

# Impact of Personality and Parenting Style on Divergent Thinking among Middle School Students

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## Abstract

In recent years, there has been a significant focus in psychology research on exploring creativity and divergent thinking (DT) among college students. However, limited empirical research exists on the relationship between parenting style, personality traits, and divergent thinking among middle school students. This research aims to address this gap by investigating how parenting style and personality influence adolescents' divergent thinking (DT), particularly among those attending different types of schools. The study involved 116 participants, comprising 53.4% males and 46.6% females. These participants were 7<sup>th</sup> and 8<sup>th</sup> grade students aged 12 and 13 from different schools, including the Central Board of Secondary Education (CBSE), government schools, and matriculation schools from Tamil Nadu, India. The research used a descriptive cross-sectional study with a simple random sampling technique, and the data was collected by standardized psychometric questionnaires such as Sharma's Divergent Production Abilities Test, Standard Progressive Matrices, the Big Five Personality Inventory, and the Perceived Parenting Style Scale. The findings indicate that there is a significant connection between parenting style and personality. In addition, students from CBSE schools achieved higher scores in DT compared to students from matriculation and government schools. Ultimately, educational institutions have the opportunity to cultivate their students' personal and professional development by promoting DT in classroom settings. However, this study has revealed complex findings that require thorough examination.

**Keywords:** Adolescents, Divergent thinking, Parenting style, Personality, Schools.

## Introduction

The ability to engage in divergent thinking (DT) is crucial in our rapidly changing society. It enables individuals to break free from conventional thoughts, explore alternative perspectives, and generate innovative solutions for current challenges. DT is widely recognized as a fundamental element of fostering creativity, as it is frequently referenced in the field of creativity research. Research by Runco demonstrates the common use of DT tests to assess creativity. Studies have highlighted the fact that DT is a core component of creativity. It entails assessing an individual's creative potential and forecasting their creative accomplishments (1). By encouraging a DT that embraces different perspectives, individuals can cultivate fresh and unique ideas that have the potential to drive progress and change across various fields. DT is a valuable skill that can assist students in navigating complex problems and adapting to challenges (2). To achieve success and fulfilment in personal and professional pursuits, students must have

unwavering confidence in their creative potential (3). A wide range of factors, including internal and external influences, shape DT. Family factors have a significant impact on student DT development (4). Research has shown that family factors, particularly parenting style, play a crucial role in shaping a child's creativity. Researchers have conducted extensive research and validated this relationship, highlighting its significance in influencing a child's creative potential and future pursuits (3, 5–8). Previous researchers have primarily concentrated on highly creative or talented individuals rather than the general population in their studies (5, 9). And mostly, researchers examined both stable and changing factors, including socioeconomic status, cultural diversity, demographics (9–11), and personal characteristics like problem-solving skills, academic achievement, memory, and intelligence quotient (IQ) (12, 13). Nevertheless, recent research has shifted towards analysing divergent thinking (DT) in normal school and college

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students (14–16). Additionally, researchers revealed that children consistently demonstrate high levels of DT in their early years but show a decline once they enter formal education at around 11 years old (8, 17–19). As a result, it is critical to thoroughly examine the influence of various educational institutions on DT growth among adolescents. As a result, this study aims to investigate the impact of various types of schools, parenting styles, and personality traits on students' DT development. Developing a profound comprehension of this correlation can provide invaluable insights for educators, psychologists, and policymakers who are eager to tap into the creative potential of students.

### **Parenting style and Divergent Thinking**

Parents can shape their children's creativity through various means, including engaging with them, being actively involved in their lives, and providing a supportive family environment. The way parents interact with their children directly influences how they develop and express their creative abilities. While we often emphasize parental involvement in academic achievement, we often overlook their influence on their children's creative thinking abilities. This gap in research highlights the need for further exploration into the role of parents in fostering creativity in adolescence (20). Research has consistently shown that responsive parenting styles, such as permissive and authoritative, have a positive impact on children's creativity. Conversely, low-responsiveness in parenting, such as authoritarian and uninvolved styles, is associated with lower levels of creativity in children (21, 22). Considering the significant influence of familial circumstances on creativity, it is crucial to emphasize the importance of parents' approach, especially during their adolescence stage. This highlights the longstanding research focus on exploring the connection between creativity and parenting methods rather than DT (23). DT is defined as “a significant basis of creative thinking and creative production” (24). It is a cognitive strategy that generates creative ideas by exploring multiple possible solutions. It typically occurs spontaneously and freely, in a non-linear manner, leading to the creation of several ideas in an emergent cognitive structure (1). Multiple alternatives are promptly explored, resulting in unexpected connections. It can be cultivated

through evaluation and instruction (25). Most studies have established a correlation between parenting styles and creativity or personality. However, only a small number of studies have investigated the influence of parenting approaches on middle school students' DT and personality. This study aims to find out the influence of parenting style on students' innovative thinking.

### **Parenting Style and Dimension**

Parenting styles have become a focal point within the realm of developmental psychology due to their growing importance and impact on child development (26). Parenting style is a consistent and enduring collection of attitudes that a parent holds towards their child. It is defined as “constellations of attitudes towards the child that are communicated to the child and that, taken together, create an emotional climate in which the parent's behaviours are expressed” (3). Baumrind categorized the concept of parenting styles, according to the level of parental responsiveness and demands placed on children. These styles include authoritative, characterized by high demands but minimal support; authoritarian, known for significant demands and strong support; and permissive, where there is minimal demand but high levels of support. Later on, an additional parenting style called uninvolved was identified, characterised by minimal demands and inadequate support. These distinct parenting styles play a crucial role in shaping a child's development and behaviour (27, 28). Authoritative parenting places a high value on enforcing rules and emphasizing discipline over nurturing their children's emotions. This parenting style is characterized by setting clear expectations and holding children accountable for their actions, while also showing less sensitivity towards their emotional needs (29, 30). Authoritarian parenting involves a child striving to act autonomously and competently. When parents exhibit authoritative parental behaviour, they support and give guidance to their children, as well as encourage their autonomy (31). This parenting approach facilitates the acquisition of crucial life skills and problem-solving capabilities in children. Authoritative parents promote self-reliance and competence, enabling their children to assume accountability for their behaviour and make well-informed choices (27, 32). Permissive parents prioritise their children's happiness and refrain

from establishing explicit boundaries or expectations. They frequently encounter difficulties in enforcing discipline with their children and may not consistently offer direction (33, 34). Neglectful parenting, also referred to as uninvolved parenting, is characterised by a lack of concern for a child's needs. These parents have low expectations for their children and often show indifference, dismissiveness, or neglect. These youngsters lack sufficient parental guidance, discipline, and nurturing. Often, parents allow their children to advocate for themselves and make independent decisions (27).

