited greater enthusiasm and commitment to their studies.

Accelerated learning curve and Absorption: The presence of the accelerated learning curve theme was significantly correlated with absorption scores ($r_{pb} = 0.40$, $p < 0.01$), suggesting that students who valued immediate feedback and accelerated learning experienced deeper immersion in their academic tasks.

TABLE 4
Point-biserial correlations between themes and engagement dimensions

Theme	Engagement	Dimension correlation coefficient (r_{pb})	p-value
Enhanced personal engagement	Vigour	0.43	<0.001
Motivation through competition	Dedication	0.46	<0.001
Accelerated learning curve	Absorption	0.40	<0.01

These statistical correlations provide empirical support for the connections between the qualitative themes and the quantitative engagement dimensions. The findings indicate that

specific features of AI-assisted learning tools are associated with higher levels of student engagement as measured by the UWES-9S.

These insights are invaluable for educational technology developers and educators seeking to optimise AI tools to foster more engaging and effective learning environments. The integration of quantitative and qualitative data provides a comprehensive understanding of how AI features such as personalisation, competition, and immediate feedback contribute to enhancing vigour, dedication, and absorption among students.

DISCUSSION OF THE RESULTS

The present study investigated the impact of AI-assisted learning environments on student engagement among undergraduate students at the University of Montenegro, using the Utrecht Work Engagement Scale for Students (UWES-9S) to measure the dimensions of vigour, dedication, and absorption. The findings indicate that students exposed to AI-assisted instructional methods showed significant improvements in all three dimensions of engagement compared to those in traditional teaching settings. Specifically, the AI-assisted group demonstrated substantial increases in vigour, dedication, and absorption scores post-intervention, with large effect sizes observed. Furthermore, a strong positive correlation was found between increased dedication and academic performance, suggesting that heightened engagement is associated with better educational outcomes. These results align with Schaufeli et al.'s (2006) work engagement theory, which posits that engagement is characterised by elevated levels of energy, enthusiasm, and immersion in activities. The significant improvements in the engagement dimensions suggest that AI-assisted learning environments effectively enhance these aspects of student experience. The findings also corroborate previous research indicating that personalised and interactive learning tools can boost student motivation and engagement (Chen et al., 2020; Holmes et al., 2019). The increase in vigour observed in the AI-assisted group suggests that the stimulating and responsive nature of AI tools can effectively boost students' energy and resilience in academic settings. This is consistent with previous studies highlighting the role of adaptive learning technologies in sustaining student motivation by providing appropriate challenges (Ward et al., 2024). The AI tools used in this study, ChatGPT and Quizizz, have contributed to sustaining high energy levels by offering immediate feedback and interactive learning experiences.

The marked improvement in dedication highlights AI's capacity to make learning more relevant and personally mean-

ingful to students through customised feedback and adaptive learning paths. This personalisation helps students see the value and importance of their studies, increasing their emotional and cognitive investment in their education. Similar findings have been reported by Kizilcec et al. (2017), who found that personalised feedback in online learning environments enhances student commitment and course completion rates. The significant rise in absorption scores indicates that AI-enhanced tools are particularly effective at capturing and sustaining students' attention, likely due to their interactive and immersive nature. This finding supports the notion that engaging content delivery methods, facilitated by AI technologies, can promote deep learning and sustained focus (Johnson & Lester, 2016). The interactive features of AI tools may create a flow-like experience, where students become fully immersed in the learning activity (Csikszentmihalyi, 1990). The positive correlation between increased engagement, particularly dedication, and improved academic performance reinforces the importance of fostering engagement to enhance educational outcomes. This relationship echoes the findings of Carmona-Halty et al. (2021), who demonstrated that academic engagement mediates the relationship between positive emotions and academic performance.

Our study extends the application of Schaufeli et al.'s (2006) work engagement theory to the context of AI-assisted learning environments. The observed enhancements in vigour, dedication, and absorption align with the theoretical underpinnings that emphasise the importance of energy, enthusiasm, and immersion in promoting engagement. By demonstrating that AI tools can effectively enhance these dimensions, the study provides empirical support for integrating technological advancements with established psychological frameworks. Previous research has highlighted the potential of AI in education to personalise learning experiences and improve engagement (Chen et al., 2020; Holmes et al., 2019). For instance, Chen et al. (2020) reviewed AI applications in education and found that adaptive learning systems that tailor content to individual needs can significantly enhance student motivation and learning outcomes. Our findings corroborate these conclusions, showing that AI-assisted environments contribute to higher engagement levels compared to traditional methods.

The findings have significant implications for educational practices and policy development. The enhanced vigour suggests that incorporating AI elements that actively engage students can reduce feelings of fatigue and disinterest. Educational policymakers might consider integrating AI technolo-gies that simulate real-world problems and interactive scenarios to maintain high energy levels in educational environ-

ments (Holmes et al., 2019). The improvement in dedication underscores the value of personalised learning experiences. Institutions may leverage this insight by adopting AI systems that provide tailored educational content, fostering deeper emotional connections with the academic material and promoting a sense of ownership over learning achievements (Kizilcec et al., 2017). The rise in absorption scores indicates that AI-enhanced tools effectively capture and sustain student attention. This suggests a shift towards educational strategies that emphasise engaging content delivery capable of holding student interest over extended periods. Policymakers could advocate for the development and integration of AI tools that present information in an inherently engaging and captivating manner, ensuring active participation in the learning process (Johnson & Lester, 2016).

Limitations

Despite the promising results, several limitations must be acknowledged. First, the study relied on self-report measures using the UWES-9S, which may introduce response biases such as social desirability or inaccurate self-assessment (Podsakoff et al., 2003). Future research should consider incorporating objective measures of engagement, such as behavioural analytics from AI platforms or observational assessments, to complement self-reported data. Second, the quasi-experimental design without random assignment limits the ability to establish causality. Participants were assigned to groups based on faculty affiliation, which may have introduced selection biases. Differences in academic culture or student characteristics between faculties could confound the results. Randomised controlled trials would strengthen the causal inferences and control for potential confounding variables. Third, the sample size, particularly for the control group ($n = 22$), was relatively small. This may affect the generalisability of the findings to broader populations. Larger sample sizes and replication across different institutions and disciplines are needed to validate and extend the conclusions. Additionally, the study was conducted over a single semester, providing a snapshot of the effects of AI-assisted learning. Longitudinal studies examining the long-term impact on engagement and academic performance would offer insights into the sustainability of the benefits observed.

Recommendations for future research

Future research should aim to expand on these findings by exploring the longitudinal impacts of AI engagement and examining which specific AI features are most effective across different student demographics. Investigating the role of fac-

tors such as cultural context, subject matter, and individual differences in receptivity to AI-assisted learning can provide a better understanding of how to optimise these technologies for diverse learner populations. Moreover, future research should address the potential challenges and ethical considerations associated with AI in education, such as data privacy, algorithmic bias, and the digital divide between students exposed to AI-assisted learning environments and those receiving traditional instruction. Ensuring equitable access to AI technologies is crucial to avoid exacerbating existing educational inequalities.

CONCLUSIONS

This study aimed to investigate the impact of AI-assisted learning environments on student engagement, specifically focusing on the dimensions of vigour, dedication, and absorption as measured by the Utrecht Work Engagement Scale for Students (UWES-9S). Additionally, the research sought to explore the relationship between enhanced engagement and academic performance and to identify specific AI features that most effectively enhance student engagement. The findings conclusively demonstrate that integrating AI-assisted tools within the educational context significantly enhances student engagement across all measured dimensions. The AI-assisted group exhibited substantial improvements in vigour, dedication, and absorption, with large effect sizes observed in the mixed ANOVA analysis. Dedication showed a strong positive correlation with academic performance, underscoring the potential of increased engagement to contribute to better learning outcomes. These preliminary results provide empirical support for the transformative potential of AI in education. The dynamic and interactive nature of AI tools resonates more effectively with students than traditional teaching methods, leading to deeper involvement and commitment to their studies. Features such as personalised feedback, immediate response mechanisms, and interactive learning experiences offered by AI tools like ChatGPT and Quizizz not only boost engagement levels but also facilitate improved academic performance.

The practical implications of these findings are significant for educators and administrators. Educational institutions should consider integrating AI-assisted methodologies into their curricula to enhance student engagement and academic outcomes. By incorporating AI tools that offer personalised and interactive learning experiences, educators can cater to diverse learning needs, maintain high energy levels in the classroom, and foster a deeper emotional connection between students and their studies. Training programmes for educators should include components on effectively utilising AI tools to enhance teaching strategies. Professional development ini-

tiatives can equip teachers with the skills necessary to integrate AI technologies into their instructional practices, ensuring they can leverage these tools to maximise student engagement.

At the policy level, the findings highlight the need for educational frameworks that support the integration of AI technologies. Policymakers should advocate for the development and implementation of AI tools that enhance engagement and learning outcomes. This includes allocating resources for technological infrastructure, supporting research and development of educational AI applications, and establishing guidelines for effective and ethical use of AI in classrooms. The social relevance of this study is profound, as it addresses the growing demand for educational practices that prepare students for a technologically advanced society. By fostering higher levels of engagement and improving academic performance, AI-assisted learning environments contribute to the development of a skilled and knowledgeable workforce. This has far-reaching implications for economic growth, innovation, and societal advancement.

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Usporedna analiza angažiranosti studenata u tradicionalnoj nastavi i nastavi potpomognutoj umjetnom inteligencijom primjenom UWES-9S

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U ovom istraživanju empirijski ispitujemo utjecaj obrazovnog okruženja podržanog umjetnom inteligencijom u odnosu na tradicionalne nastavne metode na angažiranost studenata na Sveučilištu Crne Gore. Koristeći se Utrechtskom ljestvicom angažiranosti studenata (UWES-9S) te kvalitativnim upitnikom procijenili smo tri temeljne dimenzije angažiranosti: energičnost, predanost i zadubljenost. Ukupno 82 studenta preddiplomskoga studija (dob od 19 do 27 godina; 59 % studentica, 41 % studenata) sudjelovalo je u usporednoj analizi tijekom jednoga semestra, uz mjerenje rezultata prije i nakon intervencije. Zbog logističkih razloga i rasporeda nastave, šezdeset studenata s Prirodoslovno-matematičkoga fakulteta raspoređeno je u skupinu s nastavom podržanom umjetnom inteligencijom, dok su dvadeset i dva studenta s Metalurškoga fakulteta nastavili s tradicionalnim oblikom nastave, čineći kontrolnu skupinu. Analiza je provedena primjenom mješovitog ANOVA testa za istraživanje interakcija između vremena i vrste nastave, pri čemu su zabilježena značajna poboljšanja nakon prelaska na nastavu uz podršku umjetne inteligencije za energičnost ($F(1,80) = 22,35$, $p < 0,001$, $\eta p^2 = 0,218$), predanost ($F(1,80) = 24,48$, $p < 0,001$, $\eta p^2 = 0,234$) i zadubljenost ($F(1,80) = 20,11$, $p < 0,001$, $\eta p^2 = 0,201$). Povišene vrijednosti Cohenova indeksa d upućuju na velike veličine efekta, što potvrđuje statističku i praktičnu važnost ovih poboljšanja.

Ključne riječi: UWES-9S, angažiranost, energičnost, predanost, zadubljenost, učionica potpomognuta umjetnom inteligencijom

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MEDIJACIJSKA ULOGA EPISTEMIČKIH EMOCIJA U ODNOSU MOTIVACIJSKIH UVJERENJA I UKLJUČENOSTI UČENIKA

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Cilj ovog istraživanja bio je ispitati medijacijsku ulogu epistemičkih emocija u objašnjenju odnosa između motivacijskih uvjerenja i uključenosti učenika. U istraživanju je sudjelovalo 15 842 učenika iz 73 srednje škole u Hrvatskoj koji su bili raspoređeni unutar 984 razredna odjeljenja. Učenici su ispunili upitnik kojim su se ispitivale epistemičke emocije (iznenađenje, znatiželja, uživanje, zbunjenost, anksioznost, frustracija i dosada), motivacijska uvjerenja (samoefikasnost i vrijednost zadatka) i uključenost u učenje (kognitivna, emocionalna i ponašajna). Podaci su analizirani tehnikom višerazinskoga modeliranja strukturalnim jednadžbama, a dobiveni rezultati pokazali su da epistemičke emocije djelomično posreduju odnos motivacijskih uvjerenja i uključenosti učenika na razinama unutar (L1) i između razrednih odjeljenja (L2). Međutim, snaga odnosa između epistemičkih emocija, motivacijskih uvjerenja i uključenosti učenika donekle se razlikovala u ovisnosti o razini analize i valenciji emocija. Dobiveni rezultati sugeriraju da se oblikovanjem motivacijskih uvjerenja učenika može unaprijediti emocionalno doživljavanje učenika i njihova uključenost u učenje.

Ključne riječi: epistemičke emocije, motivacijska uvjerenja, uključenost učenika, medijacijska analiza

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Prepoznavanje i shvaćanje čimbenika koji oblikuju uključenost učenika u obrazovni proces ključni su za razvoj njihovih potencijala i postizanje optimalnih ishoda učenja. Među tim čimbenicima ključnu ulogu u usmjeravanju učenikovih ponašanja i njihovom aktivnom sudjelovanju u učenju imaju motivacijska uvjerenja, kao što su očekivanja uspjeha i percepcija osobne kompetentnosti, ali i vrijednost koju pridaju učenju i znanju na nekom području. Međutim, malo se zna o mehanizmima u podlozi odnosa između motivacijskih uvjerenja i uključenosti učenika u učenje. Čini se da bi središnju ulogu u objašnjenju ovog odnosa mogle imati tzv. epistemičke emocije, odnosno emocije učenika koje se javljaju u procesu stjecanja znanja poput zbunjenosti, znatiželje i frustracije (Pekrun i sur., 2017). Stoga je cilj ovog istraživanja bio ispitati posredujuću ulogu epistemičkih emocija u objašnjenju odnosa motivacijskih uvjerenja i uključenosti učenika u učenje. Rezultati ovog istraživanja mogu pomoći u boljem razumijevanju emocionalne dimenzije učenja, naglašavajući na koji način određene emocije mogu podržavati ili sputavati aktivno sudjelovanje učenika i njihovu motivaciju. Osim toga, dobiveni rezultati mogu poslužiti za kreiranje smjernica za razvoj odgojno-obrazovnih strategija, koje uključuju emocionalnu i motivacijsku podršku u učenju i poučavanju čime se može poboljšati kvaliteta obrazovnog iskustva kao i realiziranje pozitivnih obrazovnih ishoda.

EPISTEMIČKE EMOCIJE U KONTEKSTU TEORIJE KONTROLE I VRIJEDNOSTI

Akademske emocije jesu emocije koje se vežu uz procese poučavanja i učenja, odnosno emocije koje učenici ili studenti doživljavaju u školskom, odnosno fakultetskom, okruženju (Pekrun, 2006). Jedna od kategorija akademskih emocija odnosi se na epistemičke emocije koje se mogu definirati kao emocije povezane s aspektima učenja, stvaranja znanja i stimulirajućih kognitivnih aktivnosti, a nastaju kao rezultat obradbe informacija i kognitivne kvalitete informacija o samom zadatku (Muis i sur., 2018). Riječ je o emocijama koje proizlaze iz procjena usmjerenih na informacije, a koje su vezane uz stupanj (ne)usklađenosti između novih informacija i trenutačnih uvjerenja, odnosno struktura znanja pojedinca ili nedavno obrađenih informacija (Muis i sur., 2018). Vogl i suradnici (2021) navode sedam epistemičkih emocija: iznenađenje, znatiželja, uživanje, frustracija, anksioznost, zbunjenost i dosada. Primjerice, uživanje, iznenađenje, znatiželja i zbunjenost mogu se doživjeti u situacijama u kojima nove informacije nisu u skladu s prethodnim znanjem, dok se tjeskoba, frustracija ili dosada javljaju u obrnutim situacijama (D'Mello i Graesser, 2012).

Teorija kontrole i vrijednosti (Pekrun, 2006) pruža uvid u dinamiku emocionalnih iskustava koja prate proces učenja. Preciznije, teorija povezuje emocionalne reakcije učenika s njihovom percepcijom kontrole nad ishodima učenja i vrijednosti koje pridaju tim ishodima. Primjerice, ako učenik vjeruje da može uspješno riješiti matematički problem (jer ima visoke razine samoefikasnosti na području matematike) te taj zadatak percipira kao važan za svoj školski uspjeh, on će vjerojatno doživjeti ugodne emocije, poput ponosa ili zadovoljstva. S druge strane, nedostatak percepcije kontrole i niska vrijednost zadatka mogu dovesti do doživljavanja neugodnih emocija, poput anksioznosti ili ljutnje.

S obzirom na to da ova teorija pruža okvir za razumijevanje emocija koje su povezane s učenjem i školskim dostignućem, može se očekivati da će i epistemičke emocije proizlaziti iz kognitivnih procjena učenika o kontroli nad učenjem i dostignućem te vrijednosti kojima pridaju. Dakle, epistemičke emocije određene su kognitivnim procjenama učenika, pa su tako pozitivne epistemičke emocije (npr. uživanje i znatiželja) često rezultat percepcije visoke kontrole i visokoga vrednovanja nekoga zadatka, dok negativne epistemičke emocije (npr. frustracija i zbunjenost) mogu nastati kada učenici evaluiraju zadatak kao vrijedan, ali percipiraju nisku kontrolu nad tim zadatkom, jer im, primjerice, gradivo nije dovoljno jasno (Balaž i Pavlin-Bernardić, 2022).

Nadalje, prema teoriji kontrole i vrijednosti (Pekrun, 2006), emocije doživljene u akademskom kontekstu utječu na motivaciju učenika, odabir strategija učenja i samoregulaciju učenja. Jednako tako, epistemičke emocije – i pozitivne i negative – mogu potaknuti učenike na veću uključenost u učenje. Primjerice, zbunjenost koja se javlja kao posljedica obrađivanja nejasnih ili kontradiktornih informacija može motivirati učenika na dublji angažman u učenju i rješavanje problema, dok uživanje može učeniku signalizirati efikasnost njegova trenutačnog uloženog truda, što dodatno poboljšava motivaciju. Muis i suradnici (2015) pokazali su da epistemičke emocije služe kao prediktori strategija učenja i dostignuća u procesu učenja, odnosno znatiželja i uživanje facilitiraju upotrebu dubinskih strategija učenja, dok neugodne emocije, poput anksioznosti i frustracije, vode do površnih strategija učenja. Kada je riječ o specifičnom predmetu, istraživanja upućuju na to da su epistemičke emocije povezane s kognitivnom i bihevioralnom uključenosti učenika u učenje fizike, s tim da se pokazalo kako procjena vrijednosti posreduje u odnosu između kvalitete poučavanja i epistemičkih emocija (Balaž, 2021; Balaž i Pavlin-Bernardić, 2022).

MOTIVACIJSKA UVJERENJA I UKLJUČENOST UČENIKA

Motivacijska uvjerenja odnose se na osobna stajališta i percepciju koju pojedinac ima o vlastitim sposobnostima, ciljevima i ishodima u nekim konkretnim zadacima ili općenito u životu (Pintrich, 2000). U ovom istraživanju fokus je bio na dva motivacijska uvjerenja – samoefikanosti i vrijednosti zadatka. Primjerice, prema *socijalno-kognitivnoj teoriji* (Bandura, 1997), samoefikasnost se definira kao vjerovanje pojedinca u vlastitu sposobnost da organizira i izvrši radnje potrebne za postizanje specifičnih ciljeva te kao takva predstavlja okosnicu motiviranoga ponašanja – za pojedince koji imaju visoku samoefikasnost vjerojatnije je da će se angažirati u izazovnim zadacima, ustrajati u njihovu izvođenju te postići određene uspjehe. S druge strane, prema *teoriji očekivanja i vrijednosti* (Wigfield i Eccles, 2000), motivaciju oblikuju dvije ključne značajke, odnosno *očekivanja* (uvjerenja u vlastitu sposobnost za postizanje uspjeha) i *vrijednost* (percipirana vrijednost nekog zadatka). Drugim riječima, ako osoba vjeruje da će uspjeti u izvršavanju nekoga zadataka (očekivanje) te da je zadatak visoko vrijedan, bit će i motiviranija za njegovo izvođenje.

Uključenost učenika i studenata postala je fokus brojnih istraživanja u psihologiji obrazovanja zbog svog doprinosa u objašnjenju slabijega školskog uspjeha, dosade te odustajanja od škole ili fakulteta (npr. Fredricks i sur., 2004). U Finnovu modelu uključenosti učenika (1989), ističu se dvije međusobno povezane dimenzije: sudjelovanje i identifikacija. *Sudjelovanje* se odnosi na pohađanje nastave, prihvaćanje školskih ili fakultetskih pravila te poštivanje predmetnoga nastavnika, dok se *identifikacija* povezuje s percepcijom pripadanja školskom ili akademskom okruženju. Di Battista i suradnici (2014) navode kako je, generalno gledajući, uključenost učenika tendencija k uključivanju u školske, odnosno akademske, zadatke i aktivnosti, dok je za neke druge autore ona uočljiva u izvannastavnim ili društvenim aktivnostima (Finn i Rock, 1997). Uključeni učenik se, prema ovim značajkama, opisuje kao zaokupljen, energičan i predan te istovremeno sebe percipira kao aktivnoga sudionika koji je povezan s vlastitom zajednicom (Baron i Corbin, 2012). Mnogi autori uključenost učenika opisuju kao trodimenzionalni konstrukt kroz *ponašajnu* (sudjelovanje i identifikacija), *kognitivnu* (kognitivna fleksibilnost, postavljanje ciljeva i planiranje) i *afektivnu* komponentu (ugodne i neugodne emocije kao determinante razine interesa studenta i pristupa akademskom okruženju) (Fredericks i sur., 2004; Jang i sur., 2016). U ovom istraživanju fokus je upravo na trodimenzionalnom shvaćanju akademske uključenosti.

Sukladno socijalno-kognitivnoj motivacijskoj teoriji (Maehr, 1984), uvjerenja koja učenici imaju o vlastitim kompetencija-

ma (npr. samoefikasnost) i vrijednosti koju pripisuju školskim zadacima mogu biti izravno povezani s njihovom uključenosti u učenje. Motivacijska uvjerenja opisuju unutarnje procese učenika koji pridonose njihovoj motivaciji, učenju i dostignuću na školskom planu. Uvjerenja o vlastitim sposobnostima izvršavanja zadatka imaju za posljedicu doživljavanje pozitivnih emocija, što zauzvrat poboljšava proces učenja (Rosman i Mayer, 2018). Učenici i studenti koji vjeruju u vlastitu sposobnost izvršavanja nekoga zadatka (visoka samoefikasnost) isto će uvjerenje zadržati unatoč izazovima s kojima se susretnu. Samoefikasnost može također djelovati na to kako učenici doživljavaju stres i neugodne emocije, pa se vjeruje da oni s visokom samoefikasnosti imaju dobru kontrolu nad vlastitim emocijama te su općenito ustrajniji prilikom rješavanja nekoga zadatka, što pridonosi većem stupnju njihove uključenosti u učenje (Šandrić, 2018). Pokazalo se da samoefikasnost značajno pridonosi uključenosti u učenje, jer učenici s visokom samoefikasnosti češće doživljavaju pozitivne emocije tijekom učenja, čime se poboljšava motivacija za učenje (Šandrić, 2018).

S obzirom na to da je procjena vrijednosti zadatka ključna sastavnica motivacijskih uvjerenja, ona potiče uključenost učenika ako on neki zadatak percipira kao zanimljiv (intrinzična vrijednost), ali i ako ga percipira kao korisnog za ostvarenje vlastitih ciljeva (Hidi i Renninger, 2006; Wigfield i Eccles, 2000). Generalno govoreći, kada se zadaci percipiraju kao relevantni i važni, onda imamo za posljedicu veću uključenost učenika, no ne samo u onoj ponašajnoj komponenti (npr. prisutnost na nastavi) nego i u emocionalnoj i kognitivnoj.

CILJ I HIPOTEZE ISTRAŽIVANJA

U skladu s postavkama teorije kontrole i vrijednosti (Pekrun, 2006), uvjerenja o vlastitim sposobnostima izvršavanja zadatka i pozitivno vrednovanje učenja imaju za posljedicu doživljavanje pozitivnih epistemičkih emocija, što zauzvrat poboljšava proces učenja i dostignuće kroz povećavanje uključenosti u učenje. S druge strane, sumnja u vlastite sposobnosti uspješnog izvršavanja zadatka, uz visoku ili nisku vrijednost zadatka, može izazvati negativne epistemičke emocije, što može umanjiti uključenost u učenje. Uza sve navedeno, cilj je ovog istraživanja ispitati medijacijsku ulogu epistemičkih emocija u odnosu između motivacijskih uvjerenja i uključenosti učenika. S obzirom na to da je u ovom istraživanju sudjelovalo 15 842 učenika iz 984 razredna odjeljenja, pri čemu su učenici pojedinih razrednih odjeljenja procjenjivali svoja motivacijska uvjerenja, epistemičke emocije i uključenost koje se odnose na određeni predmet što ga poučava određeni nastavnik,[1] podaci su imali hijerarhijsku strukturu te ih je bilo mo-

guće analizirati na razini učenika, odnosno *unutar* razrednog odjeljenja (L1), i na razini *između* razrednih odjeljenja (L2). Formulirane su sljedeće hipoteze:

(1) Na obje razine analize, epistemičke emocije posredovat će odnos između motivacijskih uvjerenja (samoefikasnost i vrijednosti zadatka) i uključenosti učenika (kognitivna, emocionalna i ponašajna uključenost).

(2) Samoefikasnost i vrijednost zadatka bit će pozitivno povezane s pozitivnim epistemičkim emocijama (znatiželja, uživanje, iznenađenje), a negativno s negativnim epistemičkim emocijama (anksioznost, zbunjenost, frustracija i dosada).

(3) Pozitivne epistemičke emocije bit će pozitivno povezane s uključenosti učenika, dok će negativne epistemičke emocije biti negativno povezane s uključenosti učenika.

(4) Samoefikasnost i vrijednost zadatka bit će izravno pozitivno povezane s većom uključenosti učenika.

