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puțin conștientizată; Consolidarea serviciilor de informare și formare pentru familii, cu scopul de a crește nivelul de conștientizare și de a sprijini stabilirea priorităților în abordarea problemelor și asigurarea suportului necesar copilului cu dizabilități; Extinderea ariei de oferire a asistenței specializate familiilor, care, pe lângă acordarea serviciilor de evaluare și stabilire a nevoilor de dezvoltare, să presteze servicii de asistență nemijlocită copilului, familiei, suport în dezvoltarea cognitivă, emoțională, socială a copilului, în gestionarea comportamentului acestuia, în depășirea situațiilor de criză, în facilitarea comunicării cu familii ce trăiesc situații similare.

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Tolerance of uncertainty as a predictor of creativity in high school students

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Abstract

The article examines the relationship between tolerance of uncertainty and creativity in high school students. The results of an empirical study conducted using the Torrance Tests of Creative Thinking, McLain's Tolerance of Ambiguity Scale, and Budner's Intolerance of Ambiguity Questionnaire are presented. An uneven development of creativity components was identified: sufficient levels of fluency, flexibility, and originality are combined with a reduced level of elaboration. A tendency toward a relationship between originality and tolerance of uncertainty was revealed. At the same time, tolerance of uncertainty is interpreted as a psychological resource that may support the manifestation of creative activity rather than as its direct predictor. These findings indicate the multifactorial nature of creativity and highlight the role of tolerance of uncertainty as one of the personal characteristics associated with its expression.

Keywords: creativity; creative thinking; originality; tolerance of uncertainty; intolerance of uncertainty; high school students.

Introduction

The current stage of educational development is characterized by the increasing importance of creativity as a key competence of an individual capable of functioning effectively under conditions of social instability and informational uncertainty. The problem of developing the creative potential of high school students is becoming particularly relevant, as this age period is marked by the intensive formation of cognitive strategies, self-awareness, and readiness for professional self-determination. In the modern educational space, creativity is considered an integrative characteristic that combines intellectual, personal, and motivational components and ensures the ability to solve complex life tasks productively.

One of the psychological factors that potentially influences the development of creative thinking is tolerance of uncertainty – a personal characteristic reflecting the readiness to perceive ambiguous situations without an excessive tendency to structure them immediately. In contemporary psychological research, tolerance of uncertainty is viewed as a cognitive style associated with openness to new experience, cognitive flexibility, and the ability to engage in divergent problem-solving. At the same time, intolerance of uncertainty may act as a factor that limits creative activity due to an increased need for stability and predictability.

In psychological science, the problem of the relationship between tolerance of uncertainty and creativity is examined within cognitive-style and personality-oriented approaches. S. Budner (1962) defined intolerance of uncertainty as a tendency to perceive new or complex stimuli as threatening, whereas D. McLain (1993) emphasized the role of openness to ambiguity as a prerequisite for productive thinking. In Ukrainian studies, tolerance of uncertainty is considered an integrative personal resource of creative giftedness. Thus, E. Nosenko and M. Shapoval (2002) substantiated tolerance of uncertainty as a system-forming personal resource that ensures acceptance of novelty, readiness for intellectual risk, and the ability to act in open problem situations. Ukrainian researchers also examine tolerance of uncertainty in the context of psychological adaptation, decision-

making, and behavioral regulation, which provides a theoretical basis for explaining its role in the development of creativity (Lytvyn, 2019; Sannikova & Sannikov, 2020; Vasylkevych, Kikinezhdi et al., 2021).

The problem of creativity development is most systematically presented in the works of E. Torrance (1974), who identified key indicators of creative thinking: fluency, flexibility, originality, and elaboration. Within contemporary research, creativity is interpreted as a multidimensional phenomenon that integrates cognitive, motivational, and personal components, and its development is associated with the individual's ability to work with open-ended problem situations (Runco & Jaeger, 2012). Psychological studies emphasize the relationship between creativity, openness to new ideas, and the ability to deal with uncertain tasks (Furnham & Marks, 2013).