### **Personality and Parenting Style and DT**

Personality and DT are critical for identifying an individual's uniqueness and distinctiveness. Personality shapes our thoughts, feelings, and behaviours, whereas DT helps us understand how different personality traits relate to DT, which can help individuals and organisations better leverage their strengths and weaknesses in the creative problem-solving process. Recognising both helps we appreciate the diverse perspectives and contributions of each person (35). Research on personality and creativity repeatedly indicates strong connections with extraversion and openness to experience, in addition to some negative relationships with neuroticism (35–38). Researchers typically assert that DT primarily correlates with openness to experience personality dimensions (39). This research aims to explore the impact of personality traits on DT in middle school students. By examining how different dimensions of personality may affect DT processes, this study seeks to contribute to a better understanding of the factors influencing DT in this age group of students.

Parental support is an essential component in children's personality development (40). However, various parental styles may have a negligible or positive impact on the personality of their children (41). Parenting styles impact the development of children, and younger people are associated with many aspects of their emotional, cognitive, and social abilities. According to the American Psychological Association, personality is defined as "Personality refers to the enduring characteristics and behaviours that comprise a person's unique adjustment to life, including major traits, interests, drives, values, self-concept,

abilities, and emotional patterns". The construction and evolution of personality have been the subject of several theories, each of which asserts that an individual's personality plays a role in shaping their conduct. The personality dimension is categorised as extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience (42). Extraversion refers to engagement in social interactions, the ability to experience happiness, the degree of activity, and the tendency to seek stimulation. Conscientiousness refers to the level of organization, responsibility, and self-discipline an individual possesses. Agreeableness relates to a person's ability to cooperate, empathize, and maintain harmonious relationships with others. Neuroticism is characterized as emotional fluctuation, anger, worry, self-doubt, sadness, and other negative emotions. Lastly, openness to experience refers to an individual's preparedness to accept new experiences, concepts, and viewpoints. These five dimensions provide a comprehensive framework for understanding and evaluating an individual's unique personality traits (42). Previous research indicates that extraversion and agreeableness are linked to high support and high demand parenting styles, conscientiousness to high support and low control, and neuroticism to persons' parents being less adept at exercising authoritarian parenting (29).

More research has focused on young children than middle school students. It is crucial to focus on school students, as this is when social behaviours tend to emerge. Furthermore, research has demonstrated that parents continue to be significant influencers in shaping behaviour, such as through their approach to parenting. Therefore, this research aims to evaluate the connection between parenting style, personality, and various types of schools in DT.

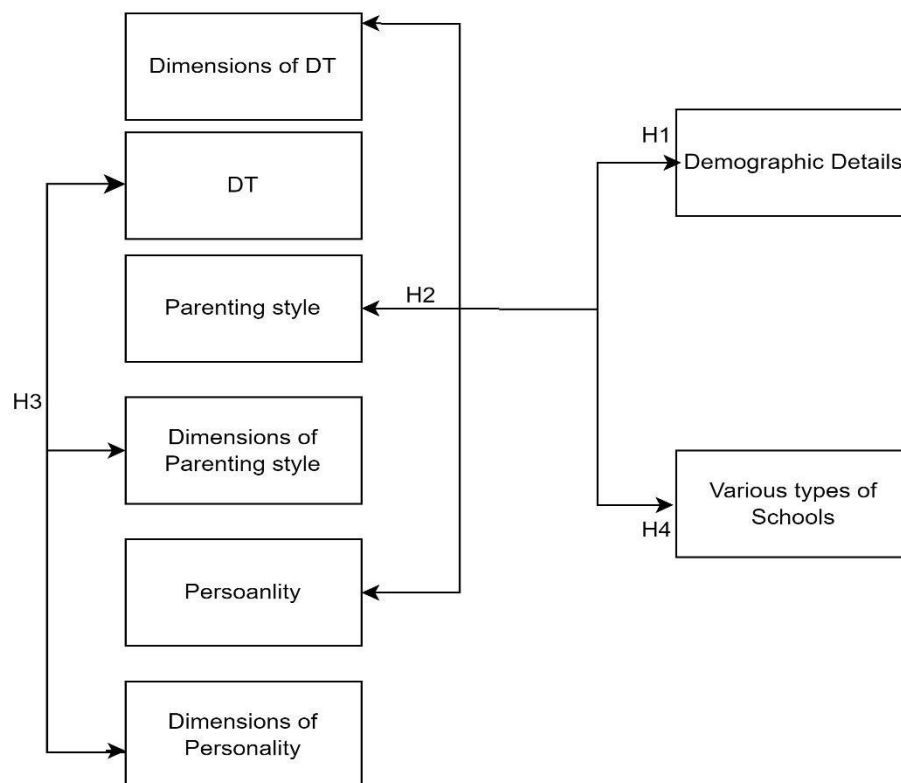
Based on the previous literature we framed following hypothesis (H),

H1: Demographic factors will have a significant impact on the study variables

H2: Parenting style and personality will have a positive relationship with DT

H3: Parenting style and personality interdimensional will have a relationship with DT dimensions

H4: Various types of school will have a significant effect on the study variables



**Figure 1:** Illustration of Research Model

## Methodology

The study adopted a descriptive research design with cross-sectional study with a simple random sampling approach. Data was gathered from 6 schools in the Tirupur district using a computerized random number generator. The selection of students from each school was done through a lottery method without replacement, and the students in each class were chosen based on their average class size. The study involved 116 participants, with 53.4% boys and 46.6% girls in the 7<sup>th</sup> and 8<sup>th</sup> grade, aged between 12 and 13 years. The adolescent stage is a critical period of development and growth, during which young individuals shape their creative identities through social, emotional, and interpersonal experiences. The education system especially for middle school students plays a vital role in fostering cognitive development among students, which can have a lasting impact on their future creative abilities (43). Piaget's developmental theory emphasizes the importance of this transitional phase, as it opens up opportunities for creative thinking and abstract reasoning around the age of 12. This study specifically focuses on this population to better understand and support their creative growth (44). Participants were from various schools,

including 47 students from government, 31 students from matriculation and 38 students from Central Board of Secondary Education (CBSE) in Tamil Nadu, India. In terms of birth order, 47.4% were from the first and second born, 4.3% were from the third born, and 0.9% were from the fourth-born students. The study revealed that 80.2% of students come from middle-class backgrounds. Furthermore, 13.8% of students are from low-income economic backgrounds, and 6% are from high-income economic backgrounds. In terms of residential areas, 48.3% of the students resided in suburban areas, followed by 30.2% in urban areas and 21.6% in rural areas. The information gathered was systematically coded and analysed using inferential and descriptive statistical techniques such as mean, standard deviation, t-test, f-test, and correlation in Excel, Jamovi, and Statistical Package for Social Sciences-26.

