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Research Paper

Creativity Outcomes Among Adolescents Across Psycho-Physiological States Using the Divergent Production Abilities (DPA) Test

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ABSTRACT

Creativity is an essential cognitive ability during adolescence, supporting problem-solving, academic development, and emotional regulation. The present study examines variations in creativity across psycho-physiological states, gender, and area of residence among adolescents. A total of 400 adolescents aged 13–19 years from Maharashtra were selected using a simple random sampling technique and equally distributed across psycho-physiological state (normal/neurotic), gender (male/female), and area (urban/rural). Creativity was assessed using the Divergent Production Abilities (DPA) Test developed by K. N. Sharma, which measures multiple dimensions of divergent thinking. The results indicated that adolescents with a normal psycho-physiological state demonstrated significantly higher creativity scores (M = 202.25) compared to those with neurotic tendencies (M = 157.75). Urban adolescents showed higher creativity (M = 188.25) than rural adolescents (M = 171.25), while gender differences were not significant. A three-way factorial ANOVA revealed significant main effects of psycho-physiological state and area of residence, whereas gender and interaction effects were non-significant. The study concludes that psycho-physiological stability plays a critical role in enhancing creativity among adolescents and highlights the importance of integrating mental health support within educational settings.

Keywords: *Creativity, Divergent thinking, Adolescents, Psycho-physiological state, DPA test*

Creativity is a central cognitive resource that enables individuals to generate novel, flexible, and meaningful responses to complex situations. During adolescence, creativity becomes particularly important as this developmental stage is marked by rapid biological maturation, emotional reorganization, and cognitive expansion. Adolescents must adapt to increasing academic demands, social expectations, and identity formation, all of which require higher-order thinking skills. Divergent thinking, defined as the ability to produce multiple and varied ideas in response to open-ended problems, is widely recognized as the core cognitive process underlying creativity (Rawlings *et al.,* 2025; Hainselin *et al.,* 2018). Creativity is influenced by an individual's psycho-physiological state, which represents the interaction between psychological processes and physiological regulation. A balanced psycho-physiological state supports attentional control, emotional stability, and

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cognitive flexibility, all of which are essential for creative ideation (Garau *et al.,* 2025; Zabelina and Ganis, 2018). In contrast, neurotic states characterized by stress, anxiety, and emotional dysregulation may hinder cognitive processing and limit divergent thinking abilities (Vásquez-Rosati *et al.,* 2019). Adolescents experiencing such conditions may struggle to sustain attention, form associations, and generate original ideas.

Previous research indicates that psycho-physiological health plays a crucial role in adolescent well-being, academic engagement, and emotional regulation. Studies have consistently shown that adolescents with stable psycho-physiological functioning demonstrate better cognitive and emotional outcomes than those with neurotic tendencies (Oropesa Ruiz *et al.,* 2022; Metts *et al.,* 2021). However, limited research has specifically examined its influence on creativity, particularly within the Indian adolescent context.

Environmental factors also contribute to creative development. Urban adolescents are often exposed to diverse educational resources and cultural experiences, which may enhance creative thinking. In contrast, rural adolescents may have limited access to such opportunities, potentially affecting creativity outcomes (Das and Hazarika, 2020). Gender differences in creativity have been explored, although recent findings suggest that overall creative potential is comparable between males and females (He and Wong, 2021). The Divergent Production Abilities (DPA) Test developed by K. N. Sharma provides a comprehensive assessment of creativity across multiple dimensions, including ideational fluency, associational fluency, expressional fluency, flexibility, originality, and semantic ability (Sandhiya and Bhuvaneshwari, 2023). This tool is particularly suitable for assessing creativity among Indian adolescents.

In this context, the present study aims to examine creativity outcomes among adolescents across psycho-physiological states, while also considering gender and area of residence. By adopting a factorial analytical approach, the study seeks to contribute empirical evidence on the role of psycho-physiological stability in shaping creativity during adolescence and to provide insights for educational and mental health interventions.

METHODOLOGY

Research Design

The present study adopted a quantitative, cross-sectional research design to examine creativity outcomes among adolescents across different psycho-physiological states (Sandhiya & Bhuvaneshwari, 2023; Oropesa Ruiz et al., 2022). A 2 × 2 × 2 factorial design was employed, with psycho-physiological state (normal and neurotic), gender (male and female), and area of residence (urban and rural) treated as independent variables (Das & Hazarika, 2020). The dependent variable was creativity, operationalized through total and dimensional scores obtained from the Divergent Production Abilities (DPA) Test, enabling analysis of both main and interaction effects.