METODA

Sudionici i postupak

U istraživanju je sudjelovalo 15 842 učenika (9001 djevojaka, 6136 mladića, 705 bez odgovora) iz 984 razredna odjeljenja i 73 srednje škole na području Republike Hrvatske. Učenici su u prosjeku imali 16,50 godina (SD = 1,153) te su brojčano bili podjednako zastupljeni s obzirom na razred koji su pohađali ($N_{1.\,razred}$ = 3820, $N_{2.\,razred}$ = 4318, $N_{3.\,razred}$ = 4113, $N_{4.\,razred}$ = 3490 i $N_{5.\,razred}$ = 101).[2] Od njihova ukupnoga broja, 9517 učenika pohađalo je gimnazijski program, a 6325 strukovni program (od toga 392 učenika trogodišnji strukovni program, 5470 četverogodišnji strukovni program, a 463 učenika petogodišnji strukovni program). Prosječan broj učenika unutar razrednog odjeljenja iznosio je 16. Podaci su prikupljeni online upitnikom za vrijeme redovite nastave i pod nadzorom školskoga koordinatora istraživanja (tj. školskoga psihologa ili pedagoga). Sudjelovanje u istraživanju bilo je dobrovoljno i anonimno.

Kao što je već spomenuto, s obzirom na to da su konstrukti ispitivani u ovom istraživanju domenski specifični, tj. mogu varirati između predmeta i nastavnika, učenici pojedinih razrednih odjeljenja bili su upareni s pojedinim nastavnikom i predmetom unutar škole, pri čemu se vodilo računa da jedan nastavnik bude uparen samo s jednim predmetom i jednim razrednim odjeljenjem učenika. Također, prilikom ispunjavanja upitnika, učenici pojedinoga razrednog odjeljenja bili su instruirani da procjenjuju svoje misli, emocije i ponašanja

kada su na nastavi iz predmeta koji poučava točno određeni nastavnik. Uparivanje razrednih odjeljenja i nastavnika unutar škole bilo je rukovođeno načelom slučajnog odabira te je provedeno uz pomoć školskoga koordinatora istraživanja. Istraživanje je provedeno u okviru širega znanstvenog projekta, u koji su bili uključeni i nastavnici i učenici u školskoj godini 2021./2022. Upitnik za učenike sadržavao je veći broj mjera o učeničkim percepcijama ponašanja nastavnika te njihovim emocijama i motivaciji, a za potrebe ovoga rada korišteni su podaci o epistemičkim emocijama, motivacijskim uvjerenjima i uključenosti učenika.

Mjerni instrumenti

Za samoprocjenu *epistemičkih emocija* korištena je hrvatska adaptacija Skala epistemičkih emocija (engl. *Epistemically-Related Emotion Scales*; Pekrun i sur., 2017; Balaž, 2021). Mjerni instrument sadrži 7 skala, a svaka skala obuhvaća 3 čestice formulirane u obliku emocionalnih pridjeva: iznenađenje (npr. iznenađeno), znatiželja (npr. zainteresirano), uživanje (npr. sretno), zbunjenost (npr. smeteno), anksioznost (npr. zabrinuto), frustracija (npr. ižívcirano), dosada (npr. zamorno). Zadatak sudionika bio je da procijene koliko snažno doživljavaju navedenu emociju kada su na nastavi iz predmeta točno određenoga profesora, koristeći se skalom od 5 stupnjeva (1 = uopće ne, 5 = vrlo jako). Hrvatska verzija mjernog instrumenta, primijenjena na uzorku od 545 učenika osmih razreda osnovne škole, pokazala je da skale imaju zadovoljavajuću valjanost i pouzdanosti (Cronbach α-koeficijenti kretali su se u rasponu od 0,71 do 0,88; Balaž i Pavlin-Bernardić, 2022).

Motivacijska uvjerenja, odnosno *samoefikasnost i vrijednost zadatka*, ispitana su pomoću hrvatskih verzija odgovarajućih skala preuzetih iz Upitnika motivirajućih strategija za učenje (engl. *The Motivated Strategies for Learning Questionnaire – MSLQ*; Pintrich i sur., 1991). Skala vrijednosti zadatka sadrži 6 čestica (npr. Važno mi je naučiti gradivo toga predmeta), dok skala samoefikasnosti sadrži 8 čestica (npr. Siguran/na sam da ću imati izvrsnu ocjenu iz toga predmeta). Sudionici iskazuju stupanj slaganja sa svakom tvrdnjom koristeći se skalom od 7 stupnjeva (1 = uopće se ne slažem, 7 = u potpunosti se slažem). Ranije primjene hrvatske verzije skala pokazale su da one imaju zadovoljavajuće metrijske karakteristike. Primjerice, u istraživanju Mujagić i Buško (2013), provedenom na skupini studenata prve godine psihologije, pouzdanost skale samoefikanosti iznosila je $\alpha = 0{,}81$, a vrijednosti zadatka $\alpha = 0{,}85$).

Skale koje mjere dimenzije uključenosti učenika, odnosno *kognitivnu, emocionalnu i ponašajnu uključenost*, preuzete su iz upitnika Janga i suradnika (2016) te su prevedene na hrvatski jezik za potrebe ovog istraživanja. Kognitivna uključenost ispituje se pomoću 4 čestice (npr. Kada učim za taj predmet,

obično pokušavam novo gradivo sažeti vlastitim riječima), a emocionalna (npr. Uživam u učenju novih stvari iz toga predmeta) i ponašajna uključenost (npr. U tom predmetu trudim se najbolje što mogu) sa po 5 čestica. Sudionici iskazuju stupanj slaganja s tvrdnjama koristeći se skalom od 5 stupnjeva (1 = uopće se ne slažem, 5 = u potpunosti se slažem). S obzirom na to da je ovo bila prva primjena na hrvatskom uzorku učenika te da su podaci imali hijerarhijsku strukturu (tj. učenici su bili ugniježđeni u razredna odjeljenja, odnosno nastavnike), pomoću višerazinske konfirmatorne faktorske analize[3] (engl. *multilevel confirmatory factor analysis* – MCFA) testiran je trofaktorski model u kojem su faktori kognitivne, emocionalne i ponašajne uključenosti objašnjavali varijancu pripadajućih čestica na obje razine analize. Rezultati su ukazali na prihvatljivo slaganje modela s podacima ($\chi^2 = 8286{,}031$, $df = 148$, $p < 0{,}001$; CFI = 0,911, TLI = 0,891, $SRMR_{L1} = 0{,}054$, $SRMR_{L2} = 0{,}084$).

Analitička strategija

Budući da su podaci u ovom istraživanju hijerarhijski organizirani (tj. učenici su ugniježđeni unutar razrednih odjeljenja ili nastavnika), korišteni su višerazinski analitički postupci. Prvo su izračunani deskriptivni pokazatelji, intraklasne korelacije (ICC), McDonaldovi omega-koeficijenti pouzdanosti (Ω) te Pearsonovi koeficijenti korelacije na obje razine analize, odnosno na razini unutar razrednog odjeljenja / nastavnika (L1) i na razini između razrednih odjeljenja / nastavnika (L2). Nakon toga provedena je višerazinska medijacijska analiza pomoću višerazinskoga modeliranja strukturalnim jednadžbama (engl. *multilevel structural equation modeling – MSEM*), u kojoj su epistemičke emocije specificirane kao medijatori odnosa između motivacijskih uvjerenja i uključenosti učenika na obje razine analize. Ovakav tip višerazinskoga medijacijskog modela označuje se kao 1-1-1, jer su prediktor, medijator i kriterij mjereni na L1, ali se postupkom latentne agregacije svojstvene MSEM-u njihova varijanca dijeli u dvije ortogonalne komponente koje egzistiraju na L1 i L2 (Muthén i Asparouhov, 2011; Preacher i sur., 2011). Kako bi se pojednostavnili modeli i olakšala estimacija, testirana su dva medijacijska modela zasebno za pozitivne i negativne epistemičke emocije.

Analize su provedene u programu *Mplus 8.8* (Muthén i Muthén, 1998–2017) pomoću robusne metode maksimalne vjerojatnosti (engl. *maximum likelihood robust – MLR*). Slaganje modela s podacima evaluirano je na temelju sljedećih indeksa: CFI (engl. *comparative fit index*), TLI (engl. *Tucker-Lewis index*), RMSEA (engl. *root mean square error of approximation*) i SRMR (engl. *standardized root mean square*). CFI i TLI veći od 0,90 ukazuju na to da model prihvatljivo pristaje podacima (Hu i Bentler, 1999), kao i RMSEA između 0,05 i 0,08 (McDonald i Ho, 2002), dok SRMR vrijednost manja od 0,08 ukazuju na dobro

slaganje modela podacima (Marsh i sur., 2005). Naposljetku, s obzirom na to da populacijska distribucija indirektnih efekata nije normalnog oblika te da frekvencionistički pristup višerazinskom modeliranju trenutačno ne omogućuje testiranje statističke značajnosti indirektnih efekata *bootstrap* metodom, višerazinski medijacijski modeli testirani su dodatno Bayesovom metodom. Dva "nerazrijeđena" (engl. *unthinned*) lanca sa 200.000 iteracija korištena su za procjenu posteriornih vrijednosti, a konvergencija je provjerena potencijalnim reduciranjem skaliranja (engl. *potential scale reduction – PSR*). Budući da posteriorne procjene indirektnih efekata mogu imati asimetričnu distribuciju, za evaluaciju njihove statističke značajnosti određene su 95 % granice kredibilnosti najveće posteriorne gustoće (engl. *highest posterior density – HPD*).

REZULTATI

Deskriptivni pokazatelji, pouzdanost i rezultati višerazinskih korelacijskih analiza

U Tablici 1 prikazani su deskriptivni pokazatelji, vrijednosti intraklasnih korelacija (ICC) te Ω koeficijenti pouzdanosti. Sve ICC vrijednosti, osim one za varijablu iznenađenja, bile su znatno veće od 0,10, sugerirajući time da postoji značajan dio varijabiliteta u ispitivanim konstruktima koji se može pripisati pripadnosti klasteru, odnosno razrednom odjeljenju (Lüdtke i sur., 2008), te opravdavajući višerazinski analitički pristup. Također, Ω koeficijenti pouzdanosti bili su veći od 0,70, što se smatra donjom granicom prihvatljivosti (Klein i Kozlowski, 2000). Iznimka je ponovno bila nešto niža pouzdanost za skalu iznenađenja na L1 ($\Omega = 0{,}660$).

Povezanosti među varijablama na obje razine bile su u očekivanom smjeru. Pozitivne epistemičke emocije iznenađenja, znatiželje i uživanja bile su pozitivno povezane s motivacijskim uvjerenjima, tj. samoefikasnošću i vrijednošću zadatka te tri dimenzije uključenosti učenika (kognitivnom, emocionalnom, ponašajnom). Za negativne epistemičke emocije zbunjenosti, anksioznosti, frustracije i dosade utvrđeni su suprotni obrasci povezanosti. Također, oba motivacijska uvjerenja bila su pozitivno povezana sa sve tri dimenzije uključenosti. Važno je naglasiti da su korelacije na L2 u pravilu bile veće od korespondentnih vrijednosti na L1, što je uobičajeno u višerazinskim analizama. Naposljetku, rezultati korelacijskih analiza na L1 pokazuju da djevojke iskazuju nešto niže razine iznenađenja, znatiželje, uživanja i frustracije i više razine motivacijskih uvjerenja te kognitivne i ponašajne uključenosti u odnosu na mladiće. Međutim, koeficijenti korelacije u pravilu su bili izrazito niski, a statističku značajnost dosegnuli su zahvaljujući velikom broju sudionika. Na L2 utvrđeno je da razredna odjeljenja učenika koji pohađaju strukovne programe u

TABLICA 1
Deskriptivni pokazatelji, pouzdanost i korelacije među analiziranim varijablama

		1	2	3	4	5	6	7	8	9	10	11	12
1	Iznenađenje	-	0,825	0,841	-0,412	-0,332	-0,464	-0,651	0,418	0,537	0,390	0,744	0,633
2	Znatiželja	0,564	-	0,960	-0,795	-0,743	-0,829	-0,911	0,787	0,847	0,751	0,972	0,861
3	Uživanje	0,632	0,746	-	-0,794	-0,726	-0,808	-0,902	0,772	0,803	0,609	0,966	0,795
4	Zbunjenost	0,131	-0,264	-0,206	-	0,951	0,942	0,874	-0,922	-0,779	-0,691	-0,859	-0,652
5	Anksioznost	0,172	-0,221	-0,170	0,776	-	0,964	0,841	-0,860	-0,712	-0,693	-0,805	-0,584
6	Frustracija	0,078	-0,321	-0,256	0,760	0,817	-	0,932	-0,848	-0,770	-0,737	-0,869	-0,716
7	Dosada	-0,045	-0,418	-0,356	0,686	0,645	0,735	-	-0,770	-0,810	-0,712	-0,933	-0,842
8	Samoefikasnost	0,176	-0,491	0,432	-0,460	-0,432	-0,446	-0,396	-	0,818	0,713	0,860	0,694
9	Vrijednost	0,331	0,638	0,547	-0,343	-0,298	-0,387	-0,439	0,715	-	0,775	0,882	0,826
10	Kognitivna uključenost	0,243	0,462	0,384	-0,227	-0,213	-0,244	-0,269	0,469	0,521	-	0,704	0,787
11	Emocionalna uključenost	0,401	0,712	0,658	-0,388	-0,353	-0,431	-0,502	0,651	0,780	0,562	-	0,858
12	Ponašajna uključenost	0,327	0,591	0,534	-0,293	-0,246	-0,325	-0,415	0,576	0,681	0,573	0,766	-
13	Spol[1]	-0,086*	-0,029*	-0,071*	*0,014*	*-0,008*	-0,022*	*-0,005*	0,027*	0,058*	0,063*	*-0,001*	0,066*
14	Dob[1]	*0,005*	*0,006*	*0,004*	*0,016*	*0,017*	*0,011*	*0,003*	*-0,020*	*-0,004*	*-0,021*	*0,000*	*-0,011*
15	Program[2]	*0,089*	*-0,048*	*0,042*	*0,016*	*0,062*	*0,059*	*-0,030*	-0,145*	*-0,035*	-0,238*	*-0,015*	*-0,059*
	M_{L2}	2,63	3,25	3,00	2,29	2,07	2,08	2,43	5,11	4,87	3,59	3,43	3,55
	SD_{L2}	0,232	0,386	0,425	0,415	0,410	0,457	0,387	0,725	0,668	0,281	0,421	0,305
	SD_{L1}	0,829	0,872	0,917	0,881	0,925	0,973	0,871	1,214	1,292	0,775	0,777	0,740
	ICC	0,072	0,164	0,177	0,182	0,164	0,181	0,165	0,263	0,211	0,116	0,227	0,145
	Ω_{L1}	0,660	0,837	0,852	0,788	0,838	0,864	0,734	0,936	0,924	0,824	0,872	0,842
	Ω_{L2}	0,779	0,996	0,999	0,982	0,984	0,994	0,966	0,988	0,979	0,971	0,989	0,992

Napomene. Statistički neznačajne korelacije prikazane su u kurzivu; *$p < 0{,}001$; sve ostale korelacije statistički su značajne uz $p < 0{,}001$; korelacije izračunane na L2 prikazane su iznad dijagonale, a korelacije izračunane na L1 prikazane su ispod dijagonale; [1]korelacije na L1 razini, [2]korelacije na L2 razini

prosjeku procjenjuju samoefikasnost i kognitivnu uključenost nižima. Budući da analizirane sociodemografske karakteristike učenika nisu sustavno bile povezane s medijatorskim i kriterijskim varijablama, one nisu uključene u glavne analize kao kovarijate.

Rezultati testiranja višerazinskih medijacijskih modela

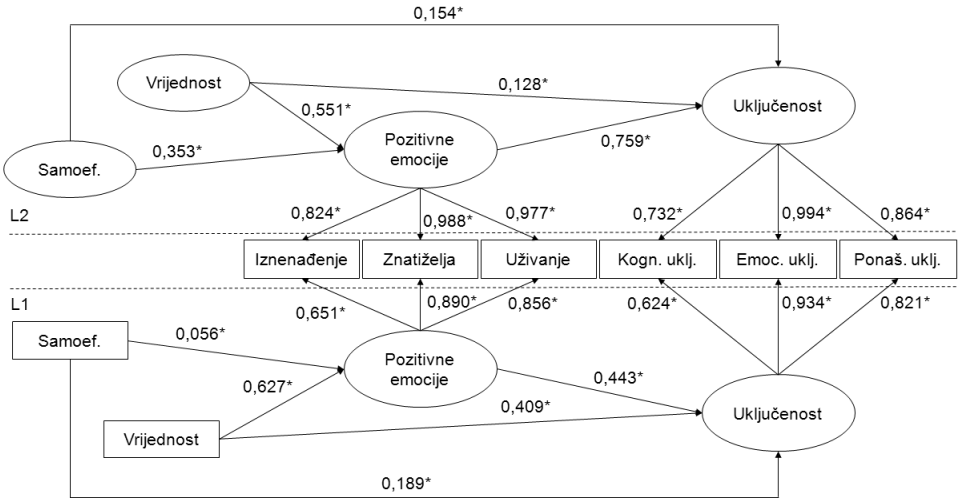
S obzirom na to da su bivarijatne korelacije između epistemičkih emocija iste valencije te između triju dimenzija uključenosti bile u pravilu visoke na obje razine analize, kako bi se dodatno pojednostavnili modeli i olakšala interpretacija, u višerazinskim medijacijskim modelima na obje razine, ukupni rezultati na podskalama pozitivnih epistemičkih emocija, negativnih epistemičkih emocija i dimenzija uključenosti specificirani su kao indikatori korespondentnih latentnih varijabli pozitivnih i negativnih epistemičkih emocija te uključenosti učenika (pogledati Sliku 1 i Sliku 2). Oba modela imala su prihvatljivo slaganje s podacima: $\chi^2 = 2875{,}55$, $df = 32$, $p < 0{,}001$; CFI = 0,949, TLI = 0,915, $SRMR_{L1} = 0{,}050$, $SRMR_{L2} = 0{,}075$ (model s pozitivnim emocijama) i $\chi^2 = 4200{,}53$, $df = 46$, $p < 0{,}001$; CFI = 0,938, TLI = 0,906, $SRMR_{L1} = 0{,}045$, $SRMR_{L2} = 0{,}053$ (model s negativnim emocijama).

U modelu s *pozitivnim epistemičkim emocijama*, na L1, utvrđeno je da učenici s višim razinama samoefikasnosti ($\beta = 0{,}056$, $p < 0{,}001$) i vrijednosti zadatka ($\beta = 0{,}627$, $p < 0{,}001$) doživljavaju više razine pozitivnih epistemičkih emocija, koje su nadalje povezane s većom razinom učeničke uključenosti ($\beta = 0{,}443$, $p < 0{,}001$). Također, veće individualne razine samoefikasnosti ($\beta = 0{,}189$, $p < 0{,}001$) i vrijednosti zadatka ($\beta = 0{,}404$, $p < 0{,}001$) izravno su povezane s većim individualnim razinama uključenosti. Na L2 utvrđeni su slični obrasci povezanosti: razredna odjeljenja učenika s većim prosječnim razinama samoefikasnosti ($\beta = 0{,}353$, $p < 0{,}001$) i vrijednosti zadataka ($\beta = 0{,}551$, $p < 0{,}001$) u prosjeku su doživljavali više razine pozitivnih epistemičkih emocija, koje su pak bile dalje povezane s većom prosječnom razrednom uključenosti učenika ($\beta = 0{,}759$, $p < 0{,}001$). Veće prosječne razredne razine samoefikasnosti ($\beta = 0{,}154$, $p < 0{,}001$) i vrijednosti zadatka ($\beta = 0{,}128$, $p < 0{,}001$) bile su i izravno povezane s većom prosječnom razinom uključenosti učenika pojedinih razrednih odjeljenja. Zanimljivo je istaknuti da je na L1 vrijednost zadatka bila važniji prediktor i emocija i uključenosti učenika u odnosu na samoefikasnost, dok su na L2 samoefikasnost i vrijednost zadatka bili podjednako važni u objašnjenju pozitivnih epistemičkih emocija i uključenosti učenika.

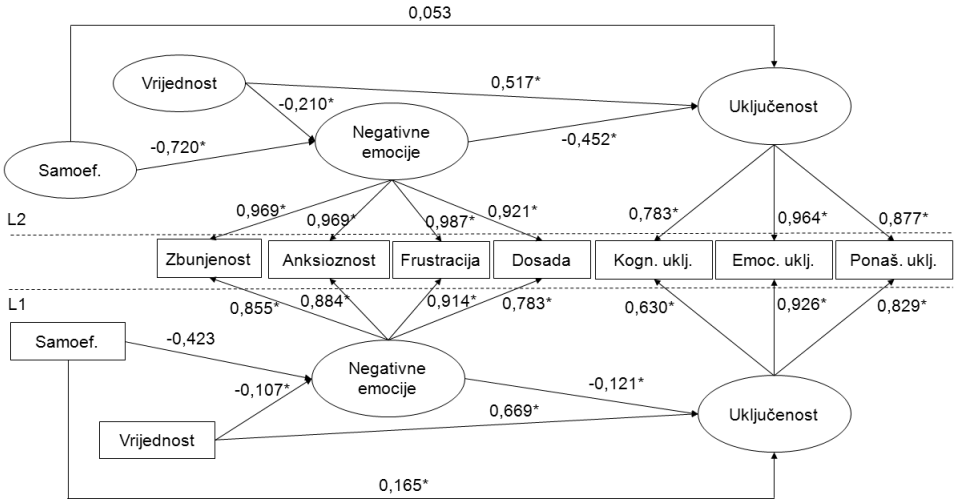
U modelu s *negativnim epistemičkim emocijama*, na L1, učenici s nižim individualnim razinama samoefikasnosti ($\beta = -0{,}423$, $p < 0{,}001$) i vrijednosti zadatka ($\beta = -0{,}107$, $p < 0{,}001$) doživljavali su više negativnih epistemičkih emocija, što je pak bilo povezano s nižom razinom uključenosti učenika ($\beta = -0{,}121$, $p < 0{,}001$). Ponovno su veće individualne razine samoefikasnosti ($\beta = 0{,}165$, $p < 0{,}001$) i vrijednosti zadatka ($\beta = 0{,}669$, $p < 0{,}001$) bile izravno povezane s većim individualnim razinama uključenosti. Na L2, razredna odjeljenja učenika s nižim prosječnim razinama samoefikasnosti ($\beta = -0{,}720$, $p < 0{,}001$) i vrijednosti

zadataka (β = -0,210, $p < 0,001$) u prosjeku su doživljavali veće razine negativnih epistemičkih emocija, koje su pak bile povezane s manjom prosječnom razrednom uključenosti učenika (β = -0,452, $p < 0,001$). Što se tiče izravnih efekata, jedino je vrijednost zadatka bila pozitivno povezana s uključenosti učenika (β = 0,517, $p < 0,001$).

SLIKA 1
Višerazinski medijacijski model za pozitivne epistemičke emocije



Napomena. *$p < 0,001$; manifestne varijable prikazane su u pravokutnicima.



Napomena. *$p < 0,001$; manifestne varijable prikazane su u pravokutnicima.

SLIKA 2
Višerazinski medijacijski model za negativne epistemičke emocije

Zaključno, rezultati pokazuju da je na obje razine analize vrijednost zadatka bila važniji prediktor pozitivnih, a samoefikasnost negativnih epistemičkih emocija. Također, vrijednost zadatka pokazala se relativno snažnijim izravnim predikto-

rom uključenosti učenika u odnosu na samoefikasnost. Slično tome, pozitivne epistemičke emocije bile su relativno snažniji prediktor uključenosti učenika u odnosu na negativne epistemičke emocije. Na kraju, rezultati sugeriraju da epistemičke emocije *djelomično posreduju* odnos između motivacijskih uvjerenja i uključenosti učenika, uz iznimku uloge negativnih epistemičkih emocija u objašnjenju odnosa između samoefikasnosti i uključenosti učenika na L2, gdje je utvrđena potpuna medijacija.

Statistička značajnost indirektnih efekata

Oba modela testirana Bayesovom metodom za procjenu parametara pokazala su zadovoljavajući stupanj konvergencije (PSR < 1,005). Nestandardizirane procjene indirektnih efekata prikazane su u Tablici 2 – svi analizirani indirektni efekti statistički su značajni uz 99 % granice kredibilnosti, čime je potvrđeno da epistemičke emocije posreduju odnos između motivacijskih uvjerenja i uključenosti učenika na obje razine analize.

TABLICA 2
Nestandardizirane procjene indirektnih efekata i pripadajuće granice kredibilnosti

	Indirektni efekt	Nestandardizirana procjena	99 % granice kredibilnosti
L1	Samoefikasnost → pozitivne epistemičke emocije → uključenost	0,009	0,005, 0,014
	Vrijednost zadatka → pozitivne epistemičke emocije → uključenost	0,106	0,099, 0,113
	Samoefikasnost → negativne epistemičke emocije → uključenost	0,021	0,018, 0,024
	Vrijednost zadatka → negativne epistemičke emocije → uključenost	0,006	0,004, 0,007
L2	Samoefikasnost → pozitivne epistemičke emocije → uključenost	0,022	0,015, 0,030
	Vrijednost zadatka → pozitivne epistemičke emocije → uključenost	0,033	0,018, 0,047
	Samoefikasnost → negativne epistemičke emocije → uključenost	0,093	0,062, 0,129
	Vrijednost zadatka → negativne epistemičke emocije → uključenost	0,029	0,012, 0,051

DISKUSIJA

Ovo istraživanje omogućuje važan uvid u ulogu epistemičkih emocija kao medijatora u odnosu između motivacijskih uvjerenja i uključenosti učenika u učenje. Pri tome su višerazinske analize omogućile precizno testiranje pretpostavljenih odnosa na dvije razine, odnosno razini *unutar* razrednog odjeljenja / nastavnika (tzv. L1) i razini *između* razrednih odjeljenja / nastavnika (tzv. L2), što je pridonijelo proširenju dosadašnjeg razumijevanja dinamike između motivacijskih uvjerenja, emocija i uključenosti učenika.