## Procedure

The study has been approved by the institutional ethical board for studies involving human subjects as it includes human participation, especially among minors. Following the ethical clearance, the researcher also obtained the required permission from the governmental educational authority and

the concerned school management to collect data from the students. The researcher began the data collection process by visiting the students and teachers in the school and explaining in detail about the study, its aim and objective, its benefits and perks, and the withdrawal rights. The researcher also ensured the participants that the study did not involve any monetary benefits and was purely voluntary in nature. They could withdraw from the study at any time if they notified the researcher. After which, the parental consent of the sample and individual assent was acquired, ensuring their willingness to participate in the study. Later, the researcher briefed the samples about the questionnaire's process and provided them with ample time to comprehend and complete it. The researcher administered the questionnaire in the local language to the respondents to enhance their understanding and gain an effective answer to the questions.

### Questionnaires

The Sharma's Divergent Production Abilities Test (DPA) (45) was used to evaluate the level of divergent thinking (DT) among 12–14-year-old students. This examination measures divergent thinking (DT) by assessing the individual's ability in fluency, flexibility, originality, and elaboration. The framework consisted of six separate components: word production ( $\alpha=0.67$ ), uses of things ( $\alpha=0.80$ ), similarities ( $\alpha=0.68$ ), sentence construction ( $\alpha=0.84$ ), titles ( $\alpha=0.85$ ), and solutions/completion ( $\alpha=0.82$ ). The assessment evaluates the individual's fluency, flexibility, and originality. The manual description contained detailed instructions for each scoring procedure. The instructions were followed accordingly during the scoring process. The assessment of originality is based on the production of unconventional ideas in the 'If' answer. Responses falling within the 1% range receive 5 marks, whereas those falling within the 2% range receive 3 marks. Responses that fall within a range of 3% are given a score of 2, whereas those that fall within a range of 4% are given a score of 1. Finally, any responses falling under the 5% range are assigned a score of zero. The assessment of elaboration was performed by evaluated through the detailed responses provided. At the end, the individual outcomes are summed up to calculate the composite score for all students. 1. Write as many as possible words starting with 'S', 2. Uses of brick, 3. What should a

person do if a robbery takes place in his house? Each subcategory within the division was evaluated individually. The assessment consisted of 6 parts. Part 1 was 'writing words' which included 5 subtests with the total of 25 marks with each subset having a total of 5 marks. Part 2 of the questionnaire consisted of 'writing uses' with five subtests and the total possible score was 25. Part 3 focused on 'writing meanings or relationships' with six subtests the maximum possible score was 30. Part 4 evaluated 'sentence construction' with five subtests, each correct answer was awarded one mark and maximum the potential score attained was 20. In Part 5, participants wrote the 'story's title' across three subtests, with a maximum score of 15. Part 6 had three subtests namely 'solution writing and story completion'. Each solution was allocated one mark while five marks was awarded for each subtest completed.

The Big Five Personality Inventory (BFI) (46) was the tool used to assess the individual's personality traits. It consisted of 44-items that measured the levels of extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Each item was rated on a 5-point scale from strongly disagree to strongly agree. This inventory provided specific scores for each factor, some of which were reverse-scored. The overall scores ranged from 44 to 220. Extraversion include items such as 1, 6R, 11, 16, 21R, 26, 31R, and 36. Agreeableness: 2R, 7, 12R, 17, 22, 27R, 32, 37R, 42. Conscientiousness: 3, 8R, 13, 18R, 23R, 28, 33, 38, 43R. Neuroticism: 4, 9R, 14, 19, 24R, 29, 34R, 39. Openness: 5, 10, 15, 20, 25, 30, 35R, 40, 41R, 44. ("R" denotes reverse-scored items: 5, 4, 3, 2, 1). Overall, the composite measured the individual's personality trait. The reliability coefficients for each dimension were 0.86, 0.76, 0.92, 0.97, and 0.87 respectively.

The perceived parenting style questionnaire (47) helps to assess adolescents' opinions on parenting styles. This questionnaire assesses three different styles of parenting: authoritarian, democratic/authoritative, and laissez-faire/permissive. It contained of 42 statements and assessed using 5-point scale from 'always to never' (1–5). "1. My parents ignore my queries; 2. My parents give me pocket money for my needs; 3. My parents give me timely advice". The overall score ranges from 42 to 210. This questionnaire doesn't have any reverse scoring, and the authoritarian

includes the following items: 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, and 40. Democratic/authoritative includes 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, and 41. Laissez-faire includes 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, and 42. Overall, the composite measures the individual's perceived parenting style. The scale's reliability was 0.86 while the Cronbach's alpha value for authoritarian was 0.82, authoritative was 0.83, and permissive/laissez-faire was 0.78.

## Results

Table 1 shows independent t-test results for the perceived parenting style, personality, and DT among school students. Based on hypothesis 1, we compared the male students ( $M = 94.81$ ,  $SD =$

11.04) with the girl students ( $M = 96.48$ ,  $SD = 8.0$ ) on perceived parenting style ( $t(114) = 0.363$ ,  $p > 0.05$ ,  $d = -0.17$ ); and male students ( $M = 113.79$ ,  $SD = 11.99$ ) with the girl students ( $M = 114.28$ ,  $SD = 10.38$ ) on personality ( $t(114) = 0.817$ ,  $p > 0.05$ ,  $d = -0.04$ ); and also, male students ( $M = 89.87$ ,  $SD = 16.18$ ) with the girl students ( $M = 83.80$ ,  $SD = 20.45$ ) on DT ( $t(114) = 0.077$ ,  $p > 0.05$ ,  $d = 0.322$ ). This result suggests that gender does not play a significant role in influencing these variables among school students. Similar to gender, other demographic factors like birth order and geographical location do not have any significant impact on the variables.

