Journal for the Education of Gifted Young Scientists, 9(1), 67-75, March 2021
e-ISSN: 2149- 360X
jegys.org

youngwisepub.com

Research Article

The effects of birth order and family size on academic achievement, divergent thinking, and problem finding among gifted students

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Article Info

Received: 19 December 2020
Revised: 01 March 2021
Accepted: 10 March 2021
Available online: 15 March 2021

Keywords:
Academic achievement
Birth order
Divergent thinking
Family size
Problem finding

Abstract

The current study explored the influence of birth order and family size on academic achievement, divergent thinking (DT), and problem finding (PF) with a sample of 156 gifted male and female Arab students (M= 12.21 years, SD= 1.75). Regarding academic achievement, it was found that first-borns possessed higher grade point averages (GPAs) than did other-born children. Family size was also related to academic achievement-participants from smaller-sized families had significantly higher GPAs compared with gifted students from middle- and large-sized families. As for the influence of birth order and family size on both DT and PF, a multivariate analysis of variance showed significant differences for birth order and the interaction between birth order and family size in the originality dimension of PF. Non-significant differences were found concerning family size. The follow-up analyses of variance showed that later-born gifted students scored higher than first-, second-, third-, and fourth-born children in PF originality. Later-born gifted students who scored higher on originality were from smaller families. No significant influences for birth order and family size were found concerning fluency for both DT and PF as well as DT originality. Limitations and future directions are discussed.

To cite this article:
AlSaleh, A., Abdulla, A.M., Ayoub, A.E.E., & Hafsyan, A.S.M. (2021). The effects of birth order and family size on academic achievement, divergent thinking, and problem finding among gifted students. *Journal for the Education of Gifted Young Scientists, 9*(1), 67-75. DOI: http://dx.doi.org/10.17478/jegys.864399

Introduction

Unlike earlier theories of giftedness which mainly focused on the person, the modern conceptions of giftedness consider several external factors that influence the gifted child. These factors, including expertise (Feldhusen, 2005), noncognitive abilities (Gardner, 1983; Renzulli, 2005), chance (Gagné, 2004; Tannenbaum, 1997), and environment (Miedijensky, 2018; Olszewski et al. 1987; Olszewski-Kubilius et al. 2014) are essential to understand how gifts can be transformed into a talent in one domain or more (Albert, 1980a, Runco & Albert, 2005). As Feldhusen (2005, p. 64) put it, "Gifts come from people. Nature gives no gifts; but it does transmit some genetic potentials. Genetic potentials unfold in interaction[s] with stimulating experiences structured by parents, family, home, schools, teachers, and curricula."

This assertion is consistent with well-known theories and conceptions of giftedness such as Gagné's Differentiated Model of Giftedness and Talent (DMGT; Gagné, 2004), and Renzulli's Three-Rings Model theory of giftedness—in which he distinguishes between *schoolhouse* giftedness and *creative-productive* giftedness (Renzulli, 2005). In his DMGT model, Gagné (2004) well explained how gifts (natural abilities) in one or more domains such as intellectual, creative, socio-affective, and psychomotor, might (or might not be) transformed into talents in specific fields such as language, math, arts, sports, science, and chess. A successful transformation from gifts to talents, according to Gagné, depends on four catalysts: (a) chance, (b) intrapersonal skills, (c) developmental process, and (d)

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environment. Environment, especially family environment, plays a major role in shaping the personality and cognitive abilities of gifted children (Albert, 1980a, 1980b; Olszewski-Kubilius, 2018; Runco & Albert, 2005).