Empirical findings regarding the strength of the relationship between creativity and tolerance of uncertainty remain inconsistent. Studies by K. Stoycheva (2010) and D. Tegano (1990) revealed positive relationships between the acceptance of uncertainty and creative manifestations, whereas other studies demonstrate weak or unstable correlations (Zenasni, Besançon, & Lubart, 2008). Ukrainian researchers also emphasize that intolerance of uncertainty may act as a psychological barrier to creativity due to the tendency toward excessive structuring (Zaviazkina & Yatsenko, 2021; Trofimov & Zabolotna, 2023). In particular, K. Stoycheva (2010) found that tolerance of uncertainty is a characteristic of a creative personality and is associated with readiness to accept novelty. Similar conclusions were obtained in D. Tegano's research, where a positive relationship between tolerance of uncertainty and indicators of creative activity was identified (Tegano, 1990).

A review of contemporary publications indicates that tolerance of uncertainty is considered a psychological resource that promotes openness to alternative ideas, divergent thinking, and innovative behavior (Furnham & Marks, 2013; Berezovska, 2025). From the perspective of integrative models of creativity, the ability to accept ambiguity allows an individual to maintain a problem situation in the field of consciousness for a longer time and generate a greater number of possible solutions. Thus, both international and Ukrainian studies generally support the theoretical assumption of a positive relationship between tolerance of uncertainty and creativity; however, empirical findings remain inconsistent. In Ukrainian psychology, tolerance of uncertainty is more often considered an integrative resource of creative giftedness and adaptation, which highlights the relevance of further empirical research on high school student samples using valid psychodiagnostic instruments. The aim of the article is to conduct a theoretical analysis and present the results of an empirical study of tolerance of uncertainty as a personal resource for the development of creativity and creative giftedness in high school students.

Methodology and Research Methods

The study was conducted within a quantitative empirical framework using a correlational design aimed at identifying relationships between indicators of creativity and tolerance/intolerance of uncertainty as personality characteristics of high school students. The methodological basis of the study was grounded in the cognitive-style approach to personality and psychometric concepts of measuring creative thinking. The sample consisted of 46 students of grades 10–11 from general secondary education institutions in the city of Pereiaslav. The sample included high school students who are at the stage of active formation of cognitive strategies and creative potential.

A set of validated instruments was used to collect empirical data: • *The shortened figural form of the Torrance Tests of Creative Thinking*, which assesses nonverbal creativity through indicators of fluency, flexibility, originality, and elaboration; • *McLain's Tolerance of Ambiguity Scale (MSTAT),* which allows for the assessment of cognitive and behavioral aspects of responding to ambiguous stimuli; • *Budner's Intolerance of Ambiguity Scale*, aimed at determining individuals' attitudes toward novelty, complexity, and insolubility of situations (Karamushka, 2023). The use of multiple instruments ensured a comprehensive assessment of the studied phenomena and increased the reliability of the interpretation of the results. Data processing was carried out using methods of descriptive statistics and nonparametric correlation analysis. Spearman's rank correlation coefficient was applied to determine the relationships between indicators of creativity and tolerance/intolerance of uncertainty, as it is appropriate for small samples and ordinal-scale data.

Results and Discussion

The empirical study was aimed at identifying the peculiarities of creativity development in high school students and determining the role of tolerance of uncertainty as a personal prerequisite for creative thinking. The analysis of creativity indicators based on the shortened figural form of the Torrance Tests of Creative Thinking revealed a heterogeneous structure of the development of creative abilities among the studied high school students. It was found that the group mean values of such indicators as fluency (9.6), flexibility (6.7), and originality (8) fall within normative ranges, whereas the elaboration score (14.9) corresponds to a below-norm level. The obtained results indicate that high school students possess a sufficient potential for idea generation and the ability for productive thinking; however, the insufficient development of elaboration may point to difficulties in detailing, refining, and structurally organizing creative ideas. This structure suggests the predominance of the

divergent aspect of creative thinking – the ability to rapidly generate new ideas – over their further cognitive processing and elaboration.

A level-based analysis of the indicators obtained using the Torrance Tests of Creative Thinking confirmed these tendencies (Table 1). Almost all high school students demonstrated a high level of fluency (productivity), which may be related to age-related characteristics of divergent thinking and high academic activity. At the same time, the indicators of flexibility and originality are predominantly at medium and low levels, while elaboration shows exclusively low representation (100% of the sample). The data presented in T-scores confirm this tendency: the average level of originality (41.9 T-scores) is combined with a reduced level of elaboration (31 T-scores), which may indicate the predominance of spontaneous creative responding over reflective and analytical processing of ideas.