**Table 1:** Gender Differences Among the Study Variables

| Variables                 | Male (62) |           | Female (54) |           | <i>t</i> | <i>df</i> | <i>p</i> | <i>d</i> |
|---------------------------|-----------|-----------|-------------|-----------|----------|-----------|----------|----------|
|                           | <i>M</i>  | <i>SD</i> | <i>M</i>    | <i>SD</i> |          |           |          |          |
| Perceived parenting style | 94.81     | 11.04     | 96.48       | 8.00      | -.933    | 114       | 0.363    | -0.17    |
| Personality               | 113.79    | 11.99     | 114.28      | 10.38     | -.232    | 114       | 0.817    | -0.04    |
| DT                        | 89.87     | 16.18     | 83.80       | 20.45     | 1.78     | 114       | 0.077    | 0.322    |

**Table 2:** Descriptions and Multiple Comparisons Among the Variables

| Variables                 | CBSE     |           | Matriculation |           | Government |           | <i>F</i> | <i>P</i> | $\eta^2$ |
|---------------------------|----------|-----------|---------------|-----------|------------|-----------|----------|----------|----------|
|                           | <i>M</i> | <i>SD</i> | <i>M</i>      | <i>SD</i> | <i>M</i>   | <i>SD</i> |          |          |          |
| Perceived parenting style | 94.69    | 9.97      | 94.72         | 5.90      | 97.31      | 11.57     | .925     | .399     | .232     |
| Personality               | 111.5    | 12.46     | 116.7         | 7.37      | 115.0      | 11.62     | 2.24     | .110     | .228     |
| DT                        | 95.65    | 12.91     | 88.72         | 19.43     | 75.21      | 17.56     | 17.06    | .000*    | .686     |

\*The mean difference is significant at the 0.05 level

Table 2 shows a one-way ANOVA to compare the effect of perceived parenting style, personality, and DT among various school students. This result indicates that there were no significant differences among perceived parenting style [ $F(2,114) = 0.925$ ,  $p = 0.399 > 0.05$ ] and personality [ $F(2,114) = 2.249$ ,  $p = 0.228 > 0.05$ ] among different boards of school students. At the same time, there was a significant relationship between composite DT scores between CBSE and government schools, matriculation, and government schools [ $F(2,114) = 17.07$ ,  $p = 0.00 < 0.05$ ]. The DT mean score for CBSE students ( $M = 95.65$ ,  $SD = 12.91$ ) was significantly different from that of matriculation students ( $M = 88.72$ ,  $SD = 19.43$ ) and government school students ( $M = 75.21$ ,  $SD = 17.56$ ). Furthermore, when comparing parenting styles ( $M = 88.72$ ,  $SD = 19.43$ ) and personality ( $M =$

114.02,  $SD = 11.23$ ) among government, CBSE, and matriculation students, we found no significant differences among the various school students. The results indicate that there is a significant difference in DT. And there were no significant results found in parenting and personality among various types of school students.

Table 3 results show the relationship between the composite score of DT, personality, and perceived parenting style among school students. The findings show that there is a positive relationship between personality ( $M = 114$ ,  $SD = 11.23$ ) and perceived parenting style ( $M = 87$ ,  $SD = 18.46$ ) ( $r = .368$ ,  $p < 0.01$ ) at the 99% confidence level (2-tailed). However, on DT, there was no significant relationship between personality ( $r = .082$ ,  $p < 0.01$ ) and perceived parenting style ( $r = .156$ ,  $p < 0.01$ ). Interestingly, the results showed that DT ( $M = 87$ ,

SD = 18.46) does not have any significant relationship with any of the study variables. Furthermore, the study revealed a significant

relationship between parenting style and personality.

**Table 3:** Mean, Standard Deviation, and Correlations Among the Study Variables

| Variables                    | M      | SD    | 1      | 2     | 3 |
|------------------------------|--------|-------|--------|-------|---|
| 1. Perceived Parenting style | 87.04  | 18.46 | 1      | -     | - |
| 2. Personality               | 114.02 | 11.23 | .368** | 1     | - |
| 3. DT                        | 87.04  | 18.46 | -.156  | -.082 | 1 |

\*\* Correlation is significant at the 0.01 level (2-tailed)

**Table 4:** Mean, Standard Deviation, and Interdimensional Correlations Among Variables

|    | M     | SD   | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15 |
|----|-------|------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|----|
| 1  | 38.98 | 8.18 | 1      |        |        |        |        |        |        |       |       |       |       |       |       |       |    |
| 2  | 49.44 | 7.88 | -.19*  | 1      |        |        |        |        |        |       |       |       |       |       |       |       |    |
| 3  | 28.88 | 7.38 | -.29** | -.64** | 1      |        |        |        |        |       |       |       |       |       |       |       |    |
| 4  | 27.81 | 4.54 | -0.13  | .30**  | -.42** | 1      |        |        |        |       |       |       |       |       |       |       |    |
| 5  | 33.84 | 5.24 | 0.03   | .41**  | -.47** | .41**  | 1      |        |        |       |       |       |       |       |       |       |    |
| 6  | 31.45 | 6.65 | 0.02   | .47**  | -.37** | .41**  | .71**  | 1      |        |       |       |       |       |       |       |       |    |
| 7  | 21.01 | 5.38 | -0.00  | -.23*  | .34**  | -.45** | -.50** | -.54** | 1      |       |       |       |       |       |       |       |    |
| 8  | 33.04 | 5.19 | -0.05  | .39**  | -.38** | .45**  | .65**  | .64**  | -.54** | 1     |       |       |       |       |       |       |    |
| 9  | 19.17 | 4.11 | -0.07  | -0.07  | 0.07   | 0.02   | 0.04   | -0.01  | 0.04   | 0.01  | 1     |       |       |       |       |       |    |
| 10 | 13.92 | 5.29 | -0.01  | -.24** | .22*   | -0.07  | -.19*  | -.22*  | 0.13   | -0.13 | .44** | 1     |       |       |       |       |    |
| 11 | 17.53 | 5.01 | -0.13  | -0.06  | 0.05   | 0.05   | -0.04  | -0.13  | 0.09   | -0.08 | .42** | .31** | 1     |       |       |       |    |
| 12 | 10.97 | 4.66 | -0.00  | -0.12  | 0.17   | -0.06  | -0.15  | -0.1   | 0.09   | -0.07 | .36** | .49** | .26** | 1     |       |       |    |
| 13 | 12.58 | 4.01 | -0.02  | -.33** | .24*   | -0.09  | -0.13  | -0.18  | 0.09   | -0.11 | .45** | .71** | .50** | .36** | 1     |       |    |
| 14 | 8.114 | 2.93 | -0.06  | 0.03   | 0.04   | 0.03   | 0.05   | -0.03  | -0.03  | 0.09  | .39** | .45** | .33** | .41** | .42** | 1     |    |
| 15 | 9.225 | 2.05 | -0.06  | -0.07  | -0.04  | 0.01   | 0.06   | -0.05  | -0.01  | -0.05 | .25** | 0.09  | .28** | -0.04 | .22*  | .32** | 1  |