Pozitivne epistemičke emocije

Rezultati potvrđuju hipotezu prema kojoj pozitivne epistemičke emocije djelomično posreduju u odnosu motivacijskih uvjerenja i uključenosti učenika – na obje razine analize (L1 i L2), više razine samoefikasnosti i vrijednosti zadatka povezane s višim

razinama doživljavanja pozitivnih epistemičkih emocija, što je dalje povezano s višim razinama emocionalne, kognitivne i ponašajne uključenost učenika. Motivacijska uvjerenja izravno su povezana i s uključenosti učenika. Ovakvi su rezultati u skladu s prethodnim istraživanjima, koja su sugerirala da pozitivne epistemičke emocije potiču i poboljšavaju intrinzičnu motivaciju i dublje angažiranje u školskim i akademskim zadacima (Pekrun, 2006). Drugim riječima, epistemičke emocije, poput znatiželje, zbunjenosti, frustracije i uživanja, imaju značajnu ulogu u formiranju motivacije učenika u procesu učenja. One se zapravo doživljavaju kao odgovor na kognitivne procese koji su usko povezani s usvajanjem znanja i razumijevanjem, a pridonose učenikovoj motivaciji da se uključi u školske zadatke. Primjerice, znatiželja i uživanje mogu biti povezani s intrinzičnom motivacijom, odnosno unutarnjom željom učenika za učenje i istraživanje. U situacijama u kojima učenici osjećaju interes za neki sadržaj ujedno su motivirani za dublji angažman u učenje, istraživanje, ali i postavljanje pitanja.

Dobivena pozitivna povezanost motivacijskih uvjerenja (samoefikasnosti i vrijednost zadatka) i pozitivnih epistemičkih emocija u skladu je s rezultatima ranijih istraživanja. Putwain i suradnici (2018) utvrdili su da učenici s visokim osjećajem samoefikasnosti čvrsto vjeruju da mogu uspješno savladati zadatke, što potiče smanjenje intenziteta dosade i anksioznosti, ali i pridonosi doživljavanju pozitivnih emocija, poput uživanja. Ova skupina učenika ima tendenciju percipirati zadatke koji su izazovni kao priliku za učenje, a ne kao prijetnju, što učvršćuje pozitivne epistemičke emocije. S druge strane, percipiranje zadatka kao relevantnog i smislenog (posebice kada je učenicima jasna uputa ili što se od njih očekuje) potiče doživljavanje pozitivnih epistemičkih emocija (Muis i sur., 2015; Pekrun, 2006). Naposljetku, pozitivne epistemičke emocije mogu imati facilitirajući učinak u smislu da podupiru kognitivno procesiranje informacija te povećavaju angažman i služe kao potpora učenikovoj motivaciji (Pekrun, 2014). One imaju ulogu katalizatora za aktivnije sudjelovanje u učenju, čime formiraju povratnu petlju koja dodatno učvršćuje motivacijska uvjerenja (Pekrun, 2014).

Negativne epistemičke emocije

U skladu s postavljenom hipotezom o medijacijskoj ulozi negativnih epistemičkih emocija u odnosu između motivacijskih uvjerenja i uključenosti učenika, na obje razine analize dobiveno je da učenici s nižim razinama samoefikasnosti i vrijednosti zadatka ujedno izvještavaju o doživljavanju više negativnih epistemičkih emocija, a to se pokazalo značajno povezano s nižom razinom uključenosti učenika. Doživljavanje negativnih epistemičkih emocija može djelovati ometajuće na motivaciju i uključenost učenika, posebice ako se zadatak procje-

njuje kao težak ili nejasan (Fredericks i sur., 2004). Ove emocije mogu izazvati osjećaj nesigurnosti te time potaknuti na povlačenje umjesto na dublji angažman, odnosno na rješavanje problema. Epistemičke emocije, poput zbunjenosti ili frustracije, u određenim kontekstima mogu djelovati ometajuće na uključenost učenika u obrazovne aktivnosti, pa tako učenici često doživljavaju frustraciju kada percipiraju da konkretan zadatak premašuje njihove sposobnosti, što smanjuje uključenost u proces učenja (D'Mello i Graesser, 2012; Pekrun, 2006). Zatim, neki autori sugeriraju kako je visoka razina anksioznosti povezana s niskom kognitivnom uključenosti i akademskim učinkom jer ometa sposobnost koncentracije na zadatak (Putwain i Symes, 2011). Dodatno, učenici koji se osjećaju anksioznima često nastoje izbjegavati upotrebu strategija učenja koje podrazumijevaju trud i uključenost (Jenifer i sur., 2022).

Nadalje, motivacijska uvjerenja bila su negativno povezana s negativnim epistemičkim emocijama zbunjenosti, anksioznosti, frustracije i dosade. Učenici s nižim razinama samoefikasnosti teže se nose sa zaprekama u učenju i manje su uspješni u nošenju s negativnim emocijama i stresom, što facilitira doživljavanje negativnih epistemičkih emocija. Isto tako učenici koji manje vrednuju učenje i dostignuće u predmetu skloniji su razvoju negativnih emocija za vrijeme učenja toga predmeta zbog nedostatka interesa i otpora što ga osjećaju prema usvajanju određenoga gradiva (Balaž i Pavlin-Bernardić, 2022).

Motivacijska uvjerenja i uključenost učenika

Nadalje, u ovom istraživanju potvrđena je hipoteza o izravnoj pozitivnoj povezanosti motivacijskih uvjerenja i uključenosti učenika. Samoefikasnost i vrijednost zadatka pridonose oblikovanju načina na koji učenici sudjeluju u učenju, što je povezano s razinama njihove kognitivne, ponašajne i emocionalne uključenosti. Naime, učenici koji vjeruju u vlastite sposobnosti (samoefikasnost) i prepoznaju važnost učenja (vrijednost zadatka) skloniji su uložiti više truda u obrazovne aktivnosti. Primjerice, Schunk i DiBendetto (2022) ističu da samoefikasnost daje učenicima samopouzdanje koje je nužno za njihov aktivan angažman u učenju. Isti autori navode kako su učenici s visokom samoefikasnosti skloni postavljati ambiciozne ciljeve, češće ustraju usprkos zaprekama te imaju tendenciju razvijati adaptivne strategije u svrhu svladavanja izazova, što povratno povećava njihovu uključenost. U situacijama u kojima učenici procjenjuju konkretan zadatak učenja kao važan, odnosno zanimljiv, ujedno iskazuju i više motivacije da se aktivno uključe u proces učenja kako bi postigli ciljeve koje percipiraju kao vrijedne. Takva motivacija može pridonijeti povećanju njihove kognitivne, emocionalne i ponašajne uključenosti (Eccles i Wigifield, 2002; Pekrun i Linnenbrink-Garcia, 2012).

Prednosti i ograničenja istraživanja te implikacije za obrazovnu praksu

Provedeno istraživanje ima određene prednosti. Prvo, podaci su prikupljeni na relativno velikom uzorku, a potom analizirani višerazinskim pristupom koji pruža detaljniji uvid u dinamiku odnosa epistemičkih emocija, motivacijskih uvjerenja i uključenosti u učenje na razini unutar i između razrednih odjeljenja. No epistemičke emocije još su uvijek nedovoljno istražene, iako predstavljaju važne determinante uključenosti učenika u učenje. S druge strane, postoje metodološka ograničenja koja treba uzeti u obzir prilikom donošenja zaključaka. Prvo, u istraživanju je korišten transverzalan nacrt koji onemogućuje adekvatno testiranje medijacijskih efekata. Stoga bi buduća istraživanja trebala uključivati longitudinalni nacrt. Nadalje, ovi su podaci prikupljeni istom metodom, što uzrokuje metodološku varijancu i inflaciju veličine povezanosti među varijablama (Podsakoff i sur., 2003). Usprkos velikom broju učenika uključenih u istraživanje, uzorak i dalje ne reprezentira potpuno populaciju učenika, pa bi budućim istraživanjem trebalo obuhvatiti i osnovnoškolske učenike te srednjoškolske učenike trogodišnjih strukovnih usmjerenja.

Rezultati ovog istraživanja imaju značajne praktične implikacije za odgojno-obrazovni proces. Nastavnici mogu primijeniti strategije kojima će kod učenika potaknuti veće vrednovanje učenja i dostignuća u predmetu te jačati njihova uvjerenja o sposobnostima da se uspješno nose sa zahtjevima predmeta. Primjerice, nastavnici bi mogli izravnije i češće naglašavati smisao i relevantnost sadržaja koji se uči te pružati učenicima aktivnu podršku u učenju i postizanju uspjeha. Nadalje, prepoznavanje epistemičkih emocija od ključne je važnosti da bi se mogle osmisliti i primijeniti aktivnosti koje potiču pozitivne emocije, poput uživanja i znatiželje, dok se paralelno pruža potpora za ovladavanje negativnim epistemičkim emocijama.

ZAKLJUČCI

Rezultati ovog istraživanja potvrđuju temeljne pretpostavke teorije kontrole i vrijednosti (Pekrun, 2006), ističući središnju ulogu epistemičkih emocija u objašnjenju odnosa između motivacijskih uvjerenja i uključenosti učenika i na razini pojedinačnih učenika i na razini razrednih odjeljenja. Pozitivne epistemičke emocije javljaju se kada se zadaci percipiraju kao važni i kontrolabilni, a facilitiraju uključenost u učenje. Suprotno tome, negativne epsitemičke emocije proizlaze iz percepcije niske kontrole i niskoga vrednovanja učenja, što nadalje ometa uključenost u učenje, osim u iznimnim slučajevima, u kojima ih učenici rabe kao signal za adaptaciju vlastitih strategija pristupanja učenju (Pekrun, 2006; Pekrun i Stephens, 2010).

U ovom istraživanju vrijednost zadatka pokazala se snažnijim prediktorom pozitivnih emocija i uključenosti na razini

unutar razrednih odjeljenja, dok su vrijednost zadatka i samoefikasnost imali sličnu prediktivnu vrijednost na razini između razrednih odjeljenja. Ovakvi rezultati ističu značenje osobne percepcije vrijednosti zadatka za individualne razine emocija i motivacije učenika, odnosno sugeriraju da je vrijednost koju pojedinačni učenici pridaju učenju i dostignuću u nekom predmetu važnija za doživljavanje njihovih pozitivnih epistemičkih emocija i uključenosti u učenje u odnosu na uvjerenja o vlastitim kompetencijama za taj predmet. Međutim, na razini razrednih odjeljenja jasno je da su više prosječne razine obiju vrsta motivacijskih uvjerenja podjednako važne u objašnjenju prosječnih razina pozitivnih emocija i uključenosti u učenje. Vrijednost zadatka općenito je bila snažnije povezana s pozitivnim emocijama, dok je samoefikasnost bila snažnije povezana s negativnim emocijama. Učenici s nižom razinom samoefikasnosti slabije se suočavaju s izazovima i zaprekama, što predstavlja važan izvor negativnih emocija (Bandura, 1997). S druge strane, pozitivan stav prema učenju, interes za predmet i visoko vrednovanje učenja i dostignuća facilitiraju pozitivne emocije prilikom učenja (Pekrun, 2006).

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BILJEŠKE

[1] Motivacijska uvjerenja, akademske emocije i uključenost učenika domenski su specifični konstrukti, odnosno učenici mogu iskazivati različit intenzitet i vrstu emocija kao i različite razine motivacije u ovisnosti od školskoga predmeta i nastavnika koji poučava taj predmet (Kang i Wu, 2022).

[2] Peti razred pohađali su učenici medicinskih srednjih škola.

[3] Za provedbu višerazinske konfirmatorne faktorske analize korišteni su isti analitički postupci kao i za provedbu višerazinskih medijacijskih analiza opisanih u kasnijim poglavljima.

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The Mediating Role of Epistemic Emotions in the Relationship Between Motivational Beliefs and Student Engagement

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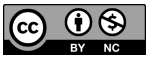
The aim of this study was to examine the mediating role of epistemic emotions in explaining the relationship between motivational beliefs and student engagement. The study involved 15,842 Croatian students from 73 secondary schools and 984 classes. Students completed a questionnaire assessing epistemic emotions (i.e., surprise, curiosity, enjoyment, confusion, anxiety, frustration, and boredom), motivational beliefs (i.e., self-efficacy and task value), and student engagement (i.e., cognitive, emotional, and behavioural). Data was analysed using multilevel structural equation modelling. The results indicated that epistemic emotions partially mediate the relationship between motivational beliefs and student engagement at both the within-class level (L1) and between-class level (L2). However, the strength of the relationships between epistemic emotions, motivational beliefs, and student engagement varied depending on the level of analysis and the valence of the emotions. The obtained results suggest that shaping students' motivational beliefs can enhance their emotional experiences and their engagement in learning.

Keywords: epistemic emotions, motivational beliefs, student engagement, mediation analysis



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UTJECAJ ZNAČAJNOSTI REZULTATA NA PROCJENU TOČNOSTI REPLIKACIJE: EKSPERIMENTALNO ISTRAŽIVANJE

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Cilj istraživanja bio je ispitati utjecaj redoslijeda prikaza istraživanja koja daju suprotne zaključke na procjenu točnosti istraživanja. U ovom registriranom paralelnom eksperimentalnom istraživanju sudionicima iz opće populacije nasumično su dodjeljivani opisi istraživanja u kojima su replikacije psihologijskih istraživanja pronašle rezultate koji pokazuju značajan ili neznačajan učinak intervencije, a zatim su zamoljeni da procijene točnost zaključaka opisanih istraživanja. Istraživanje je provedeno u virtualnom okruženju. Ukupno je analizirano 194 sudionika, 97 u svakoj eksperimentalnoj skupini. Intervenciju su u ovom istraživanju predstavljali različiti zaključci istraživanja koje je program za testiranje nasumično dodjeljivao sudionicima. Rezultati upućuju na to da je veći postotak sudionika kojima je prikazana replikacija sa značajnim učinkom procjenjivao replikaciju točnijom u odnosu na početno istraživanje (n = 71, 73,20 %) u odnosu na postotak sudionika kojima je prikazana replikacija koja nije pokazala statistički značajan učinak (n = 53, 54,64 %). Rezultati upućuju na potencijalnu pristranost redoslijeda prilikom interpretacije replikacijskih istraživanja, jer je procjena točnosti ovisila o nalazima istraživanja. Buduća kvalitativna istraživanja trebala bi istražiti čimbenike povezane s interpretacijom replikacija.

Ključne riječi: ponovljivost znanstvenih istraživanja, replikacijska kriza, razumijevanje znanstvenih istraživanja, eksperimentalno istraživanje

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UVOD

Ponovljivost znanstvenih rezultata jedan je od temeljnih principa znanstvenoga pristupa (Alston i Rick, 2021). Metode, analize i znanstveni nalazi trebali bi biti objektivno provjerljivi od drugih istraživača, koji bi, ako je istraživanje dobro provedeno, trebali dobiti iste ili slične rezultate (Taylor i Kuyatt, 1994). Ipak, u zadnjem se desetljeću pojavio koncept krize ponovljivosti u znanstvenim istraživanjima kao reakcija na neponovljivost velikoga dijela znanstvenih rezultata u pojedinim disciplinama. Pokret za poboljšanja ponovljivosti izazvao je val novih istraživanja, koja imaju za cilj povećati vjerodostojnost dobivenih rezultata (npr. Baker, 2016; Ioannidis, 2005; Open Science Collaboration, 2015). Novije su analize metodom strojnog učenja na više od 14 tisuća znanstvenih radova iz psihologije iznijele podatak da je tek oko 40 % istraživanja u psihologiji ponovljivo, što može predstavljati problem u interpretaciji psihologijskih fenomena i njihovoj primjeni u praksi (Youyou i sur., 2023). Neki od razloga za nisku ponovljivost u psihologijskim istraživanjima jesu mali uzorci, nedostupnost istraživačkih podataka te mijenjanje početne hipoteze nakon što se analiziraju rezultati (Munafò i sur., 2017). Iz krize su nastale jako pozitivne međunarodne inicijative, poput *Psychological Science Accelerator*, koja pokušava ponoviti prethodno provedena istraživanja na različitim populacijama i u različitim kulturama kako bi provjerila stabilnost izvorno pronađenih učinaka (Psychological Science Accelerator, 2023).

S druge strane, pojedinci su kritizirali pristup istraživanju ponovljivosti u kojem se statistička značajnost i mjere učinka izvornog istraživanja postavljaju kao glavni kriterij u interpretaciji nalaza. Stoga možemo reći da sam kriterij uspješno ponovljenog istraživanja još uvijek nije ustanovljen, s obzirom na to da odluka o tome je li istraživanje ponovljivo ovisi o interpretaciji znanstvenika i/ili čitatelja, koja se pritom može zasnivati na različitim kriterijima (statistička značajnost, veličina učinka, Bayes faktor) (Held i sur., 2022). Primjerice, nedavno istraživanje na uzorku novinara pronašlo je da veličina uzorka utječe na procjenu vjerodostojnosti istraživanja, za razliku od *p* vrijednosti, reprezentativnosti uzorka i institucije autora (Bottesini i sur., 2023). Navedeni i drugi čimbenici utječu na procjenu vjerodostojnosti istraživanja, pa sukladno s time donose pristranosti koje utječu na interpretaciju. Dodatan problem u današnjem vremenu jest izloženost čitatelja velikoj količini informacija koja im otežava njihovo kritičko sagledavanje, pa se može očekivati da će pribjegavati nizu mentalnih kratica prilikom zaključivanja o vjerodostojnosti istraživanja. Jedna od najpoznatijih pristranosti u kontekstu znanosti jest pristranost u objavljivanju (engl. *publication bias*), prema kojoj će istraživanja s pozitivnim (značajnim) ishodima prije biti objavljena ne-

go ona s negativnim ishodima, što u konačnici dovodi do njihova nerazmjera (Fanelli, 2012). Istodobno, istraživanja su pokazala da su i čitatelji skloniji vjerovati statistički značajnim nego neznačajnim rezultatima (Jankowski i sur., 2022). U isto vrijeme postoji mogućnost da, osim istraživačkih kriterija, postoje i drugi vanjski faktori na temelju kojih čitatelji donose odluke (npr. Sherif i sur., 1958). Primjerice, postoji mogućnost da je interpretacija kasnijih istraživanja (replikacija) pod utjecajem informacija iz istraživanja koja su napravljena inicijalno, odnosno da sam redoslijed dobivanja informacija utječe na interpretaciju točnosti istraživanja. Iz toga razloga se pristupilo provođenju ovoga eksperimentalnog istraživanja, kako bi se odgovorilo na pitanje kako sudionici interpretiraju rezultate ponovljenih istraživanja kada oni nisu u skladu s rezultatima inicijalnih istraživanja. Uobičajen način ispitivanja uvjerenja o točnosti zaključaka istraživanja uključivao bi primjenu kontinuirane skale na kojoj bi se označavao stupanj uvjerenja (npr. Buljan i sur., 2020). Tomu unatoč, u ovom istraživanju odlučili smo sudionicima dati mogućnost binarnog odgovora u procjeni slaganja s mogućim ishodima istraživanja, kako da u stvarnom svijetu moraju odlučiti vjeruju li ili ne vjeruju zaključku istraživanja koje su pročitali, to jest moraju dati binaran odgovor. Primarni cilj ovog istraživanja bio je ispitati hoće li izmjena redoslijeda prikaza identičnih istraživanja koja daju suprotne zaključke utjecati na procjenu točnosti svakoga pojedinačnog istraživanja. Također, s obzirom na nedostatak istraživanja o svjesnosti o problemu ponovljivosti istraživanja u hrvatskoj populaciji, sudionicima je postavljen niz pitanja vezan za ponovljivost istraživanja i sintezu znanstvenih dokaza, kako bi se ispitala razina svjesnosti o navedenim konceptima te koliko je pritom uzorak prikupljen u ovom istraživanju uopće reprezentativan za opću populaciju.

Hipoteza 1: Veći postotak sudionika odabrat će inicijalno istraživanje kao točnije u usporedbi s replikacijom.

Hipoteza 2: Većina sudionika (više od 50 % uzorka) izjavit će da nije upoznata s pojmovima ponovljivosti istraživanja i sustavnih pregleda, s obzirom na to da je riječ o općoj populaciji.

METODE

Nacrt istraživanja

Provedeno je randomizirano eksperimentalno istraživanje s dvjema usporednim nezavisnim eksperimentalnim skupinama koje je bilo registrirano na javno dostupnoj platformi *Open Science Framework* (*OSF*): https://osf.io/b3et7.

Uzorak i prikupljanje podataka

U istraživanju su mogle sudjelovati punoljetne osobe, a poziv za sudjelovanje bio je oglašavan na stranicama Hrvatske mreže za odgovornu i ponovljivu znanost (https://crorin.hr/), na društvenim mrežama i putem osobnih kontakata, od svibnja do kraja srpnja 2023. Istraživanje je provedeno putem internetske platforme za anketno testiranje *SurveyMonkey* (SurveyMonkey Inc., San Mateo, California, USA). Sukladno Zakonu o provedbi opće uredbe o zaštiti podataka (*NN* 42/2018), sudionicima su nakon otvaranja poveznice bile prikazane informacije o istraživanju, nakon kojih su, ako se slažu sa sudjelovanjem, mogli odabrati opciju da žele sudjelovati u istraživanju, pri čemu bi bili odvedeni na sljedeću stranicu. Program je bio ugođen tako da ne prikuplja IP adrese sudionika, kako bi se osigurala njihova potpuna anonimnost.

Materijali i intervencije

U svrhu istraživanja izmišljena su dva scenarija istraživanja koja su predstavljala intervenciju u ovom istraživanju. U oba slučaja tema istraživanja bila je učinkovitost psihoedukacije, terapijske tehnike koja se u opisanim scenarijima rabila u tretmanu perfekcionizma. U scenarijima je inicijalno napravljeno istraživanje koje je testiralo učinkovitost spomenute tehnike (broj sudionika u opisanom istraživanju $n = 250$), a zatim je napravljeno replikacijsko istraživanje s istim brojem sudionika ($n = 250$) koje je pokušalo ponoviti rezultate inicijalnog istraživanja. Rezultati obaju sljedećih (replikacijskih) istraživanja bili su u suprotnosti s onima inicijalnih istraživanja.

Opis skupina

Intervencijska skupina A: Rezultat prvog istraživanja pokazivao je da je psihoedukacija učinkovita u smanjenju simptoma perfekcionizma, drugo (replikacijsko) istraživanje pokazalo je da nije.

Intervencijska skupina B: Rezultat prvog istraživanja pokazivao je da psihoedukacija nije učinkovita u smanjenju simptoma perfekcionizma, drugo (replikacijsko) istraživanje pokazivalo je da jest.

Na ovaj način pokušala se stvoriti situacija u kojoj sudionici najprije pronalaze istraživanje s nalazom u jednom smjeru, a zatim ono sa suprotnim nalazom.

Oba scenarija dostupna su u dodatku A. Nije bilo vremenskog ograničenja za čitanje scenarija.

Randomizacija

Randomizacija se provela pomoću mrežnoga sustava za testiranje (SurveyMonkey), zatim A/B metodom za testiranje (https://help.surveymonkey.com/en/surveymonkey/create/ab-tests/). Sustav je dodjeljivao sadržaj prema slučajnom rasporedu u omje-

ru 50:50. Primjenom metode A/B testiranja u SurveyMonkey programu polovici sudionika bio je prikazan format A (intervencijska skupina A), a polovici format B (intervencijska skupina B).

Varijable

a) Primarni ishodi: zaključci o provedenim istraživanjima
Nakon čitanja scenarija, sudionici su zamoljeni da odgovore na pitanja vezana uz njihove zaključke o scenarijima i da procijene točnost provedenih istraživanja. Pritom su trebali izraziti svoje slaganje označivši "Da" ili "Ne" uz svaku od pojedinih tvrdnji:

1) Prva studija je točna.
2) Druga studija je točna.
3) Obje studije su točne.
4) Ni jedna studija nije točna.
5) Ne mogu donijeti zaključak.

S obzirom na to da su scenariji sadržavali vrlo malo informacija na temelju kojih se mogu donijeti odluke, za svaki odgovor trebalo je označiti i stupanj sigurnosti od 0 (nimalo siguran/a) do 100 (potpuno siguran/a).

b) Sekundarni ishodi: demografske informacije i znanja o ponovljivosti rezultata
Osim zaključaka o scenarijima, sudionicima je postavljen niz pitanja vezanih uz ponovljivost istraživanja. Prikupljanjem ovih informacija pokušala se: a) ispitati opća informiranost i mišljenje sudionika o ponovljivosti znanstvenih istraživanja i b) provjeriti da informiranost o ponovljivosti znanstvenih istraživanja nije bila značajno veća u jednoj skupini u odnosu na drugu. Sukladno tomu, sudionicima su postavljena sljedeća pitanja:

a) Poznavanje samoga koncepta ponovljivosti (reproducibilnosti): Jeste li upoznati s pojmom reproducibilnosti (ponovljivosti) znanstvenih istraživanja? (odgovori "Da" i "Ne")

b) S ciljem ispitivanja koliki bi postotak istraživanja trebao biti ponovljiv, sudionici su, ako je odgovor na prethodno pitanja bio potvrdan, zamoljeni da unesu procjenu u kolikom bismo postotku (raspon od 0 do 100 %) prilikom provođenja znanstvenih istraživanja svaki put trebali dobiti iste ili slične rezultate.

c) Dva su pitanja bila usmjerena na ispitivanje mišljenja vezanih uz sintezu dokaza, koja je zapravo logično rješenje situacije u kojoj imamo suprotne nalaze istraživanja:

   1) Jeste li upoznati s pojmom sustavnih pregleda? (odgovori "Da" i "Ne")

2) Ako da, prema Vašem mišljenju, što je znanstveno vrjednije za određeno istraživačko pitanje:

a) Kvalitetan eksperiment s velikim brojem osoba.
b) Kvalitetan sustavni pregled.
c) Obje vrste istraživanja podjednako su važne.

d) Konačno, mišljenje sudionika o ponovljivosti u znanstvenom radu ispitano je jednom česticom, s mogućim odgovorima "Da" i "Ne": "Smatrate li da je potrebno provoditi ponovljena istraživanja fenomena koji su dokazani prije više od desetljeća?"

Od demografskih informacija prikupljeni su spol i stupanj obrazovanja.

Etička privola

Sve postupke opisane u ovom istraživanju odobrilo je Etičko povjerenstvo Filozofskog fakulteta u Splitu (Klasa: 029-06/22-03/0001, Ur. broj: 2181-190-23-00020).