Sample and Study Area:

The sample consisted of 400 adolescents aged 13–19 years, selected from secondary and higher secondary educational institutions in Maharashtra, India, using a simple random sampling technique. The study area was divided into urban and rural regions for comparative analysis. Adolescents from Pune city were considered as the urban sample, while those from Ahmednagar district were considered as the rural sample, representing contrasting socio-environmental contexts within the same state. The sample was equally distributed across

psycho-physiological state, gender, and area of residence to maintain balance across all factorial groups. Of the total sample, 200 adolescents were classified under the normal psycho-physiological state and 200 under the neurotic psycho-physiological state. Each category included equal numbers of male and female participants, with 50 adolescents in each subgroup.

Classification of Psycho-Physiological State:

Adolescents were categorized into normal and neurotic psycho-physiological states based on established psychological screening indicators commonly used in adolescent mental health research (Oropesa Ruiz et al., 2022). Psycho-physiological state refers to the integrated functioning of psychological processes and physiological regulation, including emotional stability, stress response, and cognitive control (Garau et al., 2025). Previous studies indicate that adolescents with neurotic tendencies exhibit higher emotional reactivity and cognitive interference, which may affect creative performance (Zabelina & Ganis, 2018; Vásquez-Rosati et al., 2019).

Tool Used:

Creativity was assessed using the Divergent Production Abilities (DPA) Test developed by K. N. Sharma (Sandhiya and Bhuvaneshwari, 2023; Narayanappa, 2020). The DPA Test is a standardized psychological instrument designed to measure divergent thinking across six dimensions: ideational fluency, associational fluency, expressional fluency, spontaneous flexibility, originality, and semantic ability (Sharma and Yadav, 2025). The test has demonstrated satisfactory reliability and construct validity for Indian adolescent populations.

Procedure:

After obtaining necessary institutional permissions, participants were informed about the purpose of the study and assured of confidentiality. The DPA Test was administered in group settings under standardized conditions. Clear instructions were provided, and adequate time was allotted for completion. Responses were scored according to the standardized guidelines provided in the test manual. Data were collected from participants and analyzed using appropriate statistical techniques to examine the study variables.

Statistical Analysis:

Data were analyzed using both descriptive and inferential statistical techniques. Means and standard deviations were computed to summarize creativity scores across different groups. A three-way factorial analysis of variance (ANOVA) was conducted to examine the main effects of psycho-physiological state, gender, and area of residence, as well as their interaction effects on creativity. The level of significance was set at $p < .05$ (Nare, 2018). Although post-hoc analysis using Duncan's Multiple Range Test (DMRT) was considered, it was not applied because each independent variable consisted of only two levels, for which factorial ANOVA provides sufficient interpretation (Field, 2024).

RESULTS

The results are presented in accordance with the objectives of the study, highlighting differences in creativity outcomes among adolescents across psycho-physiological states, gender, and area of residence. Descriptive statistics were computed initially, followed by factorial analysis of variance to examine the statistical significance of observed differences.

Descriptive Statistics of Creativity Scores:

Table 1 presents the mean scores of creativity dimensions among adolescents with a normal psycho-physiological state. Overall, urban adolescents scored higher than rural adolescents, with urban males showing the highest creativity levels.

Table 1: Mean Scores for DPA Dimensions Normal Psycho-Physiological State (Urban & Rural — Male and Female)

Group	Ideational Fluency	Associational Fluency	Expressional Fluency	Spontaneous Flexibility	Originality	Semantic Ability	Total Creativity (Mean)
Urban Male (n = 50)	38	36	34	35	32	37	212
Urban Female (n = 50)	36	34	33	34	35	36	208
Rural Male (n = 50)	34	33	32	33	30	34	196
Rural Female (n = 50)	33	31	31	32	33	33	193

Table 2: presents the mean scores for adolescents with a neurotic psycho-physiological state. Overall creativity scores were substantially lower in this group compared to adolescents with normal psycho-physiological functioning. Although urban neurotic adolescents scored higher than rural neurotic adolescents, both groups exhibited reduced performance across all six DPA dimensions. Urban males recorded a mean total creativity score of 169, while rural females obtained the lowest creativity score (M = 147), reflecting the combined influence of psycho-physiological vulnerability and environmental context.