\*Correlation is a significant at the 0.05 level (2 tailed)

\*\*Correlation is a significant at the 0.01 level (2 tailed)

(M=Mean, SD= Standard Deviation, 1. Authoritarian, 2. Democratic, 3. Laissez-faire, 4. Extraversion, 5. Agreeableness, 6. Conscientiousness, 7. Neuroticism, 8. Openness to experience, 9. Word Fluency, 10. Ideational fluency, 11. Associational Fluency, 12. Expressional Fluency, 13. Spontaneous Flexibility, 14. Originality, 15. Elaboration)

Table 4 presents the study variable' interdimensional correlations among school students, it indicates that authoritarian parenting styles are negatively correlated with democratic ( $r = -.193, p < 0.05$ ) and laissez-faire ( $r = -.293, p < 0.05$ ) parenting styles at 95% confidence intervals. Democratic negatively correlated with laissez-faire ( $r = -.647, p < 0.01$ ), neuroticism ( $r = -.331, p < 0.05$ ), and ideational fluency ( $r = -.241, p < 0.01$ ). And positively correlated with extraversion ( $r = .307, p < 0.01$ ), agreeableness ( $r = .414, p < 0.01$ ),

conscientiousness ( $r = .414, p < 0.01$ ), and openness to experience ( $r = -.377, p < 0.01$ ) at the 99% confident interval. Laissez-faire positively correlated with ideational fluency and spontaneous flexibility ( $r = .220, p < 0.05$ , and  $r = .240, p < 0.05$ ). Agreeableness and conscientiousness negatively correlate with ideational fluency ( $r = -.186, p < 0.05$ , and  $r = -.222, p < 0.05$ ). In personality types, extraversion positively correlates with their subtypes, except neuroticism. Word fluency, ideational fluency, expressional fluency, spontaneous flexibility, originality, and elaboration do not correlate with parenting and personality variables.

## Discussion

In today's educational context, it is essential to promote the development of divergent thinking in students. By fostering critical thinking in students,

we empower them to think creatively and explore diverse options. This not only cultivates creativity but also enhances productivity as individuals learn to weigh various perspectives before arriving at a conclusion. The study at hand aims to delve into how parenting styles and personality traits play a role in shaping divergent thinking skills in students across different educational platforms. It is imperative that we understand the factors that influence critical thinking development in order to better support and guide students towards becoming well-rounded individuals in both academic and personal spheres. This initial investigation focused on examining our first hypothesis, which stated that there will be a significant difference between demographic variables and parenting style, personality, and DT. More specifically, there is no gender difference in parenting style due to parents increasingly placing equal value on all children, irrespective of their gender. As a result, both boys and girls now have the ability to access and benefit from equal possibilities. We are increasingly valuing all children equally, regardless of their gender. Consequently, both boys and girls now have equal access to and can benefit from the same opportunities (48). And some studies contrast this result: fathers are more likely to exhibit overly protective behaviour towards their daughters than their sons, thereby highlighting a gender disparity. The findings corroborated conventional gender norms, as mothers allocated a greater amount of time to their offspring, and youngsters reported a stronger emotional bond with their moms during their upbringing (49). Gender disparities predominantly occur in traditional parenting practices. Now there has been a shift, and parents are treating their children with equal regard. The results of the t-test indicate that there are no notable differences in personality traits based on gender. It appears that culture plays a more substantial role in shaping personality development compared to gender. Culture intricately influences the development of personality, significantly shaping an individual's traits. People from different cultures and regions may exhibit diverse characteristics based on their cultural backgrounds. It is important to emphasize that personality traits typically evolve and expand as individuals transition into adulthood, undergoing substantial changes during this phase

when compared to adolescence. Therefore, it is crucial to recognise the influence of cultural factors on the development of personality traits in order to comprehend the differences among individuals (50). In DT, there is no noteworthy difference in gender. On the other hand, earlier research has shown that boys tend to outperform girls in DT (51). Another study also highlighted the gender disparities in DT, with findings indicating that females exhibited either exceptionally high or low levels of creative thinking (52). Research has shown significant gender differences in DT. Some studies have identified significant differences, while others have reported no similarities between men and women (53). The findings suggest that personal drive and external surroundings play a greater role in divergent thinking than gender. Furthermore, our research found that factors such as birth order, handedness, and location do not significantly affect personality traits, parenting styles, and DT. The study once again highlighted the unique differences among individuals and emphasised the importance of individual interests (53).

In line with our second hypothesis, we investigated how different parenting styles and personalities influenced a student's ability to think divergently. Our findings suggest that there is no connection between parenting style and the composite score for divergent thinking, leading us to partially accept hypothesis 2. Furthermore, an examination of the relationship between specific parenting dimensions and divergent thinking components revealed that authoritarian parenting does not play a significant role in improving DT. Other researchers in the field (29, 44) have validated these results. Because authoritarian parents are very hard on their children and value punishment more than love and support, it will not enhance students' DT. Research suggests that a more hands-on approach may hinder children's creativity, as the democratic parenting style is associated with reduced ideational fluency and spontaneous flexibility. On the other hand, the laissez-faire parenting style encourages a creative environment where children are free to explore their thoughts and ideas without restrictions. This approach allows for a greater range of innovative solutions, as children are empowered to think outside the box and combine concepts in unique ways. In essence, a laissez-faire parenting style

nurtures creativity by fostering independent thinking and problem-solving skills in students. H3 is partially accepted. This study contradicts the previous studies suggesting that authoritarian parenting has a significant impact on DT in adolescents. This study discovered that a permissive parenting style improves DT ability among the middle school students because these students may highly prioritise autonomy and value their freedom from parental constraints, indicating that a lack of stringent regulations may contribute to the development of enhanced DT skills.