Izračun veličine uzorka

S obzirom na to da se radi o istraživanju koje je usmjereno na relativno nov koncept ponovljivosti, nisu pronađena eksperimentalna istraživanja na temelju kojih bismo mogli napraviti izračun veličine uzorka. Stoga je pretpostavljena potencijalna razlika u frekvencijama odgovora "Da" na pitanja o točnosti istraživanja između skupina od 20 % (60 % u skupini A i 40 % u skupini B), pa je sa snagom istraživanja od 80 % i razinom alfa pogreške od 5 % izračunano da treba minimalno 95 osoba po skupini da bi se uočila značajna razlika. Izračun je napravljen upotrebom programa *Select* (https://select-statistics.co.uk/calculators/sample-size-calculator-two-proportions/).

Obradba podataka

Sve su analize prethodno planirane u registraciji istraživanja. Kategorijske varijable prikazane su kao frekvencije i postotci, dok su numeričke varijable testirane na odstupanja od normalnosti i prikazane su kao medijani s interkvartilnim rasponima ili rasponima pouzdanosti. Skupine su uspoređene hi-kvadrat testom za kategorijske varijable ili Mann Whitney testom za numeričke varijable. Kao veličine učinka uzeti su omjer rizika za kategorijske varijable i rang-biserijalni koeficijent korelacije za kontinuirane varijable. Značajne razlike ušle su u logističku regresiju kao prediktori intervencijskih skupina kao kriterija. Snaga prediktora izražena je kao omjer izgleda s rasponom pouzdanosti. Usporedba stupnja sigurnosti u odgovor između različitih pitanja napravljena je Friedmanovim

testom za ponovljena mjerenja. Sve su analize napravljene u programskom paketu Jamovi (The jamovi project, 2024), osim izračuna medijana s pripadajućim 95 % rasponima pouzdanosti, koji su napravljeni u R jeziku za statističku analizu (R Core Team, 2021). Svi podatci i analize napravljene u ovom istraživanju dostupni su na OSF stranici projekta.

REZULTATI

Iz analize su isključeni sudionici koji su odustali odmah pri dobivanju scenarija (n = 29) ili koji su naknadno odustali (n = 1), stoga je analizirano 194 sudionika, 97 u svakoj eksperimentalnoj skupini.

Varijabla		Grupa: Replikacija nije statistički značajna (n = 97)	Grupa: Replikacija je statistički značajna (n = 97)
Spol (n, %)	Muški	33 (34,02)	17 (17,53)
	Ženski	63 (64,95)	77 (79,38)
	Ne želim se izjasniti	1 (1,03)	3 (3,09)
Stupanj obrazovanja (n, %)	Završena osnovna škola	0 (0,00)	1 (1,03)
	Završena srednja škola	5 (5,15)	4 (4,12)
	Trenutačno studiram	64 (65,98)	69 (71,13)
	Završen stručni studij	2 (2,06)	1 (1,03)
	Završen fakultet	24 (24,74)	11 (11,34)
	Završen doktorat znanosti	2 (2,06)	11 (11,34)
Jeste li upoznati s pojmom reproducibilnosti (ponovljivosti) u istraživanjima? (Da, n, %)		69 (71,13)	67 (69,07)
Ako ste odgovorili potvrdno na prethodno pitanje, označite u kojem postotku bismo trebali dobiti iste ili slične rezultate kao i u inicijalnom istraživanju, ako bismo ponovili znanstveno istraživanje na drugim podatcima (0-nijednom, 100-svaki put) (Md, 95 % CI)		75 (70-80)	74 (63-76)
Jeste li upoznati s pojmom sustavnih pregleda? (Da, n, %)		77 (79,38)	69 (71,13)
Ako da, što je po Vama vrjednije za određeno istraživačko pitanje (Da, n, %):[a]	kvalitetan eksperiment s velikim brojem osoba	10 (10,31)	9 (9,28)
	kvalitetan sustavni pregled	15 (15,57)	16 (16,49)
	obje vrste istraživanja su podjednako važne	57 (58,76)	52 (53,61)
Smatrate li da je potrebno provoditi ponovljena istraživanja fenomena koji su dokazani prije više od desetljeća? (Da, n, %)		92 (94,85)	88 (90,72)

TABLICA 1
Demografske karakteristike sudionika i stavovi prema ponovljivosti istraživanja prikazani prema eksperimentalnim skupinama

Kratice: Md – medijan; CI – engl. *confidence interval*, raspon pouzdanosti.
[a] 15 odgovora nedostaje u skupini *Replikacija nije statistički značajna* i 20 odgovora u skupini *Replikacija je statistički značajna.*

U istraživanju je ukupno sudjelovalo 140 (72,16 %) osoba ženskoga spola (Tablica 1). Sudionici su većinom bili studenti (n = 133, 68,56 %) te su pretežito bili upoznati s pojmom po-

novljivosti u istraživanjima (n = 136, 70,10 %). Prema sudionicima koji su bili upoznati s pojmom ponovljivosti, za većinu istraživanja (medijan 75 %, interkvartilni raspon: 51–90 %) trebali bismo uvijek dobiti iste ili slične rezultate. Većina sudionika (n = 146, 75,26 %) izjavila je kako su upoznati s pojmom sustavnih pregleda, a polovica (n = 109, 55,86 %) smatrala je kako su i sustavni pregled i eksperiment s velikim brojem osoba podjednako znanstveno vrijedni. Konačno, čak 180 sudionika (92,78 %) navelo je da treba provoditi ponovljena istraživanja (replikacije) fenomena koji su dokazani prije više desetljeća.

Usporedbom skupina pronađeno je da su sudionici najčešće odgovarali kako ne mogu donijeti zaključak na temelju prikazanih informacija, a najrjeđe da ni jedna od opisanih studija nije točna (Tablica 2, Slike 1 i 2). Ipak, u slučaju kad je replikacija inicijalnog istraživanja pokazala da je intervencija statistički značajna, sudionici su u značajno većem postotku vjerovali da je replikacija točna nego u odnosu na slučaj kad replikacija nije uspjela ponoviti značajne rezultate inicijalnog istraživanja.

TABLICA 2
Odgovori sudionika o vjerojatnosti točnosti rezultata podijeljeni prema eksperimentalnim skupinama

Varijabla	Replikacija nije statistički značajna (n = 97)	Replikacija je statistički značajna (n = 97)	p[a]	Veličina učinka[b]
Prva studija je točna (Da, *n*, %)	50 (51,55)	52 (53,61)	0,892	0,96
Sigurnost u odgovor (Md, 95 % CI)	60 (51-64)	60 (55-68)	0,732	0,03
Druga studija je točna (Da, *n*, %)	53 (54,64)	71 (73,20)	0,012	0,46
Sigurnost u odgovor (Md, 95 % CI)	56 (50-70)	64 (55-70)	0,563	0,05
Obje studije su točne (Da, *n*, %)	42 (43,30)	51 (52,58)	0,246	0,72
Sigurnost u odgovor (Md, 95 % CI)	75 (60-80)	70 (60-75)	0,728	0,03
Niti jedna studija nije točna (Da, *n*, %)	19 (19,59)	15 (15,46)	0,429	1,35
Sigurnost u odgovor (Md, 95 % CI)	73 (60-81)	71 (60-81)	0,925	0,01
Ne mogu donijeti konačan zaključak (Da, *n*, %)	68 (70,10)	63 (64,95)	0,505	1,23
Sigurnost u odgovor (Md, 95 % CI)	82 (75-90)	79 (73-91)	0,517	0,05

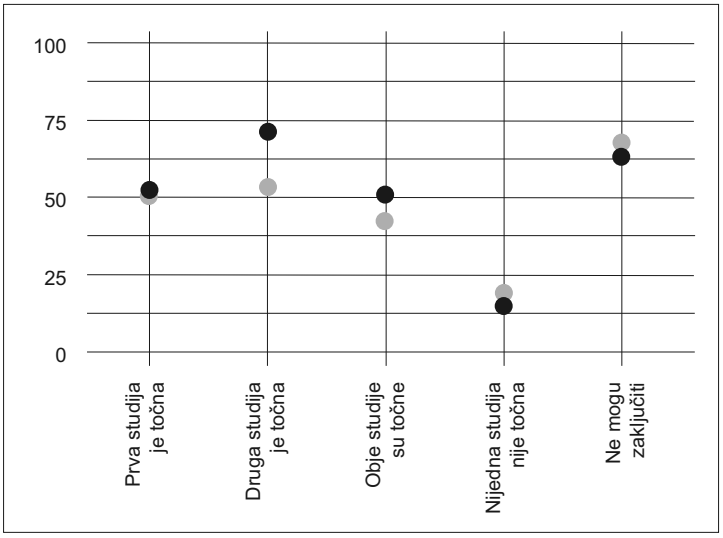
Md – medijan; CI – engl. *confidence interval*, raspon pouzdanosti.

[a] Hi kvadrat za usporedbu kategorijskih varijabli i Mann Whitney U test za usporedbu kontinuiranih varijabli.

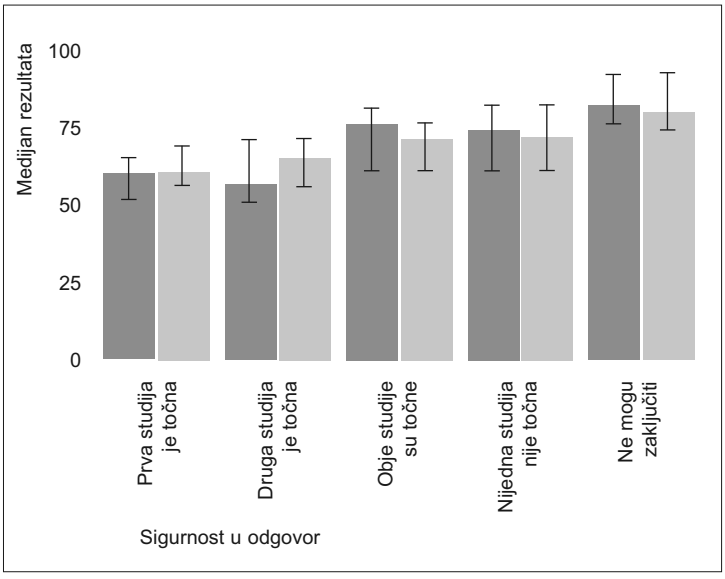
[b] Omjer rizika za kategorijske varijable i rang-biserijski koeficijent korelacije za kontinuirane varijable.

U logističkoj regresiji, u koju je kao prediktor ušla samo frekvencija odgovora "Da" na pitanje "Druga studija je točna" te kojom se posljedično pokušalo utvrditi predviđaju li frekvencije odgovora o točnosti istraživanja eksperimentalnu skupinu, izračunano je da je omjer izgleda 2,16, odnosno da je toliko puta veća vjerojatnost da će sudionik izjaviti kako je istraživanje točno ako je ponovljeno istraživanje (replikacija) bilo značajno (95 % CI 1,18-3,96) (Tablica 3).

➲ SLIKA 1
Broj sudionika u istraživanju koji se složio s izjavama o istraživanju prema intervencijskoj skupini A (siva boja): "Replikacija nije statistički značajna" i intervencijskoj skupini B (crna boja): "Replikacija je statistički značajna"



➲ SLIKA 2
Usporedba procjene stupnja sigurnosti od 0 – nimalo siguran/a do 100 – potpuno siguran/a (medijan i 95 % rasponi pouzdanosti) u odgovor između intervencijske skupine A (tamnosiva boja): "Replikacija nije bila značajna" i intervencijske skupine B (svijetlosiva boja): "Replikacija je bila značajna"



➲ TABLICA 3
Logistička regresija u predviđanju intervencijske skupine A

Prediktor	Omjer izgleda (95 % raspon pouzdanosti)	*p*	McFadden R^2
Točka presjeka	0,35 (0,15-0,82)	0,016	0,02
Druga studija je točna.	2,16 (1,18-3,96)	0,012	

U prediktorima je odgovor "Da" bio označen sa 1, a odgovor "Ne" označen sa "2". Referentna razina kriterijske varijable "grupa" je bila intervencijska skupina B: "Replikacija je statistički značajna".

Friedmanovim testom pokazano je kako se stupanj sigurnosti na različitim odgovorima razlikovao između ponuđenih odgovora ($\chi^2 = 54{,}86$, $df = 4$, $p < 0{,}001$). U odnosu na ostale

odgovore, stupanj sigurnosti bio je značajno niži za odgovore koji su navodili da je isključivo prva ili druga studija točna. Stupnjevi sigurnosti sudionika koji su navodili da ni jedna studija nije točna ili da su obje točne nisu se međusobno razlikovali, dok se stupanj sigurnosti u odgovor koji navodi da se ne može donijeti konačan zaključak nije razlikovao od zaključka da ni jedna studija nije točna.

RASPRAVA

U ovom eksperimentu provedenom u virtualnom okruženju pokušalo se ispitati hoće li manipulacija redoslijeda prikaza identičnih istraživanja koja daju suprotne zaključke utjecati na procjenu točnosti svakoga pojedinačnog istraživanja. Iako su sudionici na temelju dobivenih informacija izjavljivali da ne mogu sa sigurnosti donijeti konačan zaključak te su se u situaciji kada su morali donijeti odluku o točnosti originalnog istraživanja ili replikacije osjećali najmanje sigurni u svoje procjene ipak je pronađen obrazac donošenja odluka u takvim nejasnim situacijama. Hipoteza da će sudionici više vjerovati prvim istraživanjima koja su prikazana nije se pokazala točnom. Značajno veći broj sudionika vjerovao je da je replikacija točna kada je ona pokazala značajan rezultat (a inicijalno istraživanje neznačajan rezultat) nego kad je pokazala suprotno (to jest kada je inicijalno istraživanje pokazalo značajan rezultat). Ovo upućuje na mogućnost da pristranost prema značajnim rezultatima postoji čak i u slučaju repliciranih i nejasnih rezultata, što ima važne implikacije za interpretaciju znanstvenih nalaza. Osim toga, značajno je više sudionika izjavljivalo da su upoznati s temama ponovljivosti i sustavnim pregledima, iz čega se može zaključiti da ni druga hipoteza nije potvrđena. Ovo implicira da je tema ponovljivosti znanstvenih rezultata prisutna u javnom kontekstu, ali je moguće i to da su sudionici u istraživanju bile osobe koje su zainteresiranije za teme.

Glavni nalaz ovog istraživanja jest taj da su sudionici više vjerovali u točnost nalaza replikacije koja je bila statistički značajna u odnosu na neznačajnu inicijalnu studiju, naspram obrnute situacije. Nalaz da se u psihologijskim istraživanjima češće nalaze značajni rezultati nije novina (npr. Kühberger i sur., 2014), ali ovo istraživanje ide korak dalje i pokazuje kako postoji mogućnost da čak postoji pristranost čitatelja da značajne rezultate procjenjuju točnijima naspram neznačajnih. U istraživanju Jankowskog i suradnika (2022), sudionici su bili randomizirani u jednu od četiri eksperimentalne skupine, u kojima su u samo jednom scenariju mijenjani statistička značajnost te sudionici nisu mogli uspoređivati vjerodostojnost

različitih opisa. Naši su rezultati u skladu s rezultatima spomenutog istraživanja, jer se pokazalo da će sudionici vjerovati značajnom rezultatu, ne samo kada vide samostalno istraživanje nego i kad im je prikazano identično istraživanje s potpuno suprotnim nalazima. Nadalje, osim same pristranosti u procjeni točnosti istraživanja, postoji mogućnost da čitatelji čekaju značajan rezultat. Dodatan problem u svakodnevnom radu jest pitanje definicije uspješne replikacije zbog izostanka složnosti oko potrebnih kriterija (Muradchanian i sur., 2021). Stoga se u scenarijima u ovom istraživanju nije navodio ni jedan ustaljeni kriterij značajnosti istraživanja (*p* vrijednost ili veličina učinka), nego je samo navedeno da učinak postoji, bez navođenja kvantitativnih podataka. U intervencijskoj skupini A psihoedukacija se inicijalno pokazala značajnom, no taj je nalaz bio doveden u pitanje naknadnom replikacijom. S druge strane, kad se inicijalno istraživanje nije prikazano kao značajno u skupini B, ako se replikacija pokazala značajnom, sudionici su procjenjivali da je druga studija točnija. Ni u jednom od opisanih scenarija ne može se donijeti konačan zaključak, jer su oba istraživanja imala iste veličine uzorka i metodološke karakteristike. Sljedeći korak u testiranju ove hipoteze bilo bi ponavljanje ovog istraživanja kako bi se moglo utvrditi jesu li ovi nalazi slučajni.

Sudionici su bili najsigurniji u odabiru odgovora da se ne može donijeti konačan zaključak o učinkovitosti provedenih istraživanja, što implicira da je većina sudionika (oko 70 %) shvaćala da opisani nalazi nisu dovoljni za donošenje zaključaka o učinkovitosti, jer su nalazi konceptualno istih istraživanja potpuno suprotni. Nedostatak dokaza može predstavljati problem u slučajevima u praktičnom radu, gdje pojedinac treba donijeti odluku na temelju provođenja određenoga testiranja, terapije ili intervencije. U ovom istraživanju sudionici su se očito oslanjali na podatke o značajnosti istraživanja kao mentalnu kraticu za njegovu točnost, to jest procjenjivali replikaciju značajno točnijom ako je tretman bio značajno učinkovit u odnosu na situaciju kada replikacija nije bila točna. Nedavno istraživanje pokazalo je kako postoji velik broj medicinskih intervencija za koje se ne može izvesti snažan zaključak s obzirom na dostupnu razinu dokaza (Banić i sur., 2022). Stoga, s obzirom na složenost i prirodu istraživanih konstrukata, valja očekivati da bi na velikim uzorcima ista situacija s nedostatkom snažnih i jasnih zaključaka bila i u psihologijskim istraživanjima (u teorijskima i praktičnima). Zbog toga bi bilo važno poznavati i prepoznavati kognitivne pristranosti povezane s procesom interpretacije znanstvenih nalaza te recenzije i objavljivanja znanstvenih radova da bi se utvrdilo kako

profesionalci reagiraju kada su suočeni s nejasnim informacijama. Naši rezultati sukladni su s onima Bottesini i suradnika (2023), jer pokazuju da, uz čimbenike poput veličine uzorka, redoslijed prikazivanja istraživanja može utjecati na interpretaciju točnosti istraživanja. Uz to je važno i naglasiti da je razmjerno malen broj sudionika izjavio kako ni jedna studija nije točna (n = 34, 17,44 %), što je također bilo moguće, s obzirom na to da nismo imali detalje o provedenim istraživanjima, pa su obje studije mogle biti netočne. Postoji i mogućnost da je većina sudionika smatrala kako od prikazanih istraživanja barem jedno mora biti točno, što bi također upućivalo na prisutnost pristranosti uvjerenja (Trippas i sur., 2014), što bi pak u praktičnom kontekstu potencijalno dovelo do pogrešnih odluka. Međutim, ovaj nalaz trebao bi biti bolje i sustavnije istražen u budućnosti prije donošenja snažnijih zaključaka.

Svim je sudionicima postavljen niz pitanja o ponovljivosti znanstvenih istraživanja i sintezama dokaza. Sekundarna hipoteza ovog istraživanja – da većina sudionika neće biti upoznata s konceptima sustavnih pregleda i ponovljivosti – također nije potvrđena. S obzirom na to da dosad nisu bila provedena istraživanja o tome koliko je hrvatska populacija upoznata s praksama otvorene znanosti, ovo istraživanje započelo je s pretpostavkom da će koncepti biti zanemareni. Visok postotak osoba koje su izjavile da su upoznate s konceptima može upućivati na to da su istraživanju pristupile osobe koje su zainteresiranije za temu, što dovodi u pitanje poopćivost rezultata na opću populaciju. Osim toga, upoznatost s konceptima ispitana je pitanjima s binarnim odgovorima ("Da" ili "Ne"), koji neprecizno mjere konstrukt. Buduća istraživanja trebala bi rabiti detaljnija i preciznija pitanja, ali uključiti i kvalitativan pristup. Ubuduće treba provesti i istraživanja koja bi detaljnije ispitala upoznatost hrvatske populacije s konceptima otvorene znanosti, pa je važno naglasiti da takvi pokušaji već postoje (Pale i sur., 2024). Većina sudionika složila se s tim da je provođenje replikacija potrebno u kontinuitetu te da treba provoditi kvalitetna eksperimentalna istraživanja (primarna istraživanja) i kvalitetne sustavne preglede (sekundarna istraživanja).

Kada su upitani u kolikom bismo postotku istraživanja trebali dobiti iste ili slične nalaze, medijan odgovora sudionika bio je oko 75 %, što je još uvijek značajno više od dosad dobivenih 40 % u prijašnjim procjenama psihologijskih istraživanja (Open Science Collaboration, 2015; Youyou i sur., 2023). Iako je promjena u pristupu provođenja psihologijskih istraživanja nužna, do nje dolazi izrazito sporo, s obzirom na to da je još vrlo malen broj istraživanja preregistriran (Thibault i sur.,

2023) te da jako malo istraživača dijeli svoje podatke (Tedersoo i sur., 2021). Kako bi pratili svjetske znanstvene standarde u slučajevima kada imaju ograničene resurse i ograničen pristup ispitanicima, istraživači bi se trebali usredotočiti na provođenje kvalitetnih i metodološko rigoroznih sustavnih pregleda ili se uključivati u međunarodne istraživačke skupine. Ovaj pristup poboljšao bi iskorištenost resursa te pridonio međunarodnoj prepoznatljivosti manjih istraživačkih skupina u globalnom kontekstu. Pritom bi u procesu racionalne upotrebe resursa značajno pomogli časopisi uvođenjem preregistriranih izvještaja (engl. *registered reports*) (Purgar i sur. 2024), u kojima protokol evaluiraju nezavisni stručnjaci, pri čemu se istraživanje provedeno na osnovi protokola objavljuje neovisno o smjeru rezultata dokle god je ono provedeno prema spomenutom protokolu. Tako je moguće unaprijed uočiti istraživanja s metodološkim problemima te istraživanja koja obrađuju već istražene teme, kao i da se unaprijed mogu dogovoriti kriteriji značajnosti rezultata. Osim toga, u dogledno je vrijeme cilj napraviti preregistraciju istraživanja i dijeljenje podataka normom tijekom provođenja znanstvenih istraživanja, što bi znatno pridonijelo prepoznavanju stabilnih i validnih zaključaka u psihologiji, naspram onih koji su rezultat slučajnosti i statističkih manipulacija (Flis, 2023). Usprkos velikom zamahu istraživanja koja su se usredotočila na tehničke načine poboljšanja ponovljivosti – poput preregistracije znanstvenih istraživanja (Strømland, 2019) ili dijeljenja podataka (Merz i sur., 2020) – psihološki faktori razumijevanja reproducibilnosti poput kognitivnih pristranosti i iskustava još su uvijek relativno neistraženi. Stoga je preporuka da buduća istraživanja stave veći naglasak na ispitivanje koliko i kako su navedeni faktori povezani s donošenjem odluka o interpretaciji ponovljivosti istraživanja.

Prilikom interpretacije rezultata provedenog istraživanja treba uzeti u obzir neka ograničenja. Istraživanje je provedeno u virtualnom okruženju i u pozivu je oglašavano kao istraživanje o interpretaciji znanstvenog istraživanja, stoga je vjerojatnije kako se sudionici koji su pristali sudjelovati više zanimaju za teme razumijevanja znanstvenih istraživanja. Sami scenariji bili su napisani kao sažetci iz svakodnevnoga tiska, a ne nalazi znanstvenog istraživanja, pa bi rezultate provedenog eksperimenta trebalo promatrati uz dozu opreza ako bi ih se željelo poopćiti za svakodnevno čitanje znanstvenih članaka. Uz to, među osobama s doktoratom postojao je manji nerazmjer između skupina podijeljenih prema slučaju jer su sudionici raspoređeni u skupine putem mrežnoga programa, no zbog malobrojnosti malo je vjerojatno da je to utjeca-

lo na rezultate. Nadalje, uzorak se pretežno sastojao od studenata, što je jedan od razloga zašto nije poopćiv na opću populaciju. S druge strane, uzorci u kojima sudjeluju uglavnom studenti relativno su česti za psihologijska istraživanja. Buduća istraživanja trebala bi ispitati i smjer studija uključenih studenata i uključivanje šire populacije, s ciljem dobivanja bolje reprezentativnosti uzorka. Osim toga, nisu se uspjele prikupiti informacije o sudionicima koji su napustili istraživanje prije randomizacije u intervencijske skupine, ali taj otpad ispitanika nije bio velik (12,8 %). Konačno, u ovom se istraživanju kao scenarij rabilo istraživanje jedne intervencije (utjecaj psihoedukacije na smanjenje perfekcionizma) koju su sudionici mogli otprije bolje poznavati te znati da je učinkovita u smanjenju simptoma perfekcionizma. Ova se pristranost pokušala kontrolirati slučajnim rasporedom u skupine, s obzirom na to da nisu ispitana znanja sudionika o psihoedukacijama prije provođenja istraživanja. Za čvršću snagu dokaza ipak bi trebalo ponoviti istraživanje upotrebom različitih tema kao podražaja. U analizi podataka korišteni su neparametrijski postupci koji imaju manju statističku snagu, pa je i manja vjerojatnost da će se opaziti razlika između skupina negoli upotrebom parametrijskih postupaka. Ipak, s obzirom na to da pretpostavke za parametrijske postupke nisu bile zadovoljene, njihovo provođenje ne bi bilo opravdano. Konačno, sudionici su pitani treba li ponavljati istraživanja koja su već dokazana. Iako se ovim putem pokušalo procijeniti potrebe za replikacijama, ispitanici su potencijalno mogli biti zbunjeni, jer se u društvenim istraživanjima fenomeni prikazuju, a ne dokazuju. Stoga je preporuka u budućim istraživanjima izbjegavati formulaciju "dokaza" u kontekstu reproducibilnosti te staviti veći naglasak na predstavljanje fenomena.