Table 2: Mean Scores for DPA Dimensions Neurotic Psycho-Physiological State (Urban & Rural — Male & Female)

Group	Ideational Fluency	Associational Fluency	Expressional Fluency	Spontaneous Flexibility	Originality	Semantic Ability	Total Creativity (Mean)
Urban Male (n = 50)	30	29	27	28	26	29	169
Urban Female (n = 50)	29	28	26	27	28	28	166
Rural Male (n = 50)	27	25	24	25	22	26	149

Rural Female (n = 50)	26	24	23	24	25	25	147

Overall Group Comparison:

Table 3 summarizes the overall mean creativity scores across psycho-physiological states. Adolescents with a normal psycho-physiological state obtained a considerably higher mean creativity score (M = 202.25) compared to adolescents with a neurotic psycho-physiological state (M = 157.75). The standard deviation values indicate moderate variability in creativity scores within each group.

Table 3. Overall Creativity Scores by Psycho-Physiological State

Variable	Normal State (n=200)	Neurotic State (n=200)
Total Creativity Mean	202.25	157.75
Standard Deviation (approx.)	18.2	16.7

Factorial Means across Area and Gender:

Factorial mean scores presented in Table 4 show that urban adolescents from Pune consistently outperformed rural adolescents from Ahmednagar across both psycho-physiological states. Gender-wise differences were minimal across both normal and neurotic groups, suggesting comparable creative potential among male and female adolescents.

Table 4. Factorial Mean Creativity Scores (2 × 2 × 2 Designs)

Psycho-Physiological State	Urban	Rural	Male	Female
Normal	210	194.5	204	200
Neurotic	167.5	148	159	162

Inferential Statistical Analysis:

A three-way factorial ANOVA was conducted to examine the effects of psycho-physiological state, gender, and area of residence on creativity scores. The results (Table 5) revealed a highly significant main effect of psycho-physiological state, indicating that adolescents with a normal psycho-physiological state demonstrated significantly higher creativity than those with neurotic tendencies. The main effect of area was also statistically significant, showing higher creativity scores among urban adolescents compared to rural adolescents. In contrast, the main effect of gender was not statistically significant. None of the two-way or three-way interaction effects were significant, indicating that psycho-physiological state independently influences creativity outcomes irrespective of gender or area.

Table 5. Three-Way Factorial ANOVA for Creativity Scores:

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F	p
Psycho-Physiological State	118,112.00	1	118,112.00	162.45	< .001
Area (Pune vs. Ahmednagar)	8,960.50	1	8,960.50	12.32	< .01
Gender	512.40	1	512.40	0.71	.398
State × Area	1,224.10	1	1,224.10	1.68	.195
State × Gender	684.50	1	684.50	0.94	.333

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F	p
Area × Gender	452.00	1	452.00	0.62	.431
State × Area × Gender	316.80	1	316.80	0.44	.506
Error	285,048.00	392	727.69	—	—
Total	562,960.30	399	—	—	—

Note: *Creativity score represents the total DPA score across six divergent thinking dimensions. Significance evaluated at α = .05*

As shown in Table 5, psycho-physiological state exerted a highly significant main effect on creativity, $F(1, 392) = 162.45$, $p < .001$, indicating substantially higher creativity among adolescents with a normal psycho-physiological state compared to those with neurotic tendencies. This result confirms psycho-physiological stability as a primary determinant of divergent thinking ability during adolescence.

The main effect of area of residence was also statistically significant, $F(1, 392) = 12.32$, $p < .01$, demonstrating that urban adolescents from Pune obtained significantly higher creativity scores than rural adolescents from Ahmednagar. This finding highlights the contribution of environmental and contextual factors to creative performance.

In contrast, the main effect of gender was not statistically significant, $F(1, 392) = 0.71$, $p = .398$, suggesting that male and female adolescents did not differ significantly in overall creativity scores.

Furthermore, none of the two-way interaction effects (psycho-physiological state × area, psycho-physiological state × gender, area × gender) nor the three-way interaction effect reached statistical significance (all $p > .05$). The absence of significant interaction effects indicates that the influence of psycho-physiological state on creativity operates independently of gender and area of residence.