Furthermore, the research examines the variations in parenting approaches between students from CBSE, matriculation, and government schools. The findings reveal that CBSE students tend to exhibit a slightly higher laissez-faire parenting style compared to students from other boards, and they also outperform in DT. On the other hand, previous research found that authoritative parenting styles can hinder creativity, while democratic or authoritarian styles can foster it, with permissive styles showing no influence on creativity (17, 21, 54). In the present context, students often expect their parents to allow them to freely pursue their own choices and actions to be more like friends rather than taking on a conventional parental position. And offering guidance and discipline, have minimal expectations for maturity, and place few restrictions on their behaviour. Finally, the overall findings of this study suggest that parenting style has no significant impact on a student's divergent thinking. However, existing literature suggests a direct relationship between parenting style and DT (3, 20). While parenting styles are important in fostering DT, they are not the only determining factor. School types also play a crucial role in developing DT among students. Our research results suggest that students in CBSE schools tend to perform higher than students in other types of schools. Factors such as teacher involvement, class structure, school environment, recognition for creative work, assignments, and proper training all may contribute to developing students' DT. Additionally, individual differences, educational context, a parent's personality, and familial background also play a role in shaping a student's ability to think critically and creatively. According to self-determination theory, creativity is closely linked to intrinsic motivation, which is influenced by factors such as personality and

internal locus of control (55). Intrinsic motivation stems from a genuine passion for an activity, while extrinsic motivation is driven by external rewards or benefits (20, 56). However, it is important to note that external motivation can also fuel internal drive. Students who excel in DT might receive support and acknowledgment from their teachers and parents, which, in conjunction with their internal drive, can enhance their creative thinking abilities (20, 56).

Conversely, a strong correlation exists between parenting style and personality, partially supporting hypothesis 2. Research shows that different parenting styles have varying impacts on a student's personality. Researchers have found no significant relationship between personality dimensions and authoritative parenting, which involves setting clear boundaries and expectations while also being responsive to a child's needs. On the other hand, democratic parenting, which involves involving children in decision-making and encouraging independence, has shown links to extraversion, agreeableness, conscientiousness, and openness to experience. Laissez-faire parenting, where parents are hands-off and uninvolved, is associated with neuroticism and doesn't support the development of positive personality traits (20). Therefore, we can conclude that authoritarian or democratic parenting styles have more positive effects on adolescent development than laissez-faire parenting. It is beneficial for students to experience a parenting approach that emphasises collaboration, respects their autonomy, allows them to express their opinions, and encourages them to take responsibility for their actions and decisions. This type of supportive environment helps children flourish into well-rounded individuals who are confident in themselves and able to navigate challenges effectively rather than over-demanding parenting and less controlled parenting, as well as previous research that also supported these similar findings (17, 29).

We investigated the correlation between DT and personality traits, as outlined in hypothesis 3. The findings revealed that there was no significant association between personality and DT. It was explicitly mentioned that an individual's personality does not impact the student's DT. The results partially supported hypothesis 3. Conversely, previous research suggests that

individuals with higher levels of openness to experience and extraversion tend to display curiosity, a willingness to experiment, and a fascination with unconventional ideas, potentially leading them to create unique and creative solutions (37, 38). It clearly shows that while extroverted individuals may be more likely to exhibit creative behaviours in general, those with a high level of openness to experience specifically excel in divergent thinking tasks (37, 57, 58). Batey et al., discovered that extraversion and openness to experience predict the Consequences DT test. Based on the previous literature results, openness is crucial for fostering creativity and exploring innovative ideas. It's evidence that there is a strong connection between being open to experience and DT (36); however, this study did not support these results. It is possible that DT tests, which involve time-restricted tasks, such as having only 2 minutes per item, may pose challenges for individuals who tend to think about more distant possibilities. Similarly, individuals who prioritize originality and quality in their responses may focus on providing unique and high-quality answers rather than simply focusing on quantity. As a result, this emphasis on remote associations could potentially lead to lower DT scores due to the additional time required.

Past studies have illustrated the crucial role of parenting styles in shaping children's and adolescents' creative thinking abilities. Nonetheless, the current research revealed that DT is not directly correlated with parenting styles. Additionally, even the personality traits also did not have any significant relationship with DT. It is important to consider that personality may not be fully development in the students of age 12 to 13, explaining the lack of results in this age group. Future studies involving secondary school and higher secondary school students may provide more insight into the influence of personality on divergent thinking skills.

Based on the fourth hypothesis, we examined the differences between various school students and the study variables (H4). The results of this study indicate that there are no significant differences in personality and parenting style among various school students. However, there are significant differences among the various boards of education in DT. Our fourth hypothesis was partially accepted. CBSE school students outperformed

matriculation and government school students, particularly DT. In comparison to matriculation and government schools, students from government schools demonstrated lower performance than students from matriculation schools. Previous research findings also supported these conclusions (46). Traditional assessment, choice restrictions, competition, student-teacher relationships, low self-motivation, low self-esteem, and teacher perceptions about creativity frequently lead to the exclusion or punishment of creative children in the classroom (59), and teacher perceptions about creativity, creative children are frequently excluded or punished for their creative activities. In collectivist cultures, inexperienced teachers tend to favour non-creative students over creative ones. Some researchers believe that creative students might pose challenges in terms of teaching and maintaining order and discipline in classes. These factors prevent students from utilising and enhancing their creative abilities in school (59), and they can potentially impede the development and hinder the emergence of government school students. Government school students are encouraged to think creatively and unlock their full creative potential through a comprehensive training programme. Encouraging students to submit innovative assignments that stimulate their creativity and problem-solving skills can greatly benefit their cognitive development. In addition to acknowledging their creative work in subjects like algebraic equation solving and story writing, it is important to provide opportunities for students to participate in brainstorming sessions where they can freely express their thoughts and ideas. Enhancing the plasticity of an adolescent brain is important for the development of DT, education policymakers should consider placing a greater emphasis on fostering a creative environment that nurtures students' unique abilities and talents (60). Although this study provides valuable insights, it is crucial to recognise specific limits that should be considered in the upcoming research. This research primarily focuses on the influence of parenting style and personality on DT. Exploring the impact of parental personality and the amount of time they dedicate to their children is a fascinating endeavour for students of innovative thinking. Furthermore, our study focused exclusively on middle school students, employing a

limited sample size. Therefore, it is not possible to apply these findings to a larger population. Consequently, future research should use an increased sample size. Furthermore, it would be advantageous to carry out studies among both high school and college students to gain a deep understanding of them. Moreover, conducting a longitudinal or qualitative study in this context offers novel insights and facilitates the resolution of significant issues and it will provide more comprehensive information regarding the influence of this variable on cognitive development. Finally, we assessed parenting styles from the perspectives of the students, and further investigation will also examine the parents' perspectives. Additional study is necessary to have an in-depth understanding of the complex connection among the home environment, parental educational levels, classroom settings, and peer impact. In addition, teachers have a more significant influence than parents. Therefore, further studies should focus on the teacher's creativity and perception of students' DT.