Naknadna istraživanja ili replikacije ovog istraživanja trebala bi stremiti većem omjeru ekološke valjanosti, jer bi se istraživanje provedeno u ovakvim uvjetima moglo smatrati "umjetnim". Kao primjer za ovu tvrdnju jest intervencijska skupina, u kojoj se pokušava ponoviti istraživanje koje nije inicijalno pronašlo značajan učinak, što se u praktičnom radu gotovo nikad ne događa. Buduća istraživanja mogu dodati i treću skupinu, u kojoj bi učinak postojao i u originalnom istraživanju i u replikaciji, kako bi se poboljšala unutarnja valjanost i uvela kontrolna skupina. Ipak, moguće je da osobe u pretraživanju literature najprije naiđu na istraživanje koje navodi da nema efekta, a zatim i na sljedeće koje navodi da ima, što smo pokušali preslikati u ovom istraživanju.

S obzirom na niz pitanja koja proizlaze iz ovog istraživanja, preporuka je da buduća istraživanja idu u (barem) dva

smjera. Prvi smjer odnosio bi se na istraživanje donošenja odluka o točnosti istraživanja, za što bi bio potreban kvalitativni pristup. Kroz niz intervjua i/ili fokusnih skupina istraživači mogu pokušati dobiti uvid u čimbenike na koje se sudionici oslanjaju kada donose odluku o točnosti znanstvenih istraživanja, odnosno kada trebaju donijeti odluku je li istraživanje uspješno ponovljeno ili ne. Nadalje, potrebno je ponovno provesti ovo istraživanje ispitivanjem niza različitih tema i različitih populacija kako bi se utvrdila održivost pronađenoga fenomena. Moguće je da rezultati ne bi bili ponovljivi ako bi u istraživanje bili uključeni samo stručnjaci, koji bi se vjerojatno suzdržavali od donošenja bilo kakve odluke na temelju male količine podataka. Također je moguće da bi rezultati bili različiti ako bi u istraživanje bile uključene samo one osobe kojima je tema izrazito važna (npr. osobe s izraženim perfekcionizmom koji narušava svakodnevno funkcioniranje). Potrebno je sve nove čimbenike za koje se potencijalno utvrdi da utječu na pristranost u interpretaciji rezultata znanstvenih istraživanja testirati upotrebom složenijih eksperimentalnih nacrta, provjeravajući interakcije čimbenika, s ciljem stvaranja smjernica što objektivnije interpretacije nalaza znanstvenih istraživanja.

Konačno, praktična implikacija ovog istraživanja jest isticanje potrebe za uključivanjem teme ponovljivosti u metodološke kolegije. Da bi se povećalo razumijevanje znanstvenih istraživanja u općoj populaciji, moguće je uz objavljene radove imati i sažetke istraživanja napisane jednostavnijim jezikom, pri čemu bi se možda smanjio jaz između proizvodnje znanstvenih dokaza i njihove upotrebe u općoj populaciji.

ZAKLJUČAK

Sudionici u ovom istraživanju procjenjivali su rezultate točnijima kad je replikacija bila statistički značajna u odnosu na suprotni slučaj. Ovaj nalaz implicira da čitatelji vjeruju novijim i značajnim istraživanjima, iako se ona ne moraju metodološki značajno razlikovati od istraživanja u kojima nije dobiven značajan rezultat. Za potvrdu ovoga nalaza trebalo bi ponoviti ovo istraživanje na drugom uzorku i kvalitativno istraživanje o donošenju odluka prilikom interpretacije rezultata znanstvenih istraživanja, kako bismo bolje razumjeli moguće pristranosti u tom procesu.

Financiranje

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PRILOG

Anketni upitnik

Obavijest o istraživanju

Poštovana/i, pred Vama je upitnik koji se koristi kao instrument istraživanja u sklopu projekta Hrvatska mreža za ponovljivost znanstvenih istraživanja i znanstveno-istraživačku čestitost, koje je financirano od Zaklade Adris u sklopu natječaja Znanje i otkrića 2022.

Istraživanjem se pokušava otkriti kako osobe interpretiraju i donose odluke na temelju sažetaka znanstvenih informacija. Vaši odgovori su potpuno anonimni, bit će upotrijebljeni samo u istraživačke svrhe i analizirani na grupnoj razini, te će samo istraživači imati pristup Vašim podatcima. Anketa je dobrovoljna i namijenjena svim punoljetnim građanima Republike Hrvatske. Ukoliko ne želite sudjelovati u istraživanju, slobodni ste prestati ispunjavati anketu u svakom trenutku.

Ispitivanje je odobrilo Etičko povjerenstvo Filozofskog fakulteta u Splitu (Broj odobrenja: Klasa: 029-06/22-03/0001, Ur. broj: 2181-190--23-00020). Za daljnje obavijesti o istraživanju, slobodni ste kontaktirati istraživača putem emaila: ibuljan@ffst.hr. Molimo Vas da pročitate pitanja i odgovorite na njih odabirom ponuđenih odgovora ili upisivanjem odgovora na predviđeno mjesto. Iskreno cijenimo Vašu povratnu informaciju i zahvaljujemo na strpljenju i susretljivosti. Ukoliko pristajete sudjelovati u istraživanju, molimo potvrdite odabirom opcije "Slažem se" koja se nalazi ispod Suglasnosti za sudjelovanje.

Suglasnost za sudjelovanje

1. Potvrđujem da sam pročitao/pročitala ovu obavijest za gore navedeno znanstveno istraživanje.
2. Razumijem da je moje sudjelovanje dobrovoljno te se mogu povući u bilo koje vrijeme, bez navođenja razloga i bez ikakvih posljedica po zdravstvenom ili pravnom pitanju.
3. Razumijem da mojim anonimiziranim informacijama imaju pristup odgovorni pojedinci, tj. glavni istraživač i članovi Etičkog povjerenstva koje je odobrilo ovo znanstveno istraživanje. Dajem dozvolu tim pojedincima za prikupljanje i obradu podataka.
4. Razumijem da će moje anonimizirane informacije biti javno dostupne. Razumijem da to znači da će se moći koristiti za potrebe istraživanja osim onih navedenih u obavijesti o istraživanju. Također razumijem da se moje anonimizirane informacije mogu koristiti u državama izvan Europe te da uredbe o zaštiti podataka u tim zemljama mogu biti drugačije od onih unutar Europske unije.
5. Želim sudjelovati u navedenom znanstvenom istraživanju.

Format A Kognitivno bihevioralna terapija je jedan od pristupa u psihoterapiji koji je usmjeren na rješavanje trenutnih psiholoških problema kod pojedinca, kroz promjenu misli i ponašanja, uz strukturiran plan i vremenski ograničene ciljeve. Perfekcionizam je skup osobina koje

karakterizira želja osobe za savršenstvom i ispunjavanjem vrlo visokih standarda, te je osoba često sklona sebe strogo procjenjivati i brinuti se da ju drugi vide pozitivno. Istraživači su pokušali utvrditi je li kognitivno bihevioralna terapija učinkovita u smanjenju perfekcionizma. Primijenjena je tehnika psihoedukacije, u kojoj su iskusni terapeuti osobe s perfekcionizmom obrazovali o definiciji perfekcionizma, povezanosti s drugim problemima, potencijalnim uzrocima i podržavajućim čimbenicima te su pacijenti pročitali ulomke knjige za samopomoć. Pacijenti su prema slučaju raspoređeni u skupinu koja je dobivala psihoedukaciju i koja nije. Ukupan broj pacijenata koji su sudjelovali u istraživanju je bio 250. Razina perfekcionizma je mjerena upitnikom prije psihoedukacije te četiri tjedna nakon, kako bi se utvrdilo je li došlo do smanjenja perfekcionizma nakon intervencije, te su rezultati uspoređeni s drugom skupinom osoba koja nije dobila psihoedukaciju. Pacijenti su se pridržavali terapije te je utvrđeno kako je došlo do značajnog smanjenja perfekcionizma nakon četiri tjedna. Zaključak istraživanja je da je psihoedukacija učinkovita u tretmanu perfekcionizma.

Druga skupina istraživača je odlučila ponoviti spomenuto istraživanje, te su prikupili jednak broj pacijenata (u drugom istraživanju je ukupan broj osoba s perfekcionizmom bio opet 250). Primijenili su iste postupke u istraživanju kao i prethodna studija; rasporedili su osobe u skupine prema slučaju, mjerili su perfekcionizam na početku istraživanja, sa sudionicima su razgovarali iskusni terapeuti, dobili su identične materijale za čitanje te je perfekcionizam mjeren četiri tjedna nakon psihoedukacije. Kao rezultat istraživanja je dobiveno kako nema razlike u razini perfekcionizma prije i četiri tjedna nakon intervencije. Istraživači su zaključili kako psihoedukacija nije učinkovita u tretmanu perfekcionizma.

Format B

Kognitivno bihevioralna terapija je jedan od pristupa u psihoterapiji koji je usmjeren na rješavanje trenutnih psiholoških problema kod pojedinca, kroz promjenu misli i ponašanja, uz strukturiran plan i vremenski ograničene ciljeve. Perfekcionizam je skup osobina koje karakterizira želja osobe za savršenstvom i ispunjavanjem vrlo visokih standarda, te je osoba često sklona sebe strogo procjenjivati i brinuti se da ju drugi vide pozitivno. Istraživači su pokušali utvrditi je li kognitivno bihevioralna terapija učinkovita u smanjenju perfekcionizma. Primijenjena je tehnika psihoedukacije, u kojoj su iskusni terapeuti osobe s perfekcionizmom obrazovali o definiciji perfekcionizma, povezanosti s drugim problemima, potencijalnim uzrocima i podržavajućim čimbenicima te su pacijenti pročitali ulomke knjige za samopomoć. Pacijenti su prema slučaju raspoređeni u skupinu koja je dobivala psihoedukaciju i koja nije. Ukupan broj pacijenata koji su sudjelovali u istraživanju je bio 250. Razina perfekcionizma je mjerena upitnikom prije psihoedukacije te četiri tjedna nakon, kako bi se utvrdilo je li došlo do smanjenja perfekcionizma nakon intervencije, te su rezultati uspoređeni s drugom skupinom osoba koja nije dobila psihoedukaciju. Pacijenti su se pridržavali terapije te je utvrđeno kako nije došlo do značajnog smanjenja perfekcionizma nakon četiri tjedna. Zaključak istraživanja je da psihoedukacija nije učinkovita u tretmanu perfekcionizma.

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U sljedećem pitanju Vas molimo da za svaku od ponuđenih izjava označite slažete li se ili ne odabirom jedne od ponuđenih opcija. Također molimo, označite koliko ste sigurni u svoj odgovor od 0 (nimalo siguran/a) do 100 (potpuno siguran/a).

Prva studija je točna.	Da	Ne	Sigurnost u odgovor: .....
Druga studija je točna.	Da	Ne	Sigurnost u odgovor: .....
Obje studije su točne.	Da	Ne	Sigurnost u odgovor: .....
Ni jedna od studija nije točna.	Da	Ne	Sigurnost u odgovor: .....
Nije moguće donijeti konačan zaključak.	Da	Ne	Sigurnost u odgovor: .....

Jeste li upoznati s pojmom reproducibilnosti (ponovljivosti) znanstvenih istraživanja? Da Ne

Ako da, molimo označite u kolikom postotku bismo prilikom provođenja znanstvenih istraživanja svaki put trebali dobiti iste ili slične rezultate ..... (postotak)

Jeste li upoznati s pojmom sustavnih pregleda? Da Ne

Ako da, što je, prema Vašem mišljenju, znanstveno vrjednije za određeno istraživačko pitanje:

a) Kvalitetan eksperiment s velikim brojem osoba.
b) Kvalitetan sustavni pregled.
c) Obje vrste istraživanja su podjednako važne.

Smatrate li da je potrebno provoditi ponovljena istraživanja fenomena koji su dokazani prije više od desetljeća? Da Ne

Molimo označite svoj spol: M Ž

Vaš stupanj obrazovanja:

a) Završena osnovna škola
b) Završena srednja škola
c) Trenutno studiram
d) Završen stručni studij
e) Završen fakultet
f) Završen doktorat znanosti

Hvala Vam na Vašem vremenu!

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UTJECAJ ZNAČAJNOSTI...

The Impact of Result Significance on the Assessment of Replication Accuracy: An Experimental Study

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The study aimed to examine the impact of manipulating the order of presentation of studies with opposing conclusions on the assessment of the accuracy of research. In this registered parallel experimental study, participants from the general population were randomly given descriptions of studies in which replications of psychological research produced results that showed either an effect or no effect for interventions, and were asked to assess the accuracy of the conclusions of the described studies. The study was conducted in a virtual environment. Analyses included 194 individuals, 97 in each experimental group. The intervention in this study consisted of different research conclusions randomly assigned to participants by the testing program. The results suggest that a higher percentage of participants who were shown a replication with a significant effect assessed the replication as more accurate compared to the initial research (n = 71, 73.20%), than participants who were shown a replication that did not show a statistically significant effect (n = 53, 54.64%). The results suggest a potential bias in the order of presentation when interpreting replication studies because the accuracy assessment depended on the findings of the research. Future qualitative research should investigate factors associated with the interpretation of replications.

Keywords: reproducibility of scientific research, replication crisis, understanding of scientific research, experimental research

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MEĐUODNOS POZITIVNOG RAZVOJA MLADIH I ŠKOLSKE KLIME – REZULTATI LONGITUDINALNOGA PANEL-ISTRAŽIVANJA

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Model 5C nastoji objasniti kako interakcije adolescenata s okolinom pridonose pozitivnom razvoju mladih, pri čemu su indikatori pozitivnog razvoja kompetencije, samosvijest, karakter, brižnost i povezanost. Dosadašnja presječna istraživanja pokazuju da pozitivna školska klima znatno predviđa snažniji razvoj ovih indikatora, ali i da ovi indikatori predviđaju pozitivniju školsku klimu. Ovim je longitudinalnim istraživanjem ispitana povezanost modela 5C i školske klime te njihov međusobni utjecaj kroz vrijeme. Rezultati pokazuju da pozitivna školska klima pridonosi razvoju svih 5C indikatora, dok učenici s razvijenom odgovornosti i socijalnom svijesti te dobrim odnosima s vršnjacima i nastavnicima pridonose boljoj školskoj klimi. Ovi nalazi naglašavaju važnost poticanja suradnje i individualiziranoga pristupa učenicima s različitim kompetencijama i akademskim dostignućima.

Ključne riječi: pozitivan razvoj mladih, 5C model, školska klima, adolescencija

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UVOD

Pozitivan razvoj mladih jest sveobuhvatan teorijski pristup koji nastoji objasniti razdoblje adolescencije, vodeći se pritom načelom promocije, a ne dominantno prevencije (Benson i Pittman, 2001). Temeljna ideja ovoga pristupa jest da podržavajuće interakcije između adolescenta i njegova okruženja, koje pogoduju i njemu i okruženju, dovode do adaptivnih razvojnih ishoda, kao što su socijalno i emocionalno učenje, otpornost i pozitivno mentalno zdravlje. Pritom do adaptivnih razvojnih ishoda dolazi neovisno o sociodemografskim odlikama adolescenta (Benson i sur., 2007; Geldhof i sur., 2021; Lerner i sur., 2003; Lerner i sur., 2015). Pristup pozitivnog razvoja mladih obuhvaća niz teorijskih modela, od kojih najsnažniju empirijsku podršku ima model 5C (Heck i Subramaniam, 2009). Ovaj model razlikuje pet indikatora pozitivnog razvoja: kompetencije (eng. *competence*), samosvijest (eng. *confidence*), karakter (eng. *character*), brižnost (eng. *caring*) te povezanost (eng. *connection*) (Roth i Brooks-Gunn, 2003).

Kompetencije i samosvijest jesu indikatori pozitivnog razvoja koji upućuju na sebe, pa tako kompetencije obuhvaćaju kognitivne, akademske, karijerne i socijalne sposobnosti, dok se samosvijest odnosi na osjećaj vlastite vrijednosti, pozitivan identitet, ali i vjerovanja u budućnost. Drugim riječima, mladi s izraženim kompetencijama i samosvijesti jesu oni koji imaju razvijeno analitičko i logičko razmišljanje, vještine planiranja, radne navike i komunikacijske vještine, a karakteriziraju ih i visoko samopoštovanje i samoefikasnost (Johnson i Ettekal, 2022; Roth i Brooks-Gunn, 2003). S druge strane, karakter, brižnost i povezanost jesu indikatori pozitivnog razvoja koji upućuju na druge. Dok karakter obuhvaća moralnost, poštivanje društvenih normi i integritet, brižnost se odnosi na suosjećanje i samosuosjećanje. Povezanost pak obuhvaća odnose s ljudima i institucijama u okruženju, poput roditelja, vršnjaka, škole i susjedstva (Johnson i Ettekal, 2022; Roth i Brooks-Gunn, 2003). Do razvoja 5C indikatora, kao i do bilo kojega drugog adaptivnog razvojnog ishoda, dolazi zbog podržavajućih interakcija, za koje su nužni resursi u okruženju. Kao najvažniji resursi ističu se obitelj, vršnjaci, škola i zajednica (Heck i Subramaniam, 2009; Lerner, 2005). U dosadašnjim istraživanjima pozitivnog razvoja utjecaj škole najčešće je operacionaliziran školskom klimom (npr. Bakhshaee i sur., 2016a, 2016b; Tomé i sur., 2021).

Školska klima kao odrednica pozitivnog razvoja mladih

Školska je klima kompleksan konstrukt, što ga pojedini autori definiraju kao pojedinčev doživljaj institucijskih, odnosnih i moralnih aspekata školskoga života (Grazia i Molinari, 2021), dok ga drugi definiraju kao stavove, vjerovanja i vrijednosti ko-

ji su zajednički učenicima, nastavnicima, roditeljima i školskom osoblju te koji oblikuju njihove interakcije i školske norme (Wang i Degol, 2016). U svakom slučaju, riječ je o trajnoj kvaliteti školskog okruženja koja utječe na ponašanje članova škole (Hoy i Miskel, 1991). Osim što je kompleksan, školska klima je i višedimenzionalan konstrukt koji sadrži četiri domene: domenu sigurnosti, domenu zajednice, akademsku domenu te domenu institucionalnog okruženja. Domena sigurnosti odnosi se na fizičku sigurnost u vidu niskih razina nasilja i agresivnosti, socijalnu i emocionalnu sigurnost te disciplinu, odnosno konzistentnost i pravednost školskih pravila (Wang i Degol, 2016). Domena zajednice obuhvaća ne samo kvalitetu odnosa između učenika, nastavnika i školskog osoblja nego i osjećaj pripadanja školi, poštivanje i promicanje različitosti, uključivanje učenika u donošenje odluka te stupanj uključenosti roditelja i drugih članova zajednice u rad škole. Akademska domena objedinjuje karakteristike vodstva u školi, kvalitetu izvođenja nastave, motivaciju učenika te prilike za profesionalno usavršavanje nastavnika. Konačno, institucionalna domena odnosi se na karakteristike školskog okruženja kao što su osvjetljenje, temperatura, čistoća, veličina učionica, veličina razrednih odjeljenja te dostupnost materijala za rad (Wang i Degol, 2016). Sustavni pregled literature Grazie i Molinari (2021), koji je uključivao recenzirane radove na engleskom, francuskom i talijanskom jeziku, pokazao je kako postoje mnogi instrumenti za mjerenje školske klime, odnosno njezinih aspekata. U ovom je istraživanju upotrijebljen *Hrvatski upitnik školske klime,* koji su Velki i sur. (2014) razvile kako bi instrument bio prilagođen kulturološkom okruženju hrvatskih škola. Ovaj upitnik polazi od Perkinsonove (2007) definicije školske klime, prema kojoj je školska klima okružje za učenje koje proizlazi iz interakcija fizičke okoline, psihološke atmosfere i ljudi. Upravo ova definicija školske klime u skladu je s idejom pozitivnog razvoja mladih, prema kojoj su osnova razvoja pojedinca njegove interakcije s okolinom.

Unatoč opsežnim istraživanjima na područjima pozitivnog razvoja mladih i školske klime, postoji znatan manjak studija koje istovremeno ispituju međusobnu povezanost ovih dvaju fenomena. Istraživanja sugeriraju kako školska klima pridonosi adaptivnim razvojnim ishodima kod adolescenata. Tako su se, na uzorku od 400 učenica srednjih škola u Iranu, za razvoj kompetencija, samosvijesti, karaktera, brižnosti i povezanosti važnima pokazale podrška nastavnika i vršnjaka te poticanje autonomije u školi (Bakhshaee i sur., 2016a). Štoviše, školska je klima kod hrvatskih srednjoškolaca predviđala indikatore iz modela 5C i povrh karakteristika roditeljstva (Vrdoljak i sur., 2024). Čini se i kako pozitivan razvoj ima medija-

torsku ulogu u odnosu između školske klime i zadovoljstva školom (Årdal i sur., 2018), odnosno školske klime i otpornosti na akademski stres (Bakhshaee i sur., 2016b). Istodobno, istraživanje Tomé i sur. (2021) pokazalo je kako i indikatori iz modela 5C predviđaju pojedine aspekte školske klime kod adolescenata. Tako kompetencije predviđaju pozitivnije osjećaje prema školi, a zajedno s karakterom i kvalitetnije odnose s nastavnicima, dok se indikator povezanosti pokazao važnim za kvalitetnije odnose s vršnjacima. Drugo istraživanje, ono Kovačević-Lepojević i sur. (2023), pokazalo je da brižnost, povezanost i samosvijest predviđaju ukupno zadovoljstvo školom.

Valja naglasiti kako se sve spomenute studije temelje na presječnim (eng. *cross-sectional*) istraživanjima, koja ne omogućuju uvid u kauzalne odnose između školskog okruženja i pozitivnog razvoja mladih, dok longitudinalna istraživanja koja bi to omogućila gotovo da i ne postoje. Stoga je nužno provesti longitudinalne studije koje će primijeniti napredne analitičke metode kako bi se dublje razumjelo kako školska klima oblikuje pozitivne razvojne ishode i obrnuto te kako dimenzije modela 5C mogu utjecati na percepciju školske klime kroz vrijeme. Osim toga, istraživanja međuodnosa školske klime i drugih adaptivnih razvojnih ishoda, kao što je mentalna dobrobit učenika, pokazuju različite, odnosno dvosmislene, rezultate. Primjerice, Jose i sur. (2012) pratili su adolescente tri godine te utvrdili dvosmjernu povezanost između socijalne povezanosti u školi i opće dobrobiti. Nasuprot tome, istraživanje Way i sur. (2007) pokazalo je uglavnom jednosmjerne efekte, pri čemu su aspekti brižne školske klime predviđali mentalnu dobrobit. S druge strane, presječno istraživanje Urke i sur. (2023) pokazalo je da mentalna dobrobit adolescenata snažno utječe na njihovu percepciju brižne školske klime, dok obrnuta povezanost nije pronađena.

Kako bi se pridonijelo razumijevanju međuodnosa školskog okruženja i pozitivnog razvoja mladih, a uzimajući u obzir manjak longitudinalnih istraživanja kojima se on ispituje, cilj je ovog rada bio ispitati međuodnos pozitivnog razvoja mladih i školske klime. Provedba longitudinalnoga panel-istraživanja sa 2 točke mjerenja omogućila je provjeru dvaju istraživačkih pitanja: predviđa li školska klima indikatore pozitivnog razvoja iz modela 5C kod srednjoškolaca, ali i predviđaju li indikatori pozitivnog razvoja iz modela 5C školsku klimu. Na temelju dosadašnjih spoznaja iz literature pretpostavljeno je kako će kod srednjoškolaca pozitivnija percepcija školske klime predviđati izraženije kompetencije, samosvijest, karakter, brižnost i povezanost, dok će izraženije kompetencije, samosvijest, karakter, brižnost i povezanost predviđati pozitivniju percepciju školske klime.

METODA

Postupak

Ovo istraživanje provedeno je u sklopu projekta "Testiranje 5C modela pozitivnog razvoja mladih: tradicionalno i digitalno mobilno mjerenje (P.R.O.T.E.C.T)", koji je financirala Hrvatska zaklada za znanost (UIP-2020-02-2852). Riječ je o longitudinalnom panel-istraživanju, u koje su uključeni adolescenti upisani u prvi razred srednje škole u školskoj godini 2021./2022. Premda sam projekt uključuje po jednu točku mjerenja u svakom razredu srednje škole, za potrebe ovog rada uzeti su podaci prikupljeni u prvoj i drugoj točki mjerenja. Prva točka mjerenja provedena je grupno od veljače do svibnja 2022. godine, dok je druga točka mjerenja provedena grupno od veljače do travnja 2023. godine. Podaci su prikupljeni uz pomoć *online* platforme *SurveyMonkey* tijekom redovite nastave. Za provedbu istraživanja dobiveno je pozitivno mišljenje Etičkoga povjerenstva Sveučilišta u Zagrebu Edukacijsko-rehabilitacijskog fakulteta (No. 251-74/22-01/2), Ministarstva znanosti i obrazovanja te Agencije za odgoj i obrazovanje, a prikupljene su i usmene suglasnosti učenika koji su sudjelovali u istraživanju, kao i pisana suglasnost njihovih roditelja. Sudjelovanje u istraživanju je bilo dobrovoljno i povjerljivo.

Sudionici

U istraživanju je sudjelovalo 3444 učenika u prvom razredu i 3261 učenik u drugom razredu srednje škole iz urbanih sredina u Republici Hrvatskoj: Zagreba, Varaždina, Osijeka, Vinkovaca, Rijeke, Splita i Dubrovnika. Kodovi su uspješno spojeni u obje točke za 1735 učenika. U prvom mjerenju, to jest u prvom razredu srednje škole, njihova prosječna dob bila je M_{dob} = 15,09 (SD = 0,363), dok je u drugom mjerenju, to jest u drugom razredu srednje škole, njihova prosječna dob bila M_{dob} = 15,95 (SD = 0,386). U prvom valu istraživanja (N = 3444) učenici su pohađali gimnazije (39,8 %), četverogodišnje/petogodišnje strukovne škole (43,5 %) i trogodišnje strukovne škole (16,7 %). U drugom valu (N = 3261) udio učenika gimnazija smanjio se na 34,8 %, dok je porastao udio učenika četverogodišnjih/petogodišnjih škola (50,7 %), a udio učenika trogodišnjih strukovnih škola blago se smanjio (14,5 %). Za učenike za koje su podaci dostupni u oba vala (N = 1735), njih 38 % pohađalo je gimnazije, 50 % četverogodišnje ili petogodišnje strukovne škole, a tek 13 % trogodišnje strukovne škole. Kada je riječ o spolnoj strukturi uzorka, djevojke su činile 54 % uzorka, mladići 43 %, dok se 3 % sudionika nije željelo izjasniti kojega su spola. Premda su svi sudionici pohađali školu u urbanoj

sredini, 42 % njih živjelo je u velikom gradu, 27 % u manjem gradu, a 31 % na selu. Čak 77 % sudionika navelo je da je materijalni status njihove obitelji jednak obiteljima njihovih vršnjaka.