The family, with which gifted children spend most of their time (Colangelo & Dietmann, 1983), plays a crucial role in the transformation from what is known as intellectual giftedness (the potential) to creative giftedness (the realization of giftedness; Albert, 1980; Renzulli, 2005). Parents of gifted children not only influence their children's cognitive abilities through genes, but also through: (a) values (e.g., knowledge, hard work, persistence, etc.), (b) support (financial, psychological, and emotional), (c) parenting style (permissive or authoritative), and (d) beliefs about criteria of success in life. Parents who believe in academic achievement as the only indicator of future success will focus/emphasize the importance of education, and only education, because they believe it is the only way to get a better job and thus improve one's socioeconomic status (Olszewski-Kubilius, 2018). In contrast, parents who see education and academic achievement as important, but not necessary for future success, will encourage behaviors related to creativity and creative thinking such as curiosity, risk-taking, openness to experience, and unconventionality. The former type of parents will put all their efforts in one basket (academic achievement), while the latter type of parents will diversify their children's experiences and guide them to "fall in love" with a topic or a domain (Torrance, 1995) since academic achievement is not the only means of success.

As noted, parents have a powerful influence on gifted children's talent development. However, the factors mentioned above do not affect all siblings equally. Other factors such as birth order and family size determine the time and opportunity each child receives within a family. Thus, it is not surprising that a great deal of research has examined the effect of birth order on different variables including coping strategies (Breik & Zaza, 2019), personality (Barton, 2005), sibling relationships (Ben-Artzey Schieber, 2019), and perfectionism (Sondergeld et al. 2007). However, the effect of birth order and family size on intelligence and achievement has received the lion's share of researchers' attention (e.g., Albert, 1980a; Breland, 1972; Cox, 1977; Rodgers et al. 2000; Sulloway, 1966; VanTassel-Baska, 1983). Overall, these works suggest that first-borns surpass their siblings in intelligence quotient (IQ) and academic achievement; however, little is known about the effect of birth order on creativity among *gifted* samples.

The next section summarizes the main findings of research on the effect of birth order on IQ and academic achievement among gifted children. The section after that sheds light on the effect of birth order on divergent thinking (DT) and problem finding (PF).

The Effect of Birth Order and Family Size on IQ and Academic Achievement

There is ample evidence that gifted students are first-borns, regardless of whether IQ or academic achievement (i.e., grade point average [GPA]) is used to define "giftedness." For example, Cox (1977) found that 50% of his sample were first-borns; while Albert (1980b) found that, among his sample of high-IQ gifted boys, 18 were only-children or first-borns (69.2%). Moreover, in a study of 465 gifted students, VanTassel-Baska (1983), who studied the profiles of several talented students, found that first-borns scored higher on the Scholastic Aptitude Test. In addition, Margot and Rinn (2016) reported that, among 96 gifted adolescents, 40% were first-borns or only-children. These findings are consistent with other seminal works conducted with non-gifted samples regarding the effect of birth order on academic achievement and IQ (e.g., Adams & Phillips, 1972; Altus, 1965; Belmont & Marolla, 1973; Damian & Roberts, 2015; Farley, 1978; Paulhus et al. 1999; Roe, 1953; Sampson, 1962; Sulloway, 2001).

As for family size, Olszewski et al. (1987) reported that most gifted students were from small-sized families (i.e., two to three siblings). This makes sense because raising a gifted child requires a lot of time, effort, and resources (Moore, 1982). Some researchers have argued that "family size and family spacing are much more important than birth order in creating an environment which fosters intellectual development" (Parker, 1998, p. 30). However, studies that were conducted with non-gifted samples yielded contradictory findings, such as that family size was unrelated to achievement or IQ (e.g., Abdel-Khalek & Lynn, 2008; Cicirelli, 1967; Rodgers et al. 2000).

Nevertheless, as this study examined a gifted sample, we predicted that academically gifted students would be more represented in smaller (vs. larger) families. Therefore, our hypotheses regarding the influence of birth order and family size on academic achievement were as follows:

$H1_a$: First-born gifted students will have higher academic achievement scores (i.e., GPAs) than middle-born and last-borns.

$H1_b$: Gifted students from smaller families will have higher academic achievement scores (GPAs) than gifted children from larger families.

The Effect of Birth Order and Family Size on DT and PF

In his famous book, Born to Rebel: Birth Order, Family Dynamics, and Creative Lives, Sulloway (1996) showed that first-borns are ambitious, conscientious, achievement oriented, more conforming, and conventional; while later-borns are more open to experience, risk-takers, and radically innovative. These assertions were tested in creativity literature (e.g., Datta, 1968; Eisenman, 1987; Farley, 1978; Sampson, 1962) before and after Sulloway published his works on the influence of birth order on creativity.

Reviewing literature on the influence of birth order and family size on DT revealed that only three studies were conducted with gifted samples (Runco & Bahleda, 1986; Seay, 1985; Szobiova, 2012); other studies were conducted with non-gifted samples and conflicting results were observed.

For instance, while some studies reported that first-born or only-children scored higher than other ordinal positions (Comeau, 1979; Eisenman, 1987; Eisenman & Schussel; 1970; Guo et al. 2018; Lichtenwalner & Maxwell, 1968; Runco & Bahleda, 1987; Yang et al. 2017), other studies indicated that second- or third-born children (i.e., those in the middle birth position) scored higher than only-, first-, and last-borns did (Gaynor & Runco, 1992; Seay, 1985; Szobiova, 2008). Adding more complexity, some studies reported that later-borns scored higher than only-, first-, and middle-borns (Farley, 1978; Staffieri, 1970). Finally, two investigations reported that birth order and DT were unrelated (Szobiova, 2012; Wilks & Thompson, 1979).

Concerning family size, a few investigations considered family sizes influence on participants' DT skills with conflicting findings. For example, Runco and Bahleda (1987) concluded that children with more siblings had higher scores on verbal fluency and verbal originality than children with one sibling, while Cicirelli (1967) reported that creativity scores were slightly diminished when family size increased beyond four children. Further, Gaynor and Runco (1992) indicated that the number of siblings was not related to children's creative abilities.

Our literature search revealed that no single study looked at the influence of birth order and family size on PF. However, since a recent meta-analysis study showed that PF and DT were positively correlated (Abdulla et al. 2020), especially the correlation between PF and fluency ($r = .31$) and originality ($r = .29$), we hypothesized that birth order and family size would have a similar influence on PF as DT. Consequently, we hypothesized the following:

H_{2a}: Later-born gifted students will possess higher DT and PF levels than children from other birth order positions.

H_{2b}: Gifted students from smaller families will have higher DT and PF scores than those from larger families.

Methods

Participants

Participants were 156 students from the Giftedness Academy in the State of Kuwait—an intermediate, secondary private school for gifted and creative students. The acceptance of students to the Giftedness Academy is based on their performance on the following criteria: (a) traits and behavioral characteristics of gifted and creative students, as assessed by the Hope Teacher Rating Scale (Gentry et al. 2015); (b) academic aptitude tests (≥ 95 percentile), which were developed and normed for Kuwaiti culture; (c) a (≥ 95 percentile) on Raven's Advanced Progressive Matrices (Raven et al. 1998); (d) fifth-grade academic achievement (i.e., ≥ 90th percentile) in the following subjects: mathematics, science, and language; and (e) an interview with a panel of experts in gifted education and teachers of mathematics, science, and language.

Participants' ages ranged from 11 to 15 years ($M = 12.21$ years, $SD = 1.73$); 50% of participants were boys and 50% were girls. Participants' family sizes ranged between 3 to 9 members ($M = 6.01$; $SD = 1.24$), and 80% of participants came from families that comprised 5–7 members. This is consistent with the United Nations Report (2017) of household size in the State of Kuwait ($M = 5.8$ members). Based on this statistic, participants who were from a family comprising of 3 to 6 members were considered as a small family, while participants from 7 and above members were considered large family. As for birth order, 64 (41%) were first-borns, 39 (35%) were second-borns, 25 (16%) were third-borns, 18 (11.5%) were fourth-borns, and 10 (6.4%) were fifth-borns. Six participants were only-children. Finally, students' mean GPA was 96.93% ($SD = 2.20$).

Data Collection Tools

Uses Test

To measure DT, we employed the Alternative Uses Test (AUT; Wallach & Kogan, 1965). Three tasks were administered: (a) uses for a wheel, (b) uses for a spoon, and (c) uses for a toothbrush. Following Wallach and

Kogan's (1965) method for administering DT tests, the AUT was a game-like test (i.e., time was not restricted). The verbatim directions for the Alternative Uses Test were as follows:

> *"People typically use everyday items for specific purposes. Often there are alternative uses for the same object. For example, a newspaper could be used as a hat or a blanket, and many other things. For the following items, list as many alternative uses as you can. The more uses you think of, the better. Do not worry about spelling."*

Responses to the AUT were scored for fluency and originality. Participants produced 1,236 ideas in the wheel task, 1,059 ideas in the spoon task, and 1,304 ideas in the toothbrush task. Fluency was defined as the total number of different responses produced by a participant for a particular task, and originality was defined as the number of unusual responses produced by a participant for a particular task. Originality was scored based on a 3% cutoff criterion.

Problem Generation (PG) Test

The second study instrument was the PG test (Okuda, Runco, & Berger, 1991; www.creativitytestingservices.com), which was used to assess PF ability. The PG test consists of three open-ended tasks that ask participants to list as many problems as they can for problems that are related to: (a) home and school, (b) life situations, and (c) health and well-being. An example of a PG tasks is as follows:

> *"List problems with your present living situation (home, neighborhood, society, whatever). The more you list, the better. They do not have to be real problems--they can be things you have not actually experienced. Use your imagination!"*

The PG test was scored for fluency and originality. For home and school problems, life situation, and health and well-being, 1,490, 1,553, and 1,602 ideas were generated, respectively. The same method for scoring fluency and originality was used in the PG test. Reliability coefficients for fluency and originality for the Uses and PG tests were estimated using Cronbach's alpha. Results showed that Cronbach's alphas ranged from .63 to .85 for the fluency and originality dimensions on both tests.

Demographic Information

Participants were asked to complete a demographic questionnaire about their age, sex, family size, and birth order. Information about participants' GPA was obtained from school officials.

Results

Birth Order, Family Size, and Academic Achievement

Descriptive statistics showed that 64 (41%) of gifted students were first-borns, followed by second- (n = 39, 25%), third- (n = 25, 16%), fourth- (n = 18, 11.5%), and fifth-borns (n = 10, 6.5%), which is consistent with previous findings suggesting that first-born children are more represented in gifted samples (Albert, 1980b; Cox, 1977; Margot and Rinn, 2016; Sondergeld et al. 2007; VanTassel-Baska, 1983). Table 1 shows mean and standard deviations for study variables.

A one-way analysis of variance (ANOVA) was performed to determine if there was a significant difference between: (a) birth order and GPA on one hand and (b) family size and GPA on the other hand. An ANOVA yielded a significant difference between participants on academic achievement based on birth order, $F_{(4,151)} = 3.41$, $p = .011$. First-born participants had a higher GPA (M = 97.44; SD = 1.66), while fifth-born participants' GPA was the lowest (M = 95.02; SD = 3.71). Post-hoc analyses showed that this difference was significant (p = <.01).

A second ANOVA was performed to examine the effect of family size on academic achievement as measured by GPA. The results showed a significant difference between participants' academic achievement and family size, $F_{(6, 149)} = 2.90$, $p = .011$. Gifted students from smaller families had higher GPAs compared with those from larger families.

Table 1.
Descriptive Statistics of Study Variables

		Dependent variable					
		n	Fluency DT *M* (*SD*)	Originality DT *M* (*SD*)	Fluency PG *M* (*SD*)	Originality PG *M* (*SD*)	GPA *M* (*SD*)
Birth order	1.00	64	8.45 (2.23)	3.06 (1.63)	10.06 (2.62)	5.03 (2.68)	97.44 (1.66)
	2.00	39	8.69 (3.14)	3.44 (3.08)	9.28 (2.58)	4.95 (3.03)	96.48 (2.25)
	3.00	25	8.08 (2.96)	2.72 (1.51)	9.40 (3.04)	4.00 (1.76)	96.92 (2.64)
	4.00	18	8.17 (1.98)	3.28 (1.67)	9.44 (2.48)	4.67 (2.35)	97.16 (1.32)
	5.00	10	8.00 (2.16)	2.20 (1.14)	9.10 (2.38)	5.40 (4.03)	95.02 (3.71)
	Total	156	8.39 (2.56)	3.07 (2.06)	9.63 (2.65)	4.83 (2.71)	96.93 (2.20)
Family size	3.00	6	7.67 (1.75)	2.83 (0.98)	9.33 (1.51)	4.33 (1.03)	97.33 (1.51)
	4.00	8	8.50 (2.20)	3.63 (1.77)	9.13 (2.17)	4.50 (1.31)	96.34 (1.29)
	5.00	36	8.33 (2.14)	2.78 (1.57)	9.08 (1.95)	3.97 (1.61)	97.08 (1.87)
	6.00	55	8.15 (2.82)	3.24 (2.62)	10.18 (3.08)	5.05 (3.16)	97.15 (1.74)
	7.00	34	8.82 (3.04)	3.32 (2.01)	9.41 (3.04)	5.56 (3.09)	97.29 (2.44)
	8.00	14	8.79 (1.97)	2.64 (1.28)	9.79 (2.04)	4.79 (2.72)	94.79 (3.53)
	9.00	3	8.00 (1.73)	1.67 (1.15)	9.67 (1.53)	4.67 (3.79)	97.80 (1.39)
	Total	156	8.39 (2.56)	3.07 (2.06)	9.63 (2.65)	4.83 (2.71)	96.93 (2.20)

Note: DT = divergent thinking; PG = problem generation; GPA = grade point average; M = mean, SD = standard deviation

Finally, a linear regression analysis was conducted to examine whether participants' birth order predicted their GPA. A significant regression equation was found, b=.335, $t_{(155)}$=2.47, p=.016). However, family size did not significantly predict participants' GPA, b=.180, $t_{(155)}$=1.27, p=.205. Furthermore, multiple regression analysis where both, birth order and family size were included as independent variables, yielded no significant effect on GPA.

Birth Order, Family Size, PF, and DT

A multivariate analysis of variance was conducted to determine the effect of birth order and family size on DT *and* PF abilities. Family size was coded as follows: (0) for 3-6 members who were considered a small family, and (1) 7-9 members who were considered a large family. Significant differences were found for birth order, Wilks' Lambda = .823, $F_{(4,151)}$ = 1.80, p = .029 and the interaction between birth order and family size, Wilks' Lambda = .827, $F_{(4,151)}$ = 1.75, p = .035. No significant differences were found for family size (Table 2).

Table 2.

Analysis of Variance of Dependent Variables by Birth Order and Family Size

Source	Dependent variable	*df*	MS	F	p	Eta
Birth order	Fluency DT	4	4.76	.72	.583	.019
	Originality DT	4	2.25	.52	.722	.014
	Fluency PG	4	7.29	1.05	.385	.028
	Originality PG	4	20.12	2.95	.022	.075
Family size	Fluency DT	1	.12	.02	.895	.000
	Originality DT	1	1.93	.45	.505	.003
	Fluency PG	1	6.38	.92	.340	.006
	Originality PG	1	2.31	.34	.562	.002
Birth order * Family size	Fluency DT	4	4.89	.73	.570	.020
	Originality DT	4	2.22	.51	.730	.014
	Fluency PG	4	7.60	1.10	.364	.029
	Originality PG	4	21.86	3.20	.015	.081
Error	Fluency DT	146	6.66			
	Originality DT	146	4.33			
	Fluency PG	146	6.97			
	Originality PG	146	6.83			
Total	Fluency DT	156				
	Originality DT	156				
	Fluency PG	156				
	Originality PG	156				

Note: DT = divergent thinking; PG = problem generation

A follow-up ANOVA was conducted to test the effect of birth order and the interaction between birth order and family size on DT and PF. A significant effect of birth