## Conclusion

There is no significant gender, birth-order, geographical location differences in DT, personality, and parenting style. DT is not linked to personality and over all parenting style, but it is influenced by the type of school a person attends. Students in CBSE schools exhibit higher levels of DT compared to students in government and matriculation schools. These findings support the idea that the educational environment can substantially improve cognitive and creative abilities. Based on the results permissive parenting style is associated with DT than other parenting styles. Permissive style prioritises empathy, responsiveness, and warmth, while authoritative parents focus on fostering self-regulation, decision-making skills, and implementing strict rules. Permissive parenting may stimulate DT but in the study, it is associated negatively with the personality traits. In contrast, authoritative parenting is linked to positive personality development but does not impact DT. Therefore, a balanced approach combining both the aspects of parenting styles can lead to the development of good personality traits and support overall cognitive and emotional growth. Embracing DT can help the individuals to improve their cognitive flexibility, critical thinking skills, and adaptability

which are the essential traits for effectively manoeuvring through the ever-evolving landscape of the modern world. So, fostering open-mindedness and breaking out the rigid thinking patterns, empowers DT which in turn result in exploring new possibilities for generating a variety of solutions for various challenges.

## Abbreviations

Nil.

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## Author Contributions

Conceptualization, methodology, validation, investigation, data collection, coding, analysis, writing, and the original draft were performed by V. Sandhiya. And Mohanraj Bhuvaneswari helped with the editing process and offered helpful suggestions for improving the study's approach. Both authors participated in the process of reviewing and approving the research paper's final version.

## Conflict of Interest

The authors stated that they have no conflict of interest.

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## References

1. Runco MA, Acar S. Divergent Thinking as an Indicator of Creative Potential. *Creat Res J*. 2012;24(1):66–75.
2. Addis DR, Pan L, Musicaro R, Schacter DL. Divergent thinking and constructing episodic simulations. *Memory*. 2016;24(1):89–97.
3. Gralewski J, Jankowska DM. Do parenting styles matter? Perceived dimensions of parenting styles, creative abilities and creative self-beliefs in adolescents. *Thinking skills and creativity*. 2020 Dec 1;38:100709.
4. Bai H. Divergent thinking in young children (Doctoral dissertation, Global Academic Press).
5. Lebudai I, Csikszentmihalyi M. All You Need Is Love: The Importance of Partner and Family Relations to Highly Creative Individuals' Well-Being and Success. *J Creat Behav*. 2020;54(1):100–14.
6. Baldwin AL. Socialization and the parent-child relationship. *Child Development*. 1948 Sep 1:127–36.
7. Baer M, Oldham GR, Hollingshead AB, Jacobsohn GC. Revisiting the birth order-creativity connection: The

- role of sibling constellation. *Creat Res J*. 2005;17(1):67-77.
8. Runco MA, Albert RS. Parents' personality and the creative potential of exceptionally gifted boys. *Creat Res J*. 2005;17(4):355-67.
  9. Raimundi MJ, Molina MF, Schmidt V, Hernández-Mendo A. Family functioning profiles and character strengths in young elite athletes from Argentina. *Int J Sport Exerc Psychol*. 2019;17(1):32-51.
  10. Gaynor JL, Runco MA. Family size, birth-order, age-interval, and the creativity of children extensive and the creativity of children. *Journal of Creative Behaviour*. 1992;26(2):108-18.
  11. Chang JH, Hsu CC, Shih NH, Chen HC. Multicultural Families and Creative Children. *J Cross Cult Psychol*. 2014;45(8):1288-96.
  12. Warne RT, Golightly S, Black M. Factor structure of intelligence and divergent thinking subtests: A registered report. *PLoS One*. 2022;17(9 September):1-27.
  13. Giancola M, D'Amico S, Palmiero M. Working Memory and Divergent Thinking: The Moderating Role of Field-Dependent-Independent Cognitive Style in Adolescence. *Behav Sci (Basel)*. 2023;13(5):397.
  14. Parikh C, Maddulety K, Meadows CJ. Improving creative ability of base of pyramid (BOP) students in India. *Thinking Skills and Creativity*. 2020 Jun 1;36:100652.
  15. Anitha D, Jeyamala C, Kavitha D. Assessing and enhancing creativity in a laboratory course with project based learning. *J Eng Educ Transform*. 2018;32(2):67-74.
  16. Kalyanasundaram M, Abraham S, Ramachandran D, Jayaseelan V, Bazroy J, Singh Z, et al. Effectiveness of mind mapping technique in information retrieval among medical college students in Puducherry-A pilot study. *Indian J Community Med*. 2017;42(1):19-23.
  17. Mehrinejad SA, Rajabimoghadam S, Tarsafi M. The relationship between parenting styles and creativity and the predictability of creativity by parenting styles. *Procedia-social and behavioral sciences*. 2015 Oct 9; 205:56-60.
  18. Si S, Zhang S, Yu Q, Zhang J. The interaction of DRD2 and parenting style in predicting creativity. *Think Ski Creat*. 2018;27(88):64-77.
  19. Lim S, Smith J. The structural relationships of parenting style, creative personality, and loneliness. *Creat Res J*. 2008;20(4):412-9.
  20. Jankowska DM, Karwowski M. Family factors and development of creative thinking. *Personality and individual differences*. 2019 May 1;142:202-6.
  21. Jankowska DM, Gralewski J. The familial context of children's creativity: parenting styles and the climate for creativity in parent-child relationship. *Creativity Studies*. 2022;15(1):1-24.
  22. Mynbayeva A, Vishnevskay A, Sadvakassova Z. Experimental Study of Developing Creativity of University Students. *Procedia - Soc Behav Sci*. 2016; 217:407-13.
  23. Fearon DD, Copeland D, Saxon TF. The Relationship Between Parenting Styles and Creativity in a Sample of Jamaican Children. *Creat Res J*. 2013;25(1):119-28.
  24. Guilford JP, Hoepfner R. Sixteen divergent-production abilities at the ninth-grade level. *Multivariate Behav Res*. 1966;1(1):43-66.
  25. Abraham A. Commentary: Creativity and memory: Effects of an episodic-specificity induction on divergent thinking. *Frontiers in Psychology*. 2016 May 27;7:195324.
  26. Miller AL, Lambert AD, Neumeister KLS. Parenting style, perfectionism, and creativity in high-ability and high-achieving young adults. *J Educ Gift*. 2012;35(4):344-65.
  27. Baumrind D, Hosokawa R, Katsura T, Vyas K, Bano S, Islamia JM, et al. Parental disciplinary patterns and social competence in children. *Int J Environ Res Public Health*. 2000;16(1):77-81.
  28. Baumrind D. Parental disciplinary patterns and social competence in children. *Youth & Society*. 1978 Mar;9(3):239-67.
  29. Huver RME, Otten R, de Vries H, Engels RCME. Personality and parenting style in parents of adolescents. *J Adolesc*. 2010;33(3):395-402.
  30. Baumrind D. The Discipline Controversy Revisited. *Fam Relat*. 1996;45(4):405.
  31. Healy KL, Sanders MR, Iyer A. Facilitative Parenting and Children's Social, Emotional and Behavioral Adjustment. *J Child Fam Stud*. 2015;24(6):1762-79.
  32. Fan J, Zhang LF. The role of perceived parenting styles in thinking styles. *Learning and Individual Differences*. 2014 May 1;32:204-11. <http://dx.doi.org/10.1016/j.lindif.2014.03.004>
  33. Thompson A, Hollis C, Richards D. Authoritarian parenting attitudes as a risk for conduct problems: Results from a british national cohort study. *Eur Child Adolesc Psychiatry*. 2003;12(2):84-91.
  34. Pettit G, Bates J, Dodge K. Supportive Parenting, Ecological Context, and Children's Adjustment: A Seven-Year Longitudinal Study. 2016;68(5):908-23.
  35. Feist G. A meta-analysis of personality in scientific and artistic creativity. *Personal Soc Psychol Rev*. 1998;2(4):290-309.
  36. Batey M, Chamorro-Premuzic T, Furnham A. Intelligence and personality as predictors of divergent thinking: The role of general, fluid and crystallised intelligence. *Think Ski Creat*. 2009;4(1):60-9.
  37. Furnham A, Bachtar V. Personality and intelligence as predictors of creativity. *Pers Individ Dif*. 2008;45(7):613-7. Available from: <http://dx.doi.org/10.1016/j.paid.2008.06.023>
  38. Furnham A, Crump J, Batey M, Chamorro-Premuzic T. Personality and ability predictors of the "Consequences" Test of divergent thinking in a large non-student sample. *Pers Individ Dif*. 2009;46(4):536-40.
  39. Raz T, Reiter-palmon R, Kenett YN. The role of asking more complex questions in creative thinking. *Psychology of Aesthetics, Creativity, and the Arts*. 2023;17(6):1-20.
  40. Caspi A, Roberts BW, Shiner RL. Personality development: Stability and change. *Annu Rev Psychol*. 2005; 56:453-84.
  41. Belsky J, Crnic K, Woodworth S. Personality and Parenting: Exploring the Mediating Role of Transient Mood and Daily Hassles. *J Pers*. 1995;63(4):905-29.
  42. Pinquart M. Associations of Parenting Styles and Dimensions with Academic Achievement in Children