Mjerni instrumenti

U sklopu projekta prikupljeni su demografski podaci te je primijenjeno više instrumenata, no za potrebe ovog rada uzeta su samo dva: *Kratka verzija upitnika 5C modela* (Geldhof i sur., 2014) i *Hrvatski upitnik školske klime* (Velki i sur., 2014).

Kratka verzija upitnika 5C modela. Kompetencije, samosvijest, karakter, brižnost i povezanost izmjerene su *Kratkom verzijom upitnika 5C modela*, koja sadrži 34 čestice. Zadatak sudionika bio je procijeniti na skali od 1 (uopće me ne opisuje) do 5 (jako dobro me opisuje) u kojoj mjeri ih svaka tvrdnja opisuje. Upitnik sadrži pet podskala, pri čemu svaka predstavlja jedan od pet indikatora pozitivnog razvoja: kompetencije, samosvijest, karakter, brižnost i povezanost. Ukupni rezultat na svakoj podskali računa se kao aritmetička sredina procjena na tvrdnjama koje se odnose na tu podskalu. McDonaldov omega koeficijent pouzdanosti bio je u prvom mjerenju u rasponu od $\omega = 0{,}71$ za kompetencije do $\omega = 0{,}91$ za samosvijest, dok je raspon u drugom mjerenju varirao od $\omega = 0{,}70$ za kompetencije do $\omega = 0{,}90$ za samosvijest.

Hrvatski upitnik školske klime. Ovaj upitnik operacionalizira školsku klimu kao jednodimenzionalan konstrukt. Sadrži 15 čestica za koje sudionici procjenjuju svoje slaganje na skali od 1 (uopće se ne slažem) do 5 (potpuno se slažem). Ukupan rezultat računa se kao zbroj procjena na svim tvrdnjama. McDonaldov omega koeficijent pouzdanosti iznosio je u prvom mjerenju $\omega = 0{,}92$, a u drugom $\omega = 0{,}93$.

Statistička obradba podataka

U prvom koraku statističke obradbe provedena je multigrupna faktorska analiza kako bi se provjerila invarijantnost mjerenja pozitivnog razvoja mladih i školske klime u prvoj i drugoj točki mjerenja, pri čemu je za pozitivan razvoj testirana petofaktorska struktura, a za školsku klimu jednofaktorska struktura. Pretpostavka o invarijantnosti faktorske strukture, invarijantnosti zasićenja i invarijantnosti odsječaka prihvaćena je ako hi-kvadrat test razlika nije bio statistički značajan. Budući da je dokazana invarijantnost zasićenja, u sljedećem je koraku testiran autoregresijski križni model na manifestnim varijablama kako bi se odgovorilo na istraživačka pitanja. Ovim su modelom ispitani autoregresijski efekti indikatora pozitivnog razvoja iz modela 5C i školske klime, efekti indikatora pozitivnog razvoja iz modela 5C izmjerenih u prvom valu na percipiranu školsku klimu u drugom valu te efekti percipirane školske klime u prvom valu na izraženost indikatora po-

zitivnog razvoja iz modela 5C u drugom valu. Sve su obradbe provedene u statističkom programu JASP, a za procjenu pristajanja modela podacima uzeto je više pokazatelja pristajanja (CFI, TLI, RMSEA i SRMR).

REZULTATI

Multigrupna faktorska analiza

Rezultati konfirmatorne faktorske analize potvrdili su petofaktorsku strukturu pozitivnog razvoja mladih uz određene modifikacije modela (χ^2 = 7.104,68, *df* = 1024, $p < 0{,}001$; CFI = 0,89; TLI = 0,88; RMSEA = 0,059, 90 % CI od 0,057 do 0,060; SRMR = 0,07). Modifikacije modela odnosile su se na uključivanje pet rezidualnih kovarijanci, i to između čestica koje su zasićene istim faktorom (npr. između čestica "Mislim da imam dobre prijatelje" i "Mojim prijateljima je stalo do mene", koje su obje zasićene indikatorom povezanosti). Validacija upitnika detaljno je opisana u radu Novak i sur. (2023), u kojem su međusobno uspoređeni petofaktorski CFA model, petofaktorski ESEM model, model višeg reda te bifaktorski model. Iako je najbolje pristajanje modela podacima pokazao petofaktorski ESEM model, u ovom je radu primijenjen petofaktorski CFA model s modifikacijama radi usporedivosti nalaza s ranijim istraživanjima. Rezultati konfirmatorne faktorske analize također su potvrdili jednofaktorsku strukturu školske klime (χ^2 = 2.245,88, *df* = 170, $p < 0{,}001$; CFI = 0,92; TLI = 0,91; RMSEA = 0,085, 90 % CI od 0,082 do 0,088; SRMR = 0,06).

Rezultati multigrupne faktorske analize pokazali su kako su za *Kratku verziju upitnika 5C modela* zadovoljene invarijantnost faktorske strukture i invarijantnost zasićenja ($\Delta\chi^2$ = 34,86, *df* = 29, $p = 0{,}209$), dok invarijantnost odsječaka nije postignuta ($\Delta\chi^2$ = 128,87, *df* = 34, $p < 0{,}001$). Za *Hrvatski upitnik školske klime* također su postignute invarijantnost faktorske strukture i invarijantnost zasićenja ($\Delta\chi^2$ = 14,85, *df* = 14, $p = 0{,}446$), dok invarijantnost odsječaka nije postignuta ($\Delta\chi^2$ = 135,55, *df* = 15, $p < 0{,}001$). Iako se obično navodi kako je invarijantnost odsječaka potreban preduvjet kod usporedbe latentnih varijabli raznih grupa, Robitzsch i Lüdtke (2023) smatraju kako je malo vjerojatno da psihološki konstrukti ostaju isti kroz vrijeme. U prilog tome govore i Rutkowski i Svetina (2014), koji navode kako se invarijantnost zasićenja mnogo češće postiže u usporedbi s invarijantnosti odsječaka. Premda izostanak invarijantnosti odsječaka može upućivati na artefakte mjerenja, u ovom istraživanju one mogu biti i rezultat intenzivnih razvojnih promjena koje se događaju u adolescenciji (Robitzsch i Lüdtke, 2023). Uzimajući u obzir sve navedeno, u ovom radu nisu uspoređivane prosječne vrijednosti na latentnoj razini, nego je testiran autoregresijski križni model na manifestnim varijablama.

Deskriptivna analiza

U Tablici 1 prikazani su rezultati deskriptivne analize svih varijabli. Na svih pet indikatora pozitivnog razvoja, kao i na školskoj klimi, sudionici ostvaruju rezultat koji je blago iznadprosječan u odnosu na teorijski očekivani prosjek. Kada je riječ o indikatorima pozitivnog razvoja, u oba je vala najizraženiji indikator brižnosti, dok najveći varijabilitet pokazuje indikator samosvijesti. Trendovi sugeriraju da kompetencije i samosvijest ostaju relativno stabilne tijekom godine dana, dok su karakter, brižnost, povezanost i školska klima u opadanju.

Vrijednosti asimetrije generalno su blizu nule, što pokazuje da distribucije nisu izrazito asimetrične. Međutim, neke varijable, poput brižnosti (vrijednost -0,89 u prvom valu i vrijednost -0,63 u drugom valu), pokazuju nešto izraženiju negativnu zakrivljenost, što znači da su odgovori češće grupirani na višim vrijednostima skale. Vrijednosti spljoštenosti većinom su blizu nule, osim kod varijable karakter u prvom valu (vrijednost 0,96), što sugerira da distribucija ima blago izraženije vrhove od normalne raspodjele. Većina mjera distribucije stabilne su između prvog i drugog vala, ali postoje male promjene, što može utjecati na procjene invarijantnosti. Naime, Welzel i suradnici (2023) ističu kako se varijantnost može djelomično objasniti i matematičkim svojstvima skala i distribucijama odgovora, a ne nužno stvarnim promjenama u konstruktu koji se mjeri.

TABLICA 1
Prikaz deskriptivnih parametara analiziranih varijabli (N = 1735)

Varijabla		Teoretski raspon	Ostvareni raspon	*M*	*SD*	Koeficijent: asimetrije	Koeficijent: spljoštenosti
Prvi val	Kompetencije	1 – 5	1 – 5	3,40	0,67	-0,33	0,03
	Samosvijest	1 – 5	1 – 5	3,58	0,92	-0,59	-0,22
	Karakter	1 – 5	1,13 – 5	3,78	0,58	-0,65	0,96
	Brižnost	1 – 5	1 – 5	4,01	0,78	-0,89	0,89
	Povezanost	1 – 5	1 – 5	3,51	0,67	-0,42	0,12
	Školska klima	15 – 75	15 – 75	51,44	10,49	-0,51	0,76
Drugi val	Kompetencije	1 – 5	1 – 5	3,39	0,68	-0,32	-0,10
	Samosvijest	1 – 5	1 – 5	3,60	0,84	-0,51	-0,07
	Karakter	1 – 5	1,13 – 5	3,67	0,57	-0,33	0,27
	Brižnost	1 – 5	1 – 5	3,88	0,81	-0,63	0,08
	Povezanost	1 – 5	1 – 5	3,43	0,65	-0,18	0,05
	Školska klima	15 – 75	15 – 75	47,93	11,36	-0,41	0,38

Napomena. M = aritmetička sredina; SD = standardna devijacija.

Kao što se vidi iz Tablice 2, sve su varijable u statistički značajnoj pozitivnoj korelaciji kako u prvom, tako i u drugom valu istraživanja. Drugim riječima, izraženiji indikatori pozitivnog razvoja povezani su s pozitivnijom percepcijom škol-

TABLICA 2
Bivarijatne korelacije između svih varijabli u prvom i drugom valu istraživanja

ske klime. Istodobno, što je izraženiji jedan indikator pozitivnog razvoja, to je izraženiji i drugi. U najvišoj su korelaciji indikatori kompetencija i samosvijesti, dok najveću korelaciju sa školskom klimom pokazuje indikator povezanosti.

		1	2	3	4	5	6
1	Kompetencije	-	0,57**	0,22*	0,13**	0,53**	0,28**
2	Samosvijest	0,58**	-	0,23**	0,07**	0,60**	0,38**
3	Karakter	0,22**	0,28**	-	0,63**	0,42**	0,39**
4	Brižnost	0,14**	0,60**	0,09**	-	0,30**	0,26**
5	Povezanost	0,51**	0,41**	0,56**	0,31**	-	0,56**
6	Školska klima	0,28**	0,40**	0,34**	0,31**	0,56**	-

Napomena. Iznad dijagonale su prikazane bivarijatne korelacije dobivene u prvom valu, dok su ispod dijagonale prikazane bivarijatne korelacije dobivene u drugom valu istraživanja. $^{**}p < 0{,}001$

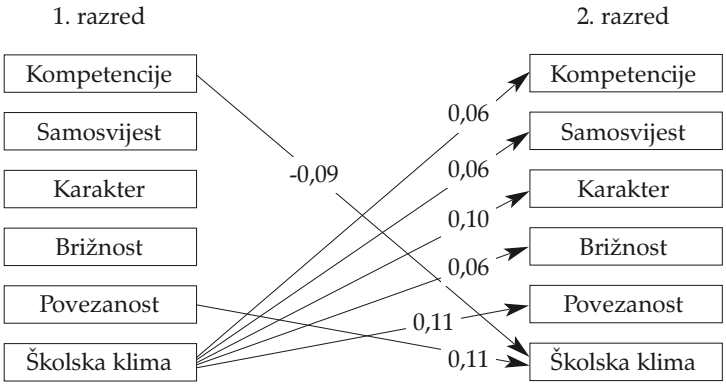
Autoregresijski križni model: međuodnos pozitivnog razvoja mladih i školske klime

Autoregresijski križni model kojim je ispitan međuodnos pozitivnog razvoja mladih i školske klime pokazao je izvrsno pristajanje podacima (RMSEA = 0,05, 90 % CI od 0,04 do 0,06; CFI = 0,99; TLI = 0,99; SRMR = 0,03). Kriterijske varijable u ovom modelu bile su kompetencije, karakter, samosvijest, brižnost, povezanost i percipirana školska klima u drugom valu. Pritom je objašnjeno 47 % varijance kompetencija, 46 % varijance samosvijesti, 36 % varijance karaktera, 35 % varijance brižnosti, odnosno povezanosti, te 34 % varijance školske klime.

U Tablici 3 prikazani su autoregresijski koeficijenti i regresijski koeficijenti s pomakom. Rezultati pokazuju da su sve varijable unutar modela 5C (kompetencije, samosvijest, karakter, brižnost i povezanost) te školska klima stabilne kroz vrijeme, što se vidi iz visokih i statistički značajnih autoregresijskih koeficijenata, koji pokazuju da svaka varijabla u prvom valu značajno predviđa istu tu varijablu u drugom valu. Autoregresijski koeficijenti za indikatore pozitivnog razvoja kreću se u rasponu od 0,52 za indikator povezanosti do 0,67 za indikator kompetencija, dok autoregresijski koeficijent za školsku klimu iznosi 0,52.

Nadalje, vidi se kako je percipirana školska klima izmjerena u prvom valu statistički značajan, pozitivan prediktor svih 5C indikatora, odnosno kompetencija, samosvijesti, karaktera, brižnosti i povezanosti, u drugom valu. S druge strane, percipiranu školsku klimu u drugom valu predviđaju samo indikatori kompetencija i povezanosti izmjereni u prvom valu. Pritom su kompetencije negativan, a povezanost pozitivan prediktor školske klime. Ovi su efekti grafički prikazani na Slici 1.

➲ SLIKA 1
Grafički prikaz rezultata testiranja autoregresijskog križnog modela



Napomena. Na slici su prikazani samo statistički značajni križni efekti; radi preglednosti izostavljeni su autoregresijski efekti.

Suprotno očekivanjima, karakter se nije pokazao statistički značajnim, a kompetencije su se pokazale negativnim prediktorom školske klime. Radi boljeg razumijevanja ovih odnosa provedena je dodatna analiza, u kojoj je kriterijska varijabla bila percipirana školska klima u drugom razredu srednje škole, dok su za prediktore uzete facete kompetencija (socijalne, akademske i fizičke kompetencije), odnosno facete karaktera (poštivanje pravila, socijalna svijest, osobne vrijednosti i prihvaćanje različitosti). Rezultati su pokazali kako izraženost socijalnih kompetencija u prvom razredu srednje škole ne pridonosi statistički značajno (Est. St. = 0,04; $p > 0,05$) objašnjenju percipirane školske klime u drugom razredu srednje škole. Akademske kompetencije pokazale su se pak statistički značajnim pozitivnim prediktorom (Est. St. = 0,27; $p < 0,01$) školske klime, dok su se fizičke kompetencije pokazale statistički značajnim negativnim prediktorom (Est. St. = -0,05; $p < 0,05$). Isto tako, ni poštivanje pravila (Est. St. = -0,04; $p > 0,05$) ni prihvaćanje različitosti (Est. St. = 0,03; $p > 0,05$) nisu se pokazali značajnim prediktorima percipirane školske klime, za razliku od socijalne svijesti (Est. St. = 0,12; $p < 0,01$) i osobnih vrijednosti (Est. St. = 0,11; $p < 0,01$), koje su se pokazale pozitivnim prediktorima.

❶ TABLICA 3
Rezultati testiranja autoregresijskoga križnog modela

Prediktori (iz prvog vala)	Kriterijske varijable (iz drugog vala) Kompetencije		Samosvijest		Karakter		Brižnost		Povezanost		Školska klima	
	Est. St.	S. E.	Est. St.	S. E.	Est. St.	S. E.	Est. St.	S. E.	Est. St.	S. E.	Est. St.	S. E.
Kompetencije	0,69**	0,02	-	-	-	-	-	-	-	-	-0,09**	0,42
Samosvijest	-	-	0,65**	0,02	-	-	-	-	-	-	0,04	0,32
Karakter	-	-	-	-	0,56**	0,02	-	-	-	-	-0,01	0,52
Brižnost	-	-	-	-	-	-	0,57**	0,02	-	-	0,03	0,37
Povezanost	-	-	-	-	-	-	-	-	0,52**	0,02	0,11**	0,50
Školska klima	0,06*	0,00	0,06*	0,00	0,10**	0,00	0,06*	0,00	0,11**	0,00	0,52**	0,03

Napomena. Est. St. = standardizirana procjena parametra. S. E. = standardna pogreška procjene parametra.
*$p < 0,01$; **$p < 0,001$

RASPRAVA

Cilj je ovog rada bio ispitati međuodnos indikatora pozitivnog razvoja mladih opisanih modelom 5C i školske klime pomoću podataka iz longitudinalnoga panel-istraživanja. Rezultati pokazuju da su sve varijable unutar modela 5C (kompetencije, samosvijest, karakter, brižnost i povezanost) te školska klima stabilne kroz vrijeme. Najviši su autoregresijski koeficijenti za kompetencije i samosvijest, što upućuje na relativno visoku stabilnost, odnosno da su razine mjerenih konstrukata prilično postojane tijekom vremena, dok su promjene manje izražene. Karakter, brižnost i povezanost pokazuju nešto niže koeficijente koji sugeriraju umjerenu stabilnost, a što pak znači da se varijable u određenoj mjeri mijenjaju između mjerenja. Slično je i s autoregresijskim koeficijentom školske klime. Drugim riječima, iako postoji kontinuitet u procjeni 5C karakteristika pozitivnog razvoja i školske klime, promjene su također prisutne, što može upućivati na razvojne ili kontekstualne utjecaje.

Nadalje, polazeći od teorijskih postavki pozitivnog razvoja mladih (Lerner, 2005) i Perkinsonove (2007) definicije školske klime, pretpostavljeno je kako će pozitivnija percepcija školske klime u prvom razredu srednje škole predviđati izraženije kompetencije, samosvijest, karakter, brižnost i povezanost u drugom razredu srednje škole. Ova je hipoteza potvrđena, a školska se klima pokazala najsnažnijim prediktorom karaktera i povezanosti, što upućuje na to da pozitivno školsko okruženje može pridonijeti razvoju ključnih karakteristika pozitivnog razvoja mladih kroz vrijeme. Drugim riječima, premda percepcija učenika da je škola sigurno mjesto u kojem nastavnici mogu zaustaviti nasilje, da su pravedni i ulijevaju povjerenje te da se učenike poštuje i potiče da budu uspješni pridonosi adaptivnim razvojnim ishodima općenito, čini se da je osobito važna za razvoj moralnosti, integriteta i osjećaja pripadnosti okruženju. Slični su nalazi dobiveni i u ranijim istraživanjima (npr. Årdal i sur., 2018; Bakhshaee i sur., 2016a; Bakhshaee i sur., 2016b), u kojima su ispitivani pojedini aspekti školske klime, poput podrške nastavnika i vršnjaka ili poticanja autonomije, ali i dodatni ishodi, poput zadovoljstva školom ili otpornosti na akademski stres. Slično potvrđuju i druga longitudinalna istraživanja, koja su pokazala da mentalna dobrobit adolescenata snažno utječe na njihovu percepciju brižne školske klime (Urke i sur., 2023), odnosno povezanosti sa školom (Jose i sur., 2012).

S obzirom na manjak usporedivih istraživanja, osobit doprinos ovog istraživanja leži u drugom istraživačkom pitanju, odnosno testiranju pretpostavke da će izraženije kompetencije, samosvijest, karakter, brižnost i povezanost u prvom razredu

srednje škole predviđati pozitivniju percepciju školske klime u drugom razredu srednje škole. Povezanost u prvom mjerenju predviđa percepciju školske klime u drugom mjerenju, što sugerira da učenici koji razvijaju jače socijalne veze kasnije školsku klimu doživljavaju pozitivnijom. Ovo je moguće i zato što dio tih socijalnih veza (npr. s učiteljima i vršnjacima) ostvaruju upravo u školi, pa učenici koji u školi ostvaruju podržavajuća prijateljstva i dobre i podržavajuće odnose s učiteljima osjećaju pripadnost školi te procjenjuju školu kao sigurno i pravedno okruženje. Osim što je ovaj nalaz u skladu s presječnim istraživanjem Tomé i sur. (2021), usklađen je i s Perkinsonovom (2007) definicijom školske klime, prema kojoj školska klima, između ostalog, proizlazi iz međuljudskih odnosa unutar školskog okruženja.

Suprotno očekivanjima utemeljenim na presječnim regresijskim modelima (Tomé i sur., 2021), karakter se pokazao neznačajnim, a kompetencije negativnim prediktorom školske klime. Detaljnom analizom utvrđeno je kako učenici koji u prvom razredu smatraju da im ide dobro u školi, koji preuzimaju odgovornost za svoje postupke i koji žele učiniti svijet boljim mjestom za život kasnije percipiraju školsku klimu pozitivnijom. Čini se kako ih njihov početni angažman, odgovornost i usmjerenost na napredak mogu učiniti otvorenijima za pozitivne interakcije, što dodatno jača njihov osjećaj pripadnosti i podrške unutar školskog okruženja. Ovo se može djelomično objasniti istraživanjima koja pokazuju da osobe s pozitivnim stavovima lakše sklapaju prijateljstva i primaju veću socijalnu podršku (Salovey i sur., 2000).

Brižnost se, suprotno nalazima o njezinoj povezanosti sa zadovoljstvom školom (Kovačević-Lepojević i sur., 2023), nije pokazala značajnim prediktorom školske klime kroz vrijeme. Naime, zadovoljstvo školom je subjektivan doživljaj pojedinca usredotočen ponajprije na osjećaj ugode, sreće i zadovoljstva odlaskom u školu i boravkom u njoj, dok školska klima obuhvaća širi kontekst odnosa između vršnjaka i nastavnika, školska pravila, osjećaj sigurnosti i kulturu škole. U tom smislu moguće je da brižniji učenici trebaju jasniji sustav pravila i podrške, odnosno sustav koji jednako uočava i cijeni sve članove kolektiva. Važno je upozoriti i na metodološke razlike u ova dva istraživanja. Presječna istraživanja, poput onoga Kovačević-Lepojević i sur. (2023), pokazuju trenutačne korelacije između brižnosti i školske klime, ali ne mogu pokazati uzročne odnose niti kako se te povezanosti mijenjaju s vremenom. Stoga ovakvi rezultati sugeriraju da brižnost možda ima kratkoročan učinak na percepciju škole, ali ne i dugoročnu ulogu u oblikovanju školske klime. Ovi nalazi ističu važnost primjene raznih metodoloških pristupa za potpuno razumijevanje razvoja školskog iskustva. Konačno, treba uzeti u

obzir i da kontekstualni čimbenici, poput razlika u školskom sustavu i kulturi između Srbije i Hrvatske, mogu moderirati odnos brižnosti i percepcije školske klime.

Kada je riječ o akademskim kompetencijama, tj. o uspješnim učenicima, istraživanje Voight i sur. (2024) utvrdilo je da u osnovnoj školi klima predviđa akademsko dostignuće, dok u srednjoj školi, koju su pohađali i sudionici u ovom istraživanju, akademsko dostignuće predviđa školsku klimu. Štoviše, rezultati njihova longitudinalnog istraživanja sugeriraju kako bolje čitalačko dostignuće predviđa veća očekivanja nastavnika, dok bolje matematičko dostignuće predviđa veću podršku nastavnika i pozitivniju percepciju vršnjačkog okruženja (Voight i sur., 2024). Moguće je, primjerice, da učenici s izraženijim akademskim kompetencijama već u prvom razredu srednje škole potaknu nastavnike da imaju veća očekivanja od njih i da im pruže više podrške, što dovodi do pozitivnije percepcije školske klime u drugom razredu srednje škole. S druge strane, istraživanje Gálvez-Nieto i sur. (2022) pokazalo je da učenici s razvijenom osobnom odgovornosti, moralnim integritetom i pozitivnim stavovima prema autoritetu pridonose razvoju bolje školske klime. Ovi autori ističu kako se osobne vrijednosti i socijalna svijest ne razvijaju isključivo u školskom okruženju nego i u obitelji, ali i široj zajednici.

Kada je riječ o razlikama u percepciji školske klime kod učenika s izraženijim fizičkim i akademskim kompetencijama, moguće je da one proizlaze iz naglaska koji škole stavljaju na međusobno natjecanje i uspoređivanje, umjesto na timski rad i zajedničko svladavanje zadataka (Huhtiniemi i sur., 2022). U takvu okruženju učenici s izraženijim akademskim kompetencijama imaju više prilika za isticanje svojih sposobnosti, što im omogućuje osjećaj uspjeha i priznanja. S druge strane, učenici čije su prednosti manje prepoznate u akademskom kontekstu mogu se osjećati manje zadovoljno i prihvaćeno unutar školskog okruženja. Jednako tako moguće je da učenici s izraženim fizičkim kompetencijama te iste kompetencije, kao i druge socijalne odnose, ostvaruju velikim dijelom izvan škole (npr. u sportskim klubovima), pa im škola i odnosi s nastavnicima, a možda i vršnjacima iz razreda, nisu na prvom mjestu. Ovaj rezultat također može upućivati na potencijalan nesklad između potreba ovih visoko kompetentnih učenika i podrške koju im pruža školsko okruženje.

Ograničenja istraživanja

Ograničenje ovog istraživanja leži prije svega u metodi samoiskaza i činjenici da su procjenu školske klime davali sami učenici. Naime, definicija školske klime sugerira kako na nju utječu brojni akteri, uključujući nastavnike i roditelje učenika, pa bi u budućim istraživanjima vrijedilo provjeriti dobivene

rezultate triangulacijom podataka prikupljenih od adolescenata, roditelja i nastavnika. Osim toga, u istraživanju je upotrijebljen jednodimenzionalni upitnik školske klime, pa bi u budućim istraživanjima bilo vrijedno primijeniti višedimenzionalni upitnik školske klime kako bi se omogućio dublji uvid u promatrane odnose. Osim toga, istraživanje je provedeno u urbanim sredinama, a uzorak je homogen s obzirom na socioekonomski status te je moguće da bi se nalazi razlikovali u uzorku učenika iz ruralnih sredina ili u uzorku učenika u riziku. Kao što su Voight i sur. (2024) utvrdili da se međuodnos školske klime i akademskog uspjeha razlikuje u osnovnoj i srednjoj školi, u budućim bi istraživanjima također bilo dobro provjeriti međuodnos školske klime i pozitivnog razvoja mladih kod osnovnoškolaca.