Graphical Representation of Results:

Figure 1. visually illustrates creativity differences across psycho-physiological states for urban (Pune) and rural (Ahmednagar) adolescents. The graph clearly shows that adolescents in the normal psycho-physiological state obtained higher creativity scores than those in the neurotic state across both areas. Urban adolescents consistently demonstrated higher creativity scores than rural adolescents under both psycho-physiological conditions. The parallel pattern of the bars supports the absence of interaction effects observed in the ANOVA and reinforces psycho-physiological state as the primary determinant of creativity.

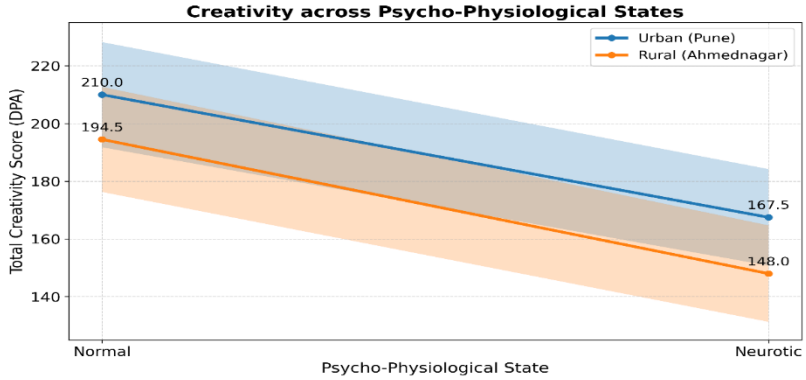

Figure 1. Creativity Differences across Psycho-Physiological States among Adolescents

DISCUSSION

The present study examined creativity outcomes among adolescents across psycho-physiological states, gender, and area of residence using the Divergent Production Abilities (DPA) Test. The findings clearly indicate that psycho-physiological functioning plays a central role in shaping divergent thinking during adolescence, while contextual factors such as area of residence exert a secondary influence.

Psycho-Physiological State and Creativity:

The most significant finding of the study is the strong effect of psycho-physiological state on creativity. Adolescents with a normal psycho-physiological state consistently demonstrated higher creativity scores across all six dimensions of the DPA Test compared to those with neurotic tendencies (Oropesa Ruiz et al., 2022). This finding aligns with psychological theories suggesting that emotional stability, cognitive flexibility, and effective self-regulation are essential for divergent thinking processes (Garau et al., 2025; Zabelina & Ganis, 2018). Neurotic tendencies are often associated with heightened anxiety, reduced attentional control, and cognitive rigidity, which may restrict the generation of original and flexible ideas. The present findings therefore reinforce the view that optimal psycho-physiological functioning provides a supportive internal environment for creative cognition during adolescence.

Influence of Area of Residence:

A significant effect of area of residence was observed, with urban adolescents from Pune demonstrating higher creativity scores than rural adolescents from Ahmednagar. This suggests that urban environments may offer richer cognitive and cultural stimulation that supports divergent thinking (Das & Hazarika, 2020; Narayanappa, 2020). Urban settings typically provide greater access to educational resources, diverse social interactions, and intellectually stimulating experiences, all of which contribute to enhanced creativity. However, the consistent decline in creativity across psycho-physiological states in both urban and rural groups indicates that environmental advantages alone cannot compensate for psycho-physiological instability.

Gender Differences in Creativity:

The absence of significant gender differences in creativity scores supports contemporary research indicating that creative potential is largely comparable between male and female adolescents, with only domain- or dimension-specific variations rather than global gaps (He and Wong, 2021; Kaufman, 2006). These finding challenges traditional gender stereotypes related to creativity and underscores the importance of psychological and contextual factors over biological sex in creative performance.

Absence of Interaction Effects:

The lack of significant interaction effects among psycho-physiological state, gender, and area indicates that psycho-physiological state independently predicts creativity outcomes. This suggests that emotional and psychological stability exerts a robust influence on divergent thinking regardless of demographic background, a pattern also reflected in the parallel trends observed in Figure 1.

Educational and Psychological Implications:

The findings highlight the importance of integrating mental health support within educational settings. Interventions aimed at stress reduction, emotional regulation, and

psychological well-being may indirectly enhance creativity by improving psycho-physiological stability. Such approaches may be particularly beneficial during adolescence, a developmental period marked by heightened emotional and cognitive sensitivity.