Table nr. 1. Distribution of Creativity Indicator Levels (%) According to the Torrance Test

Creativity Indicators	Indicator Levels		
	Low	Medium	High
Fluency	4,34	0	96,66
Flexibility	37	63	0
Originality	41,3	54,3	4,4
Elaboration	100	0	0

The obtained results suggest that the educational environment under conditions of martial law more often stimulates the speed of task performance and the productivity of thinking than the development of skills related to creative elaboration. Therefore, one of the directions of psychological and pedagogical support for gifted students may involve the purposeful development of the ability to expand, detail, and reflectively analyze creative ideas. Thus, the development of creativity in high school students is characterized by an imbalance between divergent and constructive-organizational components of creative thinking: a high rate of idea generation is combined with insufficient depth of their elaboration.

Further analysis was aimed at determining the role of tolerance of uncertainty in the development of creativity in high school students. To assess the relationship between tolerance/intolerance of uncertainty and creativity, the high school students were divided into three groups (low, medium, and high) according to the level of originality as a key indicator of creativity, which has a relatively high degree of correlation with overall creativity. Subsequently, the mean values of tolerance of uncertainty (TU) were calculated for each subgroup based on the level of originality. The relationship between the mean-level values of originality and the corresponding values of tolerance of uncertainty (TU) is presented in Table 2.

Table nr. 2. Levels of Tolerance of Uncertainty (TU) in Subgroups with Different Levels of Originality

Level of originality	Mean originality score	Mean TU score	TU level
Low	4,65	15,94	Medium
Medium	9,52	16,11	Medium
High	16	29	High

The analysis of the relationship between tolerance of uncertainty and originality revealed a tendency toward their coordinated increase (Figure 1). Specifically, the mean value of tolerance of uncertainty in the subgroup with a low level of originality is 15.94, in the subgroup with a medium level it is 16.11, whereas in the subgroup with a high level of originality this indicator increases to 29 points. Thus, in the subgroup with a high level of originality, the mean value of tolerance of uncertainty significantly exceeds the corresponding values observed in the groups with low and medium levels.

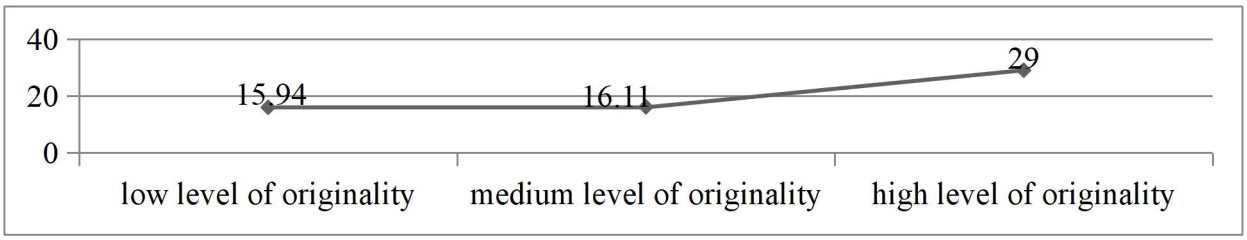

Figure 1. Levels of Tolerance of Uncertainty (TU) in Subgroups with Different Levels of Originality as a Key Indicator of Creativity.

The obtained results suggest that a higher level of tolerance of uncertain situations may act as a psychological prerequisite for the manifestation of originality as a key indicator of creativity.

Such a result is consistent with the conceptual principles of the psychology of creativity regarding the importance of accepting ambiguity and openness to uncertain stimuli as factors that activate divergent thinking. A parallel analysis of intolerance of uncertainty (IU) revealed the opposite dynamic (Figure 2): as originality increases, a gradual decrease in the mean values of IU is observed. This confirms the propositions of contemporary creativity psychology, according to which an excessive orientation toward certainty and structured situations may act as a psychological barrier to creative exploration, limiting variability of thinking and experimentation with alternative solutions.

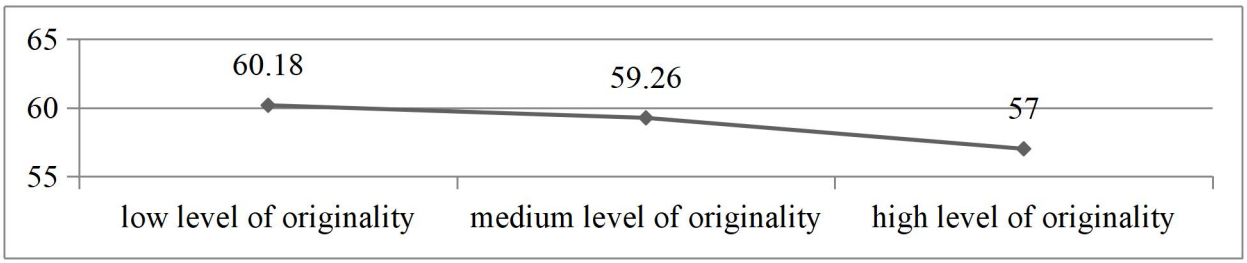

Figure nr. 2. Levels of Intolerance of Uncertainty (IU) in Subgroups with Different Levels of Originality.