Jedno od ograničenja ovog istraživanja odnosi se na smanjenje uzorka kroz vrijeme. Iako je u prvom valu sudjelovalo 3444 učenika, a u drugom 3261 učenik, uspješno su povezani podaci u obje točke mjerenja za 1735 učenika. U usporedbi s ukupnim uzorkom, primjećuje se tek nešto veći udio učenika četverogodišnjih škola i proporcionalno manji udio učenika gimnazija i trogodišnjih strukovnih škola među onima koji su sudjelovali u istraživanju tijekom oba mjerenja. Iako to upućuje na relativno stabilnu strukturu uzorka, ovo osipanje može upućivati i na selektivno ispadanje iz uzorka ili specifične obrasce sudjelovanja učenika iz različitih tipova škola, što treba imati na umu prilikom interpretacije rezultata.

Također treba imati na umu da invarijantnost odsječaka nije postignuta, pa ne možemo pouzdano tvrditi da su razlike u srednjim vrijednostima latentnih varijabli između dva mjerenja rezultat stvarne promjene u konstruktu. Drugim riječima, razlike u prosjecima mogu biti posljedica promjene u načinu na koji sudionici interpretiraju skalu kroz vrijeme, a ne stvarnih razvojnih promjena. Ipak, ne smatramo ovo velikim nedostatkom, nego pokazateljem razvojnih promjena adolescenata. Logično je, naime, pretpostaviti kako se prioriteti adolescenata na prelasku iz osnovne u srednju školu razlikuju od prioriteta koje imaju u višim razredima srednje škole. Jednako tako njihova percepcija realiteta i očekivanja od škole, tj. školskoga sustava, postaju realističnija kako stječu više iskustva i sazrijevaju. Stoga bi bilo dobro provjeriti ove odnose i na uzorcima trećih i četvrtih razreda srednje škole.

ZAKLJUČAK

Na temelju rezultata ovog istraživanja može se zaključiti kako su pozitivan razvoj mladih i školska klima međusobno isprepleteni. Rezultati istraživanja potvrđuju stabilnost individualnih karakteristika učenika i percepcije školske klime kroz vrijeme. Pozitivna školska klima pridonosi razvoju kompetencija,

samosvijesti, karaktera, brižnosti i povezanosti, dok učenici koji ostvaruju kvalitetne odnose s vršnjacima i odraslima, koji se smatraju dobrim učenicima te oni s razvijenom osobnom odgovornosti i socijalnom svijesti također pridonose razvoju takva okruženja. Ovi nalazi pridonose boljem razumijevanju uloge koju školsko okruženje ima u pozitivnom razvoju mladih, ali i upozoravaju na aktivnu ulogu koju učenici imaju u oblikovanju ozračja u školi.

Nalazi ovog istraživanja imaju i važne praktične implikacije i za školsku praksu i za obrazovne politike. Naime, dobiveni rezultati sugeriraju kako je za promociju pozitivnog razvoja mladih nužno ulagati ne samo u njihove socioemocionalne vještine nego i u socioemocionalne vještine njihovih roditelja, nastavnika te cijeloga školskog osoblja. Dok nastavnici izravno oblikuju školsku klimu svojim očekivanjima i postupcima, roditelji, kao što ističu Gálvez-Nieto i sur. (2022), oblikuju školsku klimu razvijajući vrijednosnu orijentaciju učenika. Konačno, poticanje povezanosti učenika sa školom, razvojem privrženosti školi i radnih navika vezanih uz školske aktivnosti pridonijelo bi i njihovu pozitivnom razvoju i boljoj školskoj klimi. Dobiveni rezultati također naglašavaju važnost poticanja suradnje umjesto natjecanja u školskom okruženju, poštujući različitost snaga i kompetencija, jačanja socijalnih i emocionalnih kompetencija te socijalne osjetljivosti mladih, kao i osiguravanja podrške učenicima koji se ne ističu akademski.

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The Relationship Between Positive Youth Development and School Climate – Results of a Longitudinal Panel Study

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The 5C model seeks to explain how adolescents' interactions with their environment contribute to positive youth development, with the indicators of positive development being competence, confidence, character, caring and connection. Previous cross-sectional research has shown that a positive school climate significantly predicts greater development of these indicators, but also that these indicators predict a more positive school climate. This longitudinal study examined the relationship between the 5C model and school climate and their mutual influence over time. The results show that a positive school climate contributes to the development of all 5C indicators, while students with a developed sense of responsibility and social awareness and good relationships with peers and teachers contribute to a better school climate. These findings deepen the understanding of the bidirectional links between the school environment and adaptive developmental outcomes and emphasise the importance of promoting cooperation and an individualised approach for students with different competencies and academic performance.

Keywords: positive youth development, 5C model, school climate, adolescence

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THE QUALITY OF WORKING LIFE IN CROATIA IN THE 2020s: INTRODUCING THE SUPERB MODEL OF JOB QUALITY

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This study examines the quality of working life (QWL) in Croatia using two nationally representative samples of workers and introduces the SUPERB model of job quality. This heuristic framework integrates key work motivation theories, identifying six core job quality dimensions: Safety, Upgrading, Purpose, Empowerment, Relationships, and Balance. The findings from two studies conducted in 2023 and 2024 indicate generally moderate levels of job quality, with highlighting significant gaps in empowerment and career growth opportunities in Croatian workplaces. Importantly, job quality, as measured by the SUPERB model, predicted job satisfaction, work engagement, turnover intentions, and well-being, even after controlling for biographic variables further emphasising the importance of job quality. The results underscore the need for workplace interventions that enhance autonomy and skill development. By improving job quality, Croatia may better retain its workforce, reduce turnover intentions, and enhance overall well-being, contributing to long-term labour market outcomes and social stability.

Keywords: quality of working life, job quality, SUPERB model of job quality, job satisfaction, job engagement, turnover intentions

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National human resource management has become a strategic issue for Croatia, as the country faces a demographic crisis characterised by low birth rates, high mortality rates, and significant emigration to other EU member states (World Bank, 2024). These trends pose serious challenges to economic growth and the long-term sustainability of Croatia's social security, pension, and healthcare systems. With a shrinking workforce and an ageing population, the country must not only retain its existing labour force but also implement policies to attract new residents by offering good jobs.

In this paper, we present findings from two studies investigating the quality of working life in Croatia. Using nationally representative samples of Croatian workers, we examine job quality and its associations with key outcomes, including job satisfaction, work engagement, turnover intentions, and subjective well-being. Before describing the details of our research programme, we will explain the quality of working life and job quality constructs and give an overview of the earlier studies on the issue.

Quality of working life – what constitutes a good job?

Quality of working life in a society depends on the quality of individual jobs, and the quality of jobs depends on the extent to which the jobs satisfy important human needs (Jahoda, 1981; Schwartz, 2015; Šverko & Galić, 2009, 2014). So, the key question in quality of working life/job quality research is what are the key human needs that need to be satisfied at work and what constitutes a high quality job?

Psychological needs related to work were the subject of a large body of research in work and organisational psychology. Although various frameworks define the dimensions of high-quality jobs, we highlight three that have recently garnered the most scientific and professional attention and provide a useful structure for understanding this issue: Jahoda's model of latent job functions, Ryan and Deci's self-determination theory, and the psychology of working theory by Duffy, Blustein, and colleagues.

According to Marie Jahoda's model of latent functions at work (Jahoda, 1981), employment provides individuals with both manifest and latent functions. While pay is the primary manifest function of employment, providing the means to support one's livelihood, jobs also fulfil various latent functions that satisfy fundamental psychological needs. According to Jahoda (1981), employment provides individuals with: (a) time structure of days and week, (b) feeling of meaning and participation in collective purpose, (c) social contacts and experiences outside of nuclear family, (d) social status that represents the founda-

tion of one's identity, and (e) enforced activity. The main point of this theory is that jobs as well as other social arrangements such as informal economy, retirement, education or household activities vary in the extent to which they provide workers with those needs. The empirical support for the theory seems to be relatively strong. For example, using a representative sample of German citizens, Paul and Batinic (2010) showed that employed people reported more access to latent functions than participants who were not employed (unemployed, students, retirees, and homemakers). Moreover, Batinic et al. (2010) showed that greater access to the five latent benefits in the working population is related to enhanced well-being. Finally, a recent meta-analysis by Aitken et al. (2024) showed that the existence of the five latent benefits was moderately related to both life satisfaction and psychological distress (negatively).

The self-determination theory (SDT, Ryan & Deci, 2017) is a general theory of human motivation that has been also extensively applied to the world of work (Deci et al., 2017). The theory postulates that workers' performance and well-being are affected by the type of motivation individuals have for their work. On the most general level, the types of motivation can be divided into autonomous motivation that is characterised by a sense of choice, willingness and volition, and controlled motivation that is marked by external pressures and internal obligations (Deci et al., 2017). Autonomous motivation that is related to higher performance and better well-being follows from satisfaction of the three basic human needs for competence, relatedness, and autonomy/self-determination. According to the theory, these three needs are universal. Therefore, individuals do not differ in the needs' strength but rather in the extent to which they are fulfilled in the workplace and their daily lives. The more these needs are satisfied at work, the more likely individuals are to develop autonomous motivation for their jobs. This, in turn, leads to better job performance and enhanced well-being, highlighting the importance of high-quality jobs.

Ryan Duffy and David Bluestein (Duffy et al., 2016; Bluestein et al., 2023) recently proposed the psychology of working theory (PWT). The theory differentiates between decent work that defines the baseline attributes of work which satisfy basic human needs, and meaningful work that makes individuals experience meaning and purposefulness. According to PWT, decent work is a threshold that needs to be surpassed before individuals could engage in meaningful work and includes: (a) physically and interpersonally safe working conditions, (b) working time that enables free time and satisfactory rest, (c) company values that are aligned with social and fam-

ily values, (d) satisfactory compensation, and (e) opportunity to receive proper healthcare. Finally, when decent working conditions are met, meaningful work is considered to be a crucial work condition that individuals strive for to experience a sense of significance and fulfil higher-order psychological needs.

Though all three approaches are exceptionally important for contemporary understanding of the psychology of work and have generated a large body of research, each of the theories seems incomplete for understanding the totality of work experience. Jahoda's theory stems from the research on individual experience of unemployment and seems to miss some positive aspects of work that help individuals to perfect and master the environment that surrounds them. In fact, Jahoda explicitly admits that her theory of latent functions does not capture all the aspects of job quality (Jahoda, 1981). SDT, on the other hand, seems overly psychological in its nature and not concerned with important, mundane job aspects such as meeting survival needs and obtaining basic human safety. Finally, research on PWT seems to be largely focused on groups that are marginalised on the labour market, and reintroduces previously dismissed ideas into work psychology. For example, the sharp distinction between decent and meaningful work parallels Herzberg's (1966) differentiation between hygienics and motivators that has been scientifically refuted. Moreover, the introduction of decent work as a prerequisite for meaningful work reminds of the scientifically unsupported assumptions of Maslow's (1954) hierarchy of needs that lower order needs should be met before higher order needs appear.

Building on the mentioned theoretical approaches, but also other theoretical approaches to work motivation such as Maslow's (1954)/Alderfer's (1969) need theories, Hackman's and Oldham's (1976) job characteristics model, Bandura's social cognitive theory (2001), organisational justice research (Adams, 1965; Colquitt, 2001), or recent research on the importance of job meaning (Lysova et al., 2019; Grant & Wade-Benzoni, 2009) and the importance of psychological safety in organisations (Edmondson, 2019), we propose a heuristic model of job quality that consists of six dimensions (Safety, Upgrading, Purpose, Empowerment, Relationship and Balance) that can be abbreviated into the acronym SUPERB and that tries to be more encompassing than the earlier described job quality models.

First, following PWT assumptions about decent work but also Maslow's and Alderfer's lower order needs and justice research (e.g., Adams, 1965), jobs should grant people *Safety*. In our view, Safety should encompass both economic and psychological dimensions. Workers should not only earn sufficient income to maintain a decent standard of living but also expe-

rience interpersonal safety in the workplace, ensuring they are treated with dignity and equity. Second, work should provide opportunities for *Upgrading*, i.e., continuous psychological growth that is ingrained in human nature (Ryan & Deci, 2017; Bandura, 2001). Third, in their jobs workers need to see *Purpose* and meaning of their work activities. These needs follow from our social evolution (Lysova et al., 2019) and/or are a way of constructively coping with our mortality (Grant & Wade-Benzoni, 2009). Fourth, people at work need *Empowerment*, want to be responsible for the processes and outcomes in their jobs, feel self-determined, and dislike being micromanaged. Fifth, as hypersocial animals people seek meaningful *Relationships* with peers (Maslow, 1954; Alderfer, 1969; Ryan & Deci, 2017), subordinates and supervisors. Finally, workers seek *Balance* between their working role and the other roles they have in other social entities such as family or community. Though this aspect of job in similar forms was present in the mentioned models (e.g., time structure in Jahoda's model), it appears to be gaining increased prominence among younger workers (Twenge, 2023). According to our heuristic model, the more someone's job is aligned with SUPERB dimensions, the more likely it is that (s)he will be productive and satisfied at their job.

Earlier research on quality of working life in Croatia

Several papers explored the quality of working life (QWL) in Croatia from a psychological perspective. Maslić Seršić et al. (2005) explored the importance and attainability of nine job factors deducted from work values research that capture both extrinsic (e. g., satisfactory earnings, job safety) and intrinsic (e.g., opportunities for advancement/growth, participation in decision making) job aspects using a large convenience sample of Croatian workers recruited by psychology students between 1993 and 2004. The study showed that Croatian employees perceived low attainability of most job aspects, indicating a persistent lack of opportunities to fulfil work-related needs. Šverko and Galić (2009) extended the same research programme by adding additional data collected between 2005 and 2008 to the original convenience sample and by collecting data using a representative sample of Croatian workers recruited by a market research agency. The results of this study showed that the improvement in the Croatian economy that occurred during that long period was reflected in the improvement of extrinsic aspects of job quality such as pay satisfaction, pay fairness and working conditions. However, intrinsic job aspects, such as participation in decision-making and opportunities for advancement and growth, remained unsatisfactory.

Galić and Plećaš (2012) explored how the quality of working life changed during the Great Recession again using a combination of convenience and representative sample. Measuring QWL with the same instrument as Maslić Seršić et al. (2005) and Šverko and Galić (2009), they showed that QWL declined during the recession (i.e., between 2008 and 2011), especially for lower educated workers and especially for extrinsic job aspects. Finally, in the last two studies Šverko and Galić (2014), and Galić et al. (2019) explored QWL in Croatia using datasets obtained in the 5th (2010) and 6th (2015) European Working Conditions Study (EWCS). In those two studies, the authors developed their heuristic model consisting of the four dimensions of QWL (economic security, social relations at work, meaningfulness of work and autonomy/participation), and identified indicator questions in the EWCS survey. Their results showed that despite strong workplace social relations, Croatian workers experience lower economic security and work autonomy, reflecting broader socio-economic challenges in post-socialist economies. While data from the 2010 EWCS survey indicated that Croatian workers lagged behind their Western European counterparts, the 2015 survey revealed that this gap extended to other EU member states, with the situation being particularly precarious among older workers.

THIS RESEARCH

In this paper we report results of the two studies where we tested QWL in Croatia using the SUPERB heuristic model on representative samples of Croatian workers during 2023 and 2024. In addition to obtaining information about job quality levels, we wanted to test to what extent job quality conceptualised with the SUPERB model was related to important outcomes such as job satisfaction, work engagement, intention to quit, and well-being.

STUDY 1

In Study 1 we explored job quality levels as conceptualised with the SUPERB model and their relationship with job satisfaction, job engagement and intention to quit.

Method

Participants

In total, 501 respondents participated in the study. The only condition for participating in the study was that they were fully or partially employed. Within the sample 49.1% were female with a mean age of 43.15 (SD = 12.37). Regarding education,

49% had some form of tertiary education, whereas 50% reported that they had secondary education (1% refused to respond to the education question).

Instrument

SUPERB dimensions of job quality. SUPERB dimensions of job quality were measured with 14 items designed especially for this study to capture the six job quality dimensions and were modelled after similar instruments such as Gallup's well-known Q12 survey (Harter et al., 2002). The items were statements that describe the job/workplace situation and the participants' task was to rate the extent to which they agree with them by using a 5-point response scale, from 1 = completely disagree to 5 = completely agree. With the exception of Purpose and Relationship dimensions that were measured with three items, the other four dimensions were measured with two items. All items of the SUPERB questionnaire are given in Table 2.

Job satisfaction (JS). Job satisfaction was measured with one item that captures general satisfaction with one's job "All things considered, I am satisfied with my job."

Job engagement (JE). Job engagement was captured with three items taken from the Houle et al. (2022) scale. A sample item is "I exert my full effort to my job".

Turnover intentions (TI). TI were captured with three statements assessing the current search for a job outside of the employing organisation (item 1), intention to search for another job in the following 12 months (item 2), intention to move out of Croatia in the following 12 months (item 3). The three items were combined to create a general turnover intention index.

The task of the participants on JS, JE and TI items was to rate their agreement using the same 5-point response scale as for the SUPERB items.

Procedure

Our first study was conducted in late August and September 2023 with the assistance of a local market research agency. The study utilised the CAWI (Computer-Assisted Web Interviewing) methodology, with participants recruited from the agency's panel of 16,000 individuals to ensure a demographically representative sample of Croatian citizens in terms of age, gender, regional representation and settlement size. To maintain data quality, the agency applied rigorous quality control measures, such as removing responses with low variability (e.g., participants who consistently selected the same response option) and filtering out responses with unrealistically short completion times.

Results

Descriptive statistics and intercorrelations between Study 1 variables are given in Table 1.

	M	*SD*	1	2	3	4	5	6	7	8	9	10
1 Safety	3.25	0.96	(0.63)									
2 Upgrading	3.22	1.08	0.68**	(0.79)								
3 Purpose	3.53	0.86	0.61**	0.68**	(0.71)							
4 Empowerment	3.05	1.06	0.59**	0.66**	0.50**	(0.65)						
5 Relationship	3.53	0.88	0.65**	0.66**	0.64**	0.50**	(0.73)					
6 Balance	3.44	0.95	0.38**	0.29**	0.25**	0.29**	0.40**	(0.62)				
7 SUPERB (total)	3.33	0.75	0.84**	0.86**	0.78**	0.78**	0.82**	0.56**	(0.90)			
8 Job satisfaction	3.60	1.02	0.61**	0.59**	0.57**	0.47**	0.64**	0.43**	0.71**	-		
9 Job engagement	3.96	0.73	0.36**	0.46**	0.54**	0.30**	0.52**	0.23**	0.51**	0.53**	(0.75)	
10 Turnover intentions	2.30	1.14	-0.28**	-0.24**	-0.28**	-0.11*	-0.36**	-0.36**	-0.34**	-0.43**	-0.32**	(0.84)

TABLE 1
Descriptive statistics and intercorrelations between Study 1 key variables

Note: *$p < 0.05$; **$p < 0.01$; Cronbach α given in the parentheses.

First, the internal consistencies for the SUPERB dimensions ranged between 0.63 and 0.79 with reliability of the total score being 0.87. Though relatively low, Carmines and Zeller (1979) asserted that in exploratory research alpha values above 0.60 may be considered satisfactory. With the exception of the job satisfaction measure where we used one item measure due to the construct's salience and clarity (Wanous et al., 1997), the other two criterion variables (JE and TI) had satisfactory reliabilities.

Second, an insight into current Croatian QWL levels can be obtained if one looks into descriptive statistics of the six SUPERB dimensions and the total score. In an ideal job, all estimates should be close to the maximum on the five-point scale used. As can be seen from Table 1, average estimates for the SUPERB dimension range from 3.05 for Empowerment to 3.53 for Relationships that indicate moderate satisfaction of key psychological needs. A deeper insight into deviation from the ideal can be obtained if we check the percentage of individuals who agree (i.e., give responses 4 and 5) with the positive items and disagree with the one negative item (i.e., give responses 1 and 2). The three lowest rated items were "I can decide for myself how and when I will perform work tasks." (37.5%, Empowerment), "My job offers me good opportunities for professional development." (41.0%, Upgrading), and "I can make important decisions at my job." (41.6%, Empowerment). Very close to them is the item "My income enables me to live a decent life." (41.9%, Safety). At the same time, the top-rated items with agreement over 60% were: "I have a high-quality relationship with my boss." (66.5%, Relationships), "I have good friends at work." (64.1%, Relationships), "I find my work very meaningful." (63.1%, Purpose), and "I have a good balance between my work duties and free time." (60.2%, Balance).

Dimension	Item statement	Study 1 (2023 %)	Study 2 (2024, %)
Safety	My income enables me to live a decent life.[1]	41.9	44.8
	In my organisation, employees are treated fairly and justly.[1]	49.5	52.2
Upgrading	My job offers me good opportunities for professional development.[1]	41.0	36.7
	I have the ability to express creativity at work.[1]	47.7	47.9
Purpose	I find my work very meaningful.[1]	63.0	64.0
	The results of my work significantly affect the lives of other people.[1]	47.6	51.2
	The goals of the organisation I work for are consistent with my values.[1]	57.7	54.7
Empowerment	I can decide for myself how and when I will perform work tasks.[1]	37.5	35.6
	I can make important decisions at my job.[1]	41.6	39.2
Relationships	I have good friends at work.[1]	64.1	60.6
	I feel emotionally attached to the organisation where I work.[1]	47.9	46.4
	I have a high-quality relationship with my boss.	66.5	61.0
Balance	The demands of my job interfere with my private and family life.[2]	46.2	41.9
	I have a good balance between my work duties and free time.[1]	60.5	58.3

TABLE 2
Items of the SUPERB questionnaire and percentage of participants that agree with them in Study 1 and Study 2

Note. [1] Percentage of participants giving estimates 4 ("agree") and 5 ("completely agree");

[2] Negatively oriented item, percentage of respondents disagreeing with the item by giving responses 1 ("completely disagree") and 2 ("disagree") is shown.

Moderate satisfaction of key psychological needs at work reflects also on moderate job satisfaction and job engagement levels, and somewhat lower turnover intentions. Here we would like to stress the percentage of individuals agreeing with turnover intentions items (i.e., giving responses 4 and 5), with 20.8% agreeing with the statement that they are currently searching for another job, 29.1% intending to do so in the following 12 months, and 13.9% intending to move out of Croatia.

Finally, the SUPERB dimensions correlated moderately among themselves (range 0.25 to 0.68) with the Balance dimension showing somewhat lower correlations with other SUPERB components. The correlations between SUPERB components and criteria were significant for the criterion variables job satisfaction (0.43 to 0.63), job engagement (0.23 to 0.54) and turnover intentions (-0.11 to -0.36). The total SUPERB score correlated 0.71, 0.51 and -0.36 with job satisfaction, job engagement, and turnover intentions, respectively.

In order to test how important the notion of job quality is (i.e., alignment of job characteristics with employees' psychological needs), we performed hierarchical regression analyses where the total score on SUPERB was a predictor while we controlled for age, gender, level of education and pay level, the variables that were shown to be important determinants of job quality (e.g., Šverko & Galić, 2009; Galić et al., 2019).

	Criterion:					
	job satisfaction		job engagement		turnover intentions	
	Block 1 β	Block 2 β	Block 1 β	Block 2 β	Block 1 β	Block 2 β
Gender[1]	0.03	0.01	0.18**	0.17**	-0.16**	-0.15**
Age (in years)	0.10*	0.05	0.12*	0.09*	-0.30**	-0.28**
Education level[2]	-0.02	-0.05	-0.04	-0.07	0.01	0.02
Pay level[3]	0.15**	0.02	0.13**	0.04	-0.19**	-0.14**
SUPERB Total score		0.72**		0.52**		-0.30**
R^2	0.03**	0.52**	0.05**	0.31**	0.15**	0.23**
ΔR^2	0.03**	0.49**	0.05**	0.26**	0.15**	0.08**

TABLE 3
Summary of hierarchical regression analyses testing the SUPERB's total score importance for the three criteria over and above biographical variables in Study 1

Note. [1] 1= male, 2 = female;
[2] 1 = no formal education,…, unfinished elementary school, 4 = tertiary education;
[3] 1 = individual income below 2000 Kunas / 265,12 Euros,…, 8 = individual income above 8000 Kunas / 1060 Euros;
*$p < 0.05$; **$p < 0.01$.

The results of the hierarchical regression analyses showed that job quality indicated with the SUPERB index explains job satisfaction, job engagement and turnover intentions over and above gender, age, and pay levels. In the case of job satisfaction and job engagement, the effect of SUPERB largely surpasses the one of biographic variables while the reverse is true for turnover intentions. The effect size in the case of job satisfaction and job engagement was relatively large with 49% and 26% of the variance in job satisfaction and job engagement being explained by the SUPERB total score. The SUPERB's effect on turnover intention index was lower (8% of variance) but still significant.

STUDY 2

We conducted Study 2 exactly one year after Study 1. With the second study we wanted to replicate the Study 1 findings. We believe that this was important considering that some of the SUPERB scales had mediocre internal reliabilities so our results could partially reflect random variations and not systematic effects of job quality. Second, in addition to replicating the effects we observed in Study 1, we wanted to extend the nomological network of the SUPERB heuristic model by exploring its relationship with an additional important variable – subjective well-being.

Method

Participants and procedure

The procedure of data collection was identical to that one of Study 1, and the data were collected with the help of the same market research agency. A sample of 500 respondents repre-

sentative of the population of Croatian workers in terms of gender, age, settlement size and regional representation participated in the study. The mean age of participants was 45.37 (SD = 12.60), and 49.1% of participants were female. Regarding education, 52.6% had some form of tertiary education whereas 46.5% completed secondary education or lower. One third of the Study 2 sample (179 or 35.8%) participated also in Study 1.

Instruments

SUPERB dimensions, job satisfaction, job engagement, and turnover intentions were measured with the same scales as in Study 1.