- and Adolescents: A Meta-analysis. *Educ Psychol Rev.* 2016;28(3):475–93.
43. Steinberg L, Morris AS. Adolescent development. *Annual review of psychology.* 2001 Feb;52(1):83–110.
  44. Mcleod S. Piaget's theory and stages of cognitive development. *Developmental Psychology, Simply Psychology.* 2018.  
<https://www.simplypsychology.org/piaget.html>
  45. Sharma KN. Manual for divergent production abilities (DPA). Agra: National Psychological Corporation: Manual; 2017.
  46. John OP, Srivastava S. The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of Personality: Theory and Research.* 1999; 2(4):102–138.
  47. Sehgal, Kamini. Delinquency proneness among adolescents in relation to perceived parenting style emotional maturity and demographic variables. PhD [dissertation]. Panjab University; 2020;5(3):24–27.
  48. Hosokawa R, Katsura T. Role of parenting style in children's behavioral problems through the transition from preschool to elementary school according to gender in Japan. *Int J Environ Res Public Health.* 2019;16(1):21.
  49. Stephens MA. Gender Differences in Parenting Styles and Effects on the Parent- Child Relationship. 2009;1–28.
  50. Furnham A, Crump J, Swami V. Abstract Reasoning and Big Five Personality Correlates of Creativity in a British Occupational Sample. *Imagin Cogn Pers.* 2009;28(4):361–70.
  51. Sandhiya V, Bhuvaneswari M. Influence of psychological variables on divergent thinking in adolescents: A cross-sectional study. *Int J Innov Sci Stud.* 2023;6(October 2022):1006–14.
  52. Abdulla Alabbasi AM, Thompson TL, Runco MA, Alansari LA, Ayoub AE. Gender differences in creative potential: A meta-analysis of mean differences and variability. *Psychology of aesthetics, creativity, and the arts.* 2022; 16(3):1–14.
  53. He WJ, Wong WC. Gender Differences in the Distribution of Creativity Scores: Domain-Specific Patterns in Divergent Thinking and Creative Problem Solving. *Front Psychol.* 2021;12:1–14.
  54. Olazabal AP. Developmental Relationships among Creativity Possibility Thinking, and Parenting Style (Doctoral dissertation, Fordham University); 2019.
  55. Zhao X, Yang J. Fostering creative thinking in the family: The importance of parenting styles. *Think Ski Creat.* 2021; 41:100920.  
<https://doi.org/10.1016/j.tsc.2021.100920>
  56. Deci EL, Ryan RM. Cognitive Evaluation Theory. *Intrinsic Motiv Self-Determination Hum Behav.* 1985;43–85.
  57. Silvia PJ, Winterstein BP, Willse JT, Barona CM, Cram JT, Hess KI, et al. Assessing Creativity with Divergent Thinking Tasks: Exploring the Reliability and Validity of New Subjective Scoring Methods. *Psychol Aesthetics, Creat Arts.* 2008;2(2):68–85.
  58. Shi B, Wang L, Yang J, Zhang M, Xu L. Relationship between divergent thinking and intelligence: An empirical study of the threshold hypothesis with Chinese children. *Front Psychol.* 2017; 8:1–9.
  59. Widiastuti K, Susilo MJ, Nurfinaputri HS. How classroom design impacts for student learning comfort: Architect perspective on designing classrooms. *Int J Eval Res Educ.* 2020;9(3):469–77.
  60. Stevenson CE, Kleibeuker SW, de Dreu CK, Crone EA. Training creative cognition: adolescence as a flexible period for improving creativity. *Frontiers in Human Neuroscience.* 2014 Oct 29;8:827.