At the same time, the results of the correlation analysis using Spearman's coefficient revealed only weak and statistically insignificant relationships: between originality and tolerance of uncertainty r = 0.102 (a positive insignificant relationship), and between originality and intolerance of uncertainty r = –0.05 (a negative insignificant relationship). This finding indicates the complex, multifactorial nature of creativity development, in which tolerance of uncertainty functions not so much as a direct predictor of creativity, but rather as a psychological resource that may mediate its manifestation in combination with other cognitive and personality factors. The lack of statistically significant correlations may also be explained by the limited sample size and the insufficient representation of a high level of creativity among the participants. In addition, under the conditions of the modern educational environment, the creative activity of high school students is often regulated by external requirements, which may reduce the influence of individual psychological characteristics, including tolerance of uncertainty. Thus, the results of the study allow us to conclude that tolerance of uncertainty functions rather as a psychological resource supporting creative thinking than as its direct predictor. Its influence is manifested in a tendency toward increased originality; however, this relationship requires further investigation using larger samples and more advanced statistical analysis.

This conclusion is consistent with contemporary integrative models of creativity, according to which creativity is interpreted as the result of the interaction of intellectual, personal, and sociocultural factors. Accordingly, the development of creativity in school students requires not only the stimulation of acceptance of uncertainty but also the creation of educational conditions that facilitate the transition from idea generation to their systematic elaboration and practical implementation.

Conclusions

The empirical study identified specific features of creativity development in high school students, manifested in the uneven formation of its components. A sufficient level of fluency, flexibility, and originality of creative thinking was found alongside a reduced level of elaboration, indicating the predominance of idea generation processes over their cognitive detailing and structural organization.

A tendency toward a relationship between tolerance of uncertainty and originality as a key indicator of creativity was established: as the level of creative thinking increases, tolerance of uncertain situations also increases, while intolerance of uncertainty decreases. This makes it possible to consider tolerance of uncertainty as a psychological resource supporting the creative activity of high school students.

The results of the correlation analysis revealed weak and statistically insignificant relationships between indicators of creativity and tolerance/intolerance of uncertainty, indicating the multifactorial nature of the development of creative abilities. Tolerance of uncertainty functions not as a direct predictor, but as one of the personal prerequisites for the manifestation of creativity. The practical significance of the study lies in the possibility of using the obtained results for the development of psychological and pedagogical programs aimed at enhancing students' creativity, particularly through fostering openness to novelty, cognitive flexibility, and the ability to refine creative ideas. Prospects for further research are associated with expanding the sample size, deepening statistical analysis, and examining the role of the educational environment in shaping tolerance of uncertainty as a resource for the development of creative giftedness.

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Produsele științifice ale cercetării academice. Constante epistemologice în era inteligenței artificiale

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Rezumat

Științele moderne au trecut prin numeroase „revoluții structurale" (ultima dintre ele, reprezentată de impactul inteligenței artificiale, aflându-se abia la început), pe parcursul celor două secole și jumătate de existență, dar au păstrat în mare parte neschimbată modalitatea de comunicare publică a rezultatelor lor: *articolul*, *rezumatul* și *comunicarea*. Elementele acestui *triptic* au multiple similitudini tematice, de limbaj și de strategie comunicațională, la care se adaugă exigențele comune în materie de deontologie. Înțelegerea specificului și conexiunilor acestor „constante epistemologice" reprezintă condiția *sine qua non* a inițierii oricărui demers onest de cercetare științifică, fie ea fundamentală, fie aplicativă, fie tradițională, fie agrementată cu instrumente și resurse din sfera IA.

Cuvinte cheie: articol, cercetare, comunicare, rezumat.

Abstract

Modern sciences have gone through numerous „structural revolutions" (the last of which, represented by the impact of artificial intelligence, is still in its infancy) during the two and a half centuries of existence, but