Subjective well-being was measured with the WHO-5 scale (Topp et al., 2015). The participants' task was to reflect how they felt over the last two weeks and report their agreement with the five positive worded statements such as "I have felt cheerful and in good spirits." or "I have felt active and vigorous." using the response scale from 1 = completely disagree to 5 = completely agree.

The study was conducted at the end of August and beginning of September 2024.

Results

Descriptive statistics and intercorrelations between Study 2 variables are given in Table 4.

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11
1 Safety	3.27	0.93	(0.57)										
2 Upgrading	3.18	1.03	0.69**	(0.76)									
3 Purpose	3.53	0.85	0.60**	0.71**	(0.76)								
4 Empowerment	2.98	1.07	0.53**	0.63**	0.47**	(0.68)							
5 Relationship	3.51	0.86	0.68**	0.65**	0.64**	0.46**	(0.74)						
6 Balance	3.43	0.93	0.34**	0.23**	0.20**	0.16**	0.28**	(0.49)					
7 SUPERB (total)	3.32	0.71	0.84**	0.87**	0.79**	0.74**	0.81**	0.48**	(0.89)				
8 Job satisfaction	3.56	1.02	0.66**	0.60**	0.61**	0.41**	0.67**	0.43**	0.74**	-			
9 Job engagement	3.93	0.77	0.43**	0.47**	0.60**	0.23**	0.56**	0.19**	0.54**	0.57**	(0.83)		
10 Turnover intentions	2.26	1.10	-0.34**	-0.26**	-0.30**	-0.08	-0.35**	-0.34**	-0.36**	-0.49**	-0.34**	(0.84)	
11 Well-being	3.39	0.85	0.38**	0.38**	0.45**	0.28**	0.41**	0.36**	0.49**	0.49**	0.40**	-0.19**	(0.92)

TABLE 4
Descriptive statistics and intercorrelations between Study 2 key variables

Note: *$p < 0.05$; **$p < 0.01$; Cronbach α given in the parentheses.

As internal consistencies are considered, Cronbach's alphas are similar to Study 1 variables. However, it should be noted that for the Safety and Balance dimensions of SUPERB they are slightly lower and below Carmines and Zeller's (1979) 0.60 threshold (0.57 and 0.49, respectively). All other variables, including the SUPERB total score, had satisfactory internal consistencies.

As might be seen by comparing Tables 1 and 4, the average values on the SUPERB dimensions and the job attitudes variables were similar, which is expected considering the relatively short time frame within which the two studies took place. Once again, the findings present a relatively unfavourable impression of the quality of working life in Croatia, with the degree of concern varying across different SUPERB dimensions. The dimensions of Purpose, Relationships, and Balance were more favourably rated than the dimensions Safety, Upgrading and Empowerment, which were far from the ideal standard. The three lowest rated items, with the percentage of respondents agreeing with them being 35.6%, 36.7% and 39.2%, were "I can decide for myself how and when I will perform work tasks." (Empowerment), "My job offers me good opportuniities for professional development" (Upgrading), and "I can make important decisions at my work" (Empowerment). Analogously, top rated items were "I find my work very meaningful." (Purpose, 64%), "I have a high-quality relationship with my boss." (Relationships, 61%), and "I have good friends at work." (60%, Relationships). Very close to the 60.6% agreement threshold is the item "I have a good balance between my work duties and free time." (Balance, 58.3%). So, the highest and lowest rated items in both our studies were identical though their order somewhat changed, probably due to random variation.

Regarding the criterion variables, they were also very similar to Study 1 values and indicated moderate levels of general job satisfaction/job engagement, and somewhat lower levels of turnover intentions. It is worth noting that we again observed a significant portion of the labour market in search of another job or intending to search/move out of Croatia. If responses 4 and 5 are used as the criteria, the percentage of participants who were seeking a new job at the time was 24%, who intended to do so in the following 12 months 28.8%, and who intend to move out of Croatia in the 12 months following the study 9.3%. Finally, in Study 2 the average result on the well-being scale indicated moderate levels of subjective well-being. The fact that the percentage of respondents agreeing with the five positively oriented items ranged between 38.1% for "I woke up feeling fresh and rested." and 57.1% "My daily life has been filled with things that interest me." suggest that the participants did not give socially desirable responses.

The pattern of the correlations among SUPERB variables, and their relationship with job satisfaction, job engagement, and turnover intentions remained similar to the one in Study 1. Perhaps the only difference that stands out is the fact that the relationship between Empowerment and turnover intentions was non-significant. The most interesting portion of the correlation matrix in Study 2 is the pattern of correlations of

the well-being variable, which showed positive correlations with all the SUPERB dimensions (range between 0.38 for empowerment and 0.45 for purpose) and the SUPERB total score. Moreover, subjective well-being positively correlated with job satisfaction and work engagement and negatively with turnover dimensions.

In this study we also tested if SUPERB adds to the prediction of the criterion variables (job satisfaction, job engagement, turnover intentions and well-being) over and above biographic variables (gender, age, education, and personal income).

	Criterion:							
	job satisfaction		job engagement		turnover intentions		well-being	
	Block 1 β	Block 2 β	Block 1 β	Block 2 β	Block 1 β	Block 2 β	Block 1 β	Block 2 β
Gender[1]	-0.08	0.05	0.13*	-0.12*	-0.19**	-0.18**	-0.13*	-0.14**
Age	0.15**	0.08*	0.14**	0.08	-0.29**	-0.25**	0.12*	0.07
Education level[2]	0.01	-0.04	-0.04	-0.08	-0.05	-0.08	0.07	0.03
Pay level[3]	0.09	0.02	0.03	-0.03	-0.16**	-0.13**	0.01	-0.05
SUPERB Total score		0.72**		0.55**		-0.33**		0.50**
R^2	0.03*	0.53**	0.02*	0.31**	0.10**	0.20**	0.04**	0.29**
ΔR^2	0.03*	0.50**	0.02*	0.29**	0.10**	0.10**	0.04**	0.25**

TABLE 5
Summary of hierarchical regression analyses testing the SUPERB's total score importance for the four criteria over and above biographical variables in Study 2

Note. [1] 1= male, 2 = female;
[2] 1 = no formal education,…, unfinished elementary school, 4 = tertiary education;
[3] 1 = individual income below 2000 Kunas / 265,12 Euros,…, 8 = individual income above 8000 Kunas / 1060 Euros;
*$p < 0.05$; **$p < 0.01$.

As might be seen from Table 5, the SUPERB total score explains all four criteria over and above the key biographic variables that were shown to be related to job quality. In the case of three variables (job satisfaction, job engagement, and general well-being), the extent to which a job satisfies important psychological needs is much more strongly related to each criterion than the biographic variables. Again, the effect sizes are reasonably strong, ranging between 25% (subjective well-being) and 50% (job satisfaction) of the explained variance. Only in the case of turnover intentions, biographic variables are equally predictive as the SUPERB total score (10% of variance each).

DISCUSSION

The aim of our research was twofold. First, we wanted to extend the two decades long psychology research programme on the quality of working life in Croatia and take a measure of the situation in the first half of the 2020s, several years after

the last paper on the issue was published (Galić et al., 2019). Second, considering that the quality of working life in a society depends on the quality of individual jobs (i.e., their potential to satisfy important human needs), we proposed a new conceptual framework to capture job quality. In its essence, the SUPERB model of job quality is a heuristic model that aims to provide a structured representation of the major work motivation theories to guide research and practical applications on job quality in a more encompassing manner.

Regarding our first goal to take stock of the quality of working life, our findings replicate and extend those obtained in earlier studies. In terms of the SUPERB model, Croatian workplaces fare relatively well on the dimensions of Relationships, Balance, and Purpose. Workers in Croatia frequently have good/high-quality relationships at work, generally balance their jobs well with other aspects of their life, and mostly see purpose in their jobs. The safety aspects of jobs are only moderately favourable, while the Empowerment and Upgrading dimensions of job quality remained mostly unsatisfactory as they were in earlier studies (e.g., Šverko & Galić, 2009, 2014).

However, if one dives in more detail into the components that are estimated most favourably, the picture that is revealed is a bit more complex. For example, though a large majority of workers in both studies report high levels of satisfaction about their relationships with their peers and superiors, less than half agrees with the Relationship statement that they are emotionally attached to the organisation they work for (45.9% in Study 1 and 46.4% in Study 2). There is also significant space for improvement on the generally favourably rated dimensions of Balance and Purpose with a significant proportion of individuals experiencing interference between work and private life and not seeing purpose in their jobs. In fact, the proportion of our respondents that think their job is not meaningful (37% in Study 1 and 36% in Study 2) is roughly the same as the one that was observed in the UK and incited the anthropologist David Graeber (2018) to write his well-known book "Bullshit Jobs" about jobs that feel meaningless or useless but workers need to pretend that they matter in order to keep them.

In sum, based on the findings from our two studies we can estimate the quality of working life in Croatia to be mediocre. The rest of our findings indicate that this fact might have significant ramifications. In our studies we observed and replicated that job quality, as captured with our SUPERB model, is important for several outcomes. The results of regression analyses indicate that the SUPERB total score explains job satisfaction, job engagement, turnover intentions, and well-being

even when gender, age, level of education, and personal income are controlled for. With the exception of turnover intentions which more (Study 1) or equally (Study 2) depend on the individual life situation, job quality was a much more important determinant of the listed outcomes.

Our research has important practical implications both for national and organisational human resources management practices. Organisations should insist more on practices that improve job quality, i.e., make jobs more aligned with the psychological needs of employees. Our studies indicate that there was significant room for improvement on all SUPERB dimensions, but the interventions should be first directed towards the Empowerment and Upgrading dimensions of the SUPERB model. For example, human resources management interventions should be targeted towards increasing employees' decision latitude, improving participation in decision making or allowing flexible work arrangements (all focused towards increased employees' empowerment). Moreover, based on our findings, there is need in Croatian organisations to enable employees' upgrading or growth through practices such as regular feedback procedures or continuous development of work-related skills.

Our studies have limitations that could have significantly influenced our conclusions. We will mention a few that seem most salient. Our SUPERB model of job quality is by no means comprehensive. We built it with the Goldilocks principle in mind by trying to identify just about the right number of job quality dimensions. We proposed more dimensions than the models described in the introduction in order to be more encompassing, but we decided not to include too many because this would make the model difficult to comprehend and use in both research and practical purposes. Future studies should test if we have succeeded in our endeavour, or Jahoda's latent benefits measures (Batinic et al., 2010) or the decent work scale (Duffy et al., 2017) have better explanatory power in predicting important outcomes. Relatedly, though our SUPERB measures are a significant improvement in comparison to the one-item scales that were used in the mentioned studies on the quality of working life in Croatia by Maslić Seršić et al. (2005), Šverko and Galić (2009) or Galić and Plećaš (2012), the SUPERB questionnaire should be improved. Due to the need to keep our survey as short as possible to be able to test it on national samples of participants, we were forced to use scales containing only two or three items. This seems especially to be the problem for the Safety and Balance scales that should be the subject of conceptual (i.e., do they capture items that are too heterogenous?) and/or psychometric consideration (e.g., how to improve the scales' reliability?). However, it should be noted

that similar problems were also observed in other studies of job quality using short scales on nationally representative samples. For example, Paul and Batinic (2010) reported the internal consistencies of time structure and collective purpose scales from Jahoda's latent function model to be 0.54 and 0.51 on a representative sample of German population. Morever, our SUPERB model is normative (i.e., it assumes that satisfaction of all needs is equally important for all groups of workers), which implies that the proposed humanisation of work stemming from its principles should be equally valid for anyone. Still, we need to explore the possibility that not all people seek the humanisation of work equally, considering that some studies indicate that it is more needed by more skilled and more educated workers (Hackman & Oldham, 1976; Jahoda, 1981). Finally, the samples used in our two studies are representative in terms of key characteristics such as age, gender, and region. Therefore, our findings are more generalisable than those based on convenience samples. However, a fully representative sample remains an unattainable ideal. Our sample does not capture all aspects of the Croatian working population (e.g., in terms of education and employment sector), which imposes limitations on the drawn conclusions.

CONCLUSION

Our results suggest that the quality of working life in Croatia is far from being superb, and its mediocre levels, like in similar studies (e.g., Baranik et al., 2022), reflect our level of socioeconomic development. Using our newly proposed SUPERB model, our findings suggest that, in addition to improving Safety levels happening through wage growth during recent years, employers and policy makers should take care of other important aspects such as Upgrading and Empowerment that seem especially challenging in current Croatian jobs. To attract, retain, and motivate employees to perform well, jobs should align with their psychological needs, succinctly captured by the acronym SUPERB.

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Kvaliteta radnoga života u Hrvatskoj u 2020-ima: predstavljanje SUPERB modela kvalitete poslova

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Ova studija istražuje kvalitetu radnoga života u Hrvatskoj rabeći dva nacionalno reprezentativna uzorka radnika te predstavlja SUPERB model kvalitete poslova. Ovaj heuristički okvir integrira ključne teorije radne motivacije i identificira šest temeljnih dimenzija kvalitete poslova: Sigurnost, Rast i razvoj, Svrha, Osnaživanje, Odnosi i Ravnoteža. Rezultati dviju studija provedenih 2023. i 2024. godine upućuju na općenito umjereno nisku razinu kvalitete poslova, uz značajne nedostatke u osnaživanju zaposlenika i mogućnostima za rast i razvoj karijere u hrvatskim radnim okruženjima. Važno je istaknuti da je kvaliteta posla, mjerena SUPERB modelom, predviđala zadovoljstvo poslom, radnu angažiranost, namjere napuštanja posla te opću subjektivnu dobrobit, čak i kada su uzeti u obzir biografski čimbenici, dodatno naglašavajući važnost kvalitete posla. Rezultati upućuju na potrebu za intervencijama na radnom mjestu koje će poticati autonomiju i razvoj vještina. Unapređenjem kvalitete poslova Hrvatska bi mogla učinkovitije zadržati svoju radnu snagu, smanjiti namjere za odlazak te poboljšati opću dobrobit građana, što bi pridonijelo dugoročnim ishodima na tržištu rada i društvenoj stabilnosti.

Ključne riječi: kvaliteta radnoga života, kvaliteta posla, SUPERB model kvalitete poslova, zadovoljstvo poslom, radna angažiranost, namjere napuštanja posla

IN MEMORIAM

Prof. dr. sc. MAJA ŠTAMBUK (1947. – 2025.)

U svojoj 78. godini 30. travnja 2025. zauvijek nas je napustila naša draga kolegica i prijateljica prof. dr. sc. Maja Štambuk, koja je u svojoj bogatoj znanstvenoj i stručnoj karijeri, između ostalog, od 2002. do 2009. godine bila glavna i odgovorna urednica časopisa "Društvena istraživanja".

Prof. dr. sc. Maja Štambuk rođena je 1947. u Selcima na otoku Braču. Nakon završene gimnazije u Zagrebu te studija na Filozofskom fakultetu Sveučilišta u Zagrebu (sociologija i francuski jezik) zaposlila se 1973. u Centru za sociologiju sela, grada i prostora Instituta za društvena istraživanja u Zagrebu. Magistrirala je na Odsjeku za sociologiju temom "Mješovita domaćinstva i seljaci--radnici u Hrvatskoj" te jedanaest godina (1987. – 1997.) bila glavna i odgovorna urednica časopisa "Sociologija sela". U ožujku 1997. zaposlila se u Institutu društvenih znanosti Ivo Pilar na projektu "Sustavno oživljavanje hrvatskih periferija" u okviru programa "Socijalna struktura i socijalna integracija". Disertaciju pod naslovom "Modernizacijski procesi i društvene promjene u hrvatskim ruralnim sredinama" obranila je 1998. na Sveučilištu u Zagrebu. U znanstveno zvanje znanstvene savjetnice izabrana je 2005. godine, a znanstvene savjetnice u trajnom zvanju 2011.

Ostavila je neizbrisiv trag u hrvatskoj sociologiji, posebice na području ruralne sociologije, kroz mnoge znanstvene i stručne radove, znanstveno-istraživačke projekte, izlaganja na domaćim i međunarodnim konferencijama te kao voditeljica ili članica istraživačkih grupa u više od trideset znanstvenih i stručnih projekata, u okviru kojih je bila mentorica četirima asistentima. Objavila je jednu monografiju, sedam uredničkih knjiga, 22 poglavlja u knjigama, 33 znanstvena rada u časopisima i niz istraživačkih izvješća, elaborata i ekspertiza, pa se opravdano može smatrati nacionalnim stručnjakom za područje ruralnog razvoja, sociologije sela i položaja marginalnih skupina.

Među njezina ključna djela ulazi knjiga "Lica nigdine: društveni i prostorni okvir razvitka hrvatskog sela" (2014) i uredničke knjige u koautorstvu "Ruralna općina - sutra: društvena re/konstrukcija na ruralnom teritoriju" (2014), "Kako žive hrvatski Romi" (2005), "Živjeti u Zagrebu. Prinosi sociologijskoj analizi" (2004), "Razvojne perspektive ruralnog svijeta Slavonije i Baranje" (2003), "Prostor iza: kako modernizacija mijenja hrvatsko selo" (2002) te "Budućnost na rubu močvare: razvojni izgledi naselja na Lonjskom polju" (2001).

Bila je članica Hrvatskoga sociološkog društva (gdje je od 1989. do 1990. obnašala dužnost dopredsjednice) te Europskoga društva za ruralnu sociologiju (ESRS), u okviru kojega je bila dopisnica za Hrvatsku od 1991. do 1992. Bila je i članica Matičnog odbora za područje društvenih znanosti, polje sociologija, i Područnoga vijeća za društvene znanosti (od 2005. do 2009. godine).

Prof. dr. sc. Maja Štambuk svojim je profesionalnim radom pokazala usredotočenost na temu ruralne sociologije. Međutim, ona je tu temu i živjela. Ljubav prema selu i seljacima neprestano je isticala i u privatnom životu i nikad nije propustila priliku opomenuti nekoga tko bi se drznuo upotrijebiti riječ "seljak" u pogrdnom obliku. O tome je i izlagala na jednom skupu u Opatiji 2005. godine pod naslovom "Stigmatična personalizacija seljaka".

Njezina vedrina, aktivnost i ljudska toplina bile su gotovo zarazne. Uvijek je imala lijepu riječ za razne ljude i okolnosti, bila je uvjeren optimist, odgovorna i pravedna u radu i odnosima s ljudima. Neizmjerno je voljela planine, opere i svoje podrijetlo. Suosnivačica je "Udruge Štambuk", u okviru koje je po arhivima u Pragu tražila i našla korijene prvoga Štambuka na Braču. Samu sebe opisala je ovim riječima:

"Gledajući unatrag, Selca i Zagreb podjednako su obilježila moje odrastanje. Selca su moje malo misto, a Zagreb moje velo misto. Selca su korijeni, obitelj i djetinjstvo, a Zagreb su ljubavi, prijateljstva, posao i krov nad glavom. S podjednakom odanošću pripadam jednome i drugom i oba ta mjesta u mojem životu nikada nisu bila suprotstavljena. Tko kaže da se ne mogu imati dva zavičaja … mogu, itekako. I može ih se voljeti, svaki na svoj način, i uživati družeći se na Pjaci, u procesiji za Gospu, na Croatiji redivivi, okupljanju Štambuka, Radonji, Perivoju, kao i na Trgu bana Jelačića, uz Savu, na Gornjem gradu, na Sljemenu, u kazalištima."

Većinu života provela je u Zagrebu, a počiva u Selcima na Braču.

Draga naša kolegice i prijateljice, nedostaje i nedostajat će nam tvoja aktivnost, posvećenost radu, vedrina, humor i ljudska toplina.

On April 30, 2025, in her 78th year, our dear colleague and friend Prof. Maja Štambuk, PhD, passed away. During her rich academic and professional career, she served, among other roles, as the editor-in-chief of the journal *Društvena istraživanja* from 2002 to 2009.

Prof. Maja Štambuk, PhD, was born in 1947 in Selca on the island of Brač. After completing high school in Zagreb and studying sociology and French at the Faculty of Humanities and Social Sciences, University of Zagreb, she began working in 1973 at the Centre for the Sociology of Rural, Urban, and Spatial Studies at the Institute for Social Research in Zagreb. She earned her master's degree at the Department of Sociology with the thesis "Mixed Households and Peasant-Workers in Croatia" and served for eleven years (1987–1997) as editor-in-chief of the journal *Sociologija sela*. In March 1997, she joined the Institute of Social Sciences Ivo Pilar to work on the project Systematic Revitalisation of Croatian Peripheries within the programme "Social Structure and Social Integration". She defended her doctoral dissertation titled "Modernisation Processes and Social Change in Croatian Rural Areas" in 1998 at the University of Zagreb. She was promoted to the academic title of scientific advisor in 2005 and to permanent scientific advisor in 2011.

She left an indelible mark on Croatian sociology, especially in the field of rural sociology, through numerous scientific and professional papers, research projects, presentations at national and international conferences, and as a leader or member of research teams on more than thirty scientific and professional projects, within which she also mentored four research assistants. She published one monograph,

seven edited books, 22 book chapters, 33 scholarly articles in journals, and a series of research reports, studies, and expert analyses. She is therefore rightfully regarded as a national expert in the fields of rural development, rural sociology, and the position of marginalised groups.

Among her key works are the book "Faces of Nowhere: The Social and Spatial Framework of Croatian Village Development" (2014) and several co-edited volumes, including "The Rural Municipality: Tomorrow. Social Re/Construction in a Rural Territory" (2014), "How Croatian Roma Live" (2005), "Living in Zagreb: Contributions to a Sociological Analysis" (2004), "The Development Perspectives of the Rural Areas of Slavonia and Baranja" (2003), "The Space Behind: How Modernisation Changes the Croatian Village" (2002), and "The Future on the Edge of the Swamp: Development Prospects of Settlements in the Lonjsko Polje Area" (2001).

She was a member of the Croatian Sociological Association, where she served as vice-president from 1989 to 1990, and of the European Society for Rural Sociology (ESRS), where she acted as the correspondent for Croatia from 1991 to 1992. She was also a member of the National Committee for the Field of Social Sciences, Subfield of Sociology, as well as the Council for Social Sciences, from 2005 to 2009.

Prof. Maja Štambuk, PhD, demonstrated a strong professional focus on the field of rural sociology. However, she did not only study the topic – she truly lived it. Her love for the countryside and rural people was evident not only in her work but also in her personal life. She never missed an opportunity to call out anyone who dared to use the word "seljak" (peasant) in a derogatory way. She even gave a presentation on this topic at a conference in Opatija in 2005, titled "Stigmatised Personalisation of the Peasant".

Her cheerfulness, energy, and warmth were almost contagious. She always had kind words for people and circumstances, was a committed optimist, and approached her work and relationships with great responsibility and fairness. She deeply loved mountains, opera, and her heritage. She was a co-founder of the "Štambuk Association", through which she researched archives in Prague and traced the roots of the first Štambuk family member on the island of Brač.

She once described herself with these words:

"Looking back, Selca and Zagreb equally shaped my upbringing. Selca is my *malo misto* (small hometown), and Zagreb is my *velo misto* (big city). Selca means roots, family, and childhood, while Zagreb means love, friendships, work, and a roof over my head. I belong to both with equal devotion, and in my life, these two places were never in conflict. Whoever says you can't have two homelands… you can – absolutely. And you can love them, each in its own way, and enjoy spending time in *Pjaca*, in the procession for Our Lady, at *Croatia rediviva*, at Štambuk gatherings, on *Radonja*, *Perivoj*, just as much as in Ban Jelačić Square, along the Sava River, in the Upper Town, on Sljeme, or in the theatres."

She spent most of her life in Zagreb, and she now rests in Selca on the island of Brač.

Dearest colleague and friend, we miss – and will continue to miss – your energy, dedication, cheerfulness, humour, and human warmth.

Ljiljana Kaliterna Lipovčan

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1. Profil časopisa

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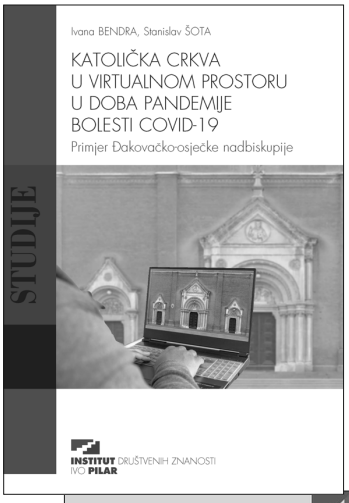

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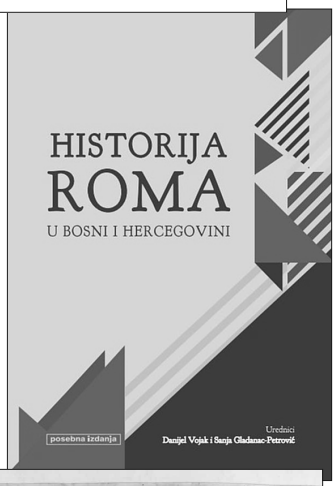

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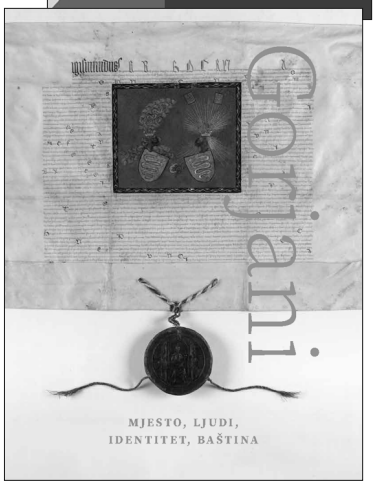

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Teacher wellbeing: In quest of its nature, determinants, and outcomes

Uz navedene glavne teme časopis *Društvena istraživanja* objavljivat će i druge manje temate, pojedinačne tekstove te informativno-kritičke priloge u rubrici "Prikazi".

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Rješenjem Ministarstva kulture i prosvjete Republike Hrvatske broj 532-03-1/5-92-02 od 7. prosinca 1992., časopis *Društvena istraživanja* oslobođen je plaćanja osnovnog poreza na promet proizvoda i usluga.

Ovaj broj *Društvenih istraživanja* financijski je potpomognut sredstvima Ministarstva znanosti, obrazovanja i mladih Republike Hrvatske.