CONCLUSION

The present study examined creativity among adolescents across psycho-physiological states, gender, and area of residence using the Divergent Production Abilities (DPA) Test. The findings clearly demonstrate that psycho-physiological state is the most influential factor in adolescent creativity, with adolescents exhibiting normal psycho-physiological functioning showing significantly higher divergent thinking abilities than those with neurotic tendencies.

The study also highlights the role of environmental context, as urban adolescents from Pune outperformed rural adolescents from Ahmednagar, suggesting that access to enriched educational and social environments may support creative development. In contrast, gender did not emerge as a significant determinant of creativity, indicating comparable creative potential among male and female adolescents. The absence of interaction effects further suggests that psycho-physiological state independently influences creativity regardless of gender or area of residence.

Overall, the findings emphasize the importance of psycho-physiological stability for fostering creativity during adolescence. Educational and psychological interventions that promote emotional well-being, stress regulation, and mental health support may therefore play a crucial role in nurturing creative capacities among adolescents across diverse contexts**.**

REFERENCES

Das, M., & Hazarika, M. Disparity in Creative Abilities Among Rural and Urban Secondary School Students in Dibrugarh District of Assam.

Field, A. (2024). *Discovering statistics using IBM SPSS statistics*. Sage publications limited.

Garau, F., Antonietti, A., Bonfiglio, N. S., Madeddu, B., Crepaldi, M., Giannì, J., ... & Penna, M. P. (2025). The Role of Well-Being, Divergent Thinking, and Cognitive Reserve in Different Socio-Cultural Contexts. *Brain Sciences*, *15*(3), 249.

Hainselin, M., Aubry, A., & Bourdin, B. (2018). Improving teenagers' divergent thinking with improvisational theater. *Frontiers in Psychology*, *9*, 1759.

He, W. J., & Wong, W. C. (2021). Gender differences in the distribution of creativity scores: Domain-specific patterns in divergent thinking and creative problem solving. *Frontiers in Psychology*, *12*, 626911.

Kaufman, J. C. (2006). Self-reported differences in creativity by ethnicity and gender. *Applied Cognitive Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition*, *20*(8), 1065-1082.

Metts, A., Yarrington, J., Enders, C., Hammen, C., Mineka, S., Zinbarg, R., & Craske, M. G. (2021). Reciprocal effects of neuroticism and life stress in adolescence. *Journal of affective disorders*, *281*, 247-255.

Narayanappa, V. (2020). A study of the divergent production ability of the secondary school students in relation to their academic achievement and socio-economic status. *International Journal of Indian Psychology*, *8*(4).

Oropesa Ruiz, N. F., Mercader Rubio, I., Gutiérrez Ángel, N., & Pérez García, M. A. (2022). Neuroticism and emotional intelligence in adolescence: a mediation model moderate by negative affect and self-esteem. *Behavioral Sciences*, *12*(7), 241.

Rawlings, B. S., Chetwynd-Talbot, D., Husband, E., Nuttall, A., Quinn, E., Taggart, R., & Roome, H. E. (2025). Divergent thinking is linked with convergent thinking; implications for models of creativity. *Thinking & Reasoning*, 1-23.

Runco, M. A., & Acar, S. (2012). Divergent thinking as an indicator of creative potential. *Creativity research journal*, *24*(1), 66-75.

Sandhiya, V., & Bhuvaneswari, M. (2023). Influence of psychological variables on divergent thinking in adolescents: A cross-sectional study. *Int. J. Innov. Res. Sci. Stud*, *6*, 1006-1014.

Sharma, N., & Yadav, R. (2025). Student-Centered Learning: Impact of New Education Reforms on student Well Being and Mental Health. *Nep 2020: A Ner Era In Education: Educational English Book*, 73.

Vásquez-Rosati, A., Montefusco-Siegmund, R., López, V., & Cosmelli, D. (2019). Emotional influences on cognitive flexibility depend on individual differences: A combined micro-phenomenological and psychophysiological study. *Frontiers in Psychology*, *10*, 1138.

Zabelina, D. L., & Ganis, G. (2018). Creativity and cognitive control: Behavioral and ERP evidence that divergent thinking, but not real-life creative achievement, relates to better cognitive control. *Neuropsychologia*, *118*, 20-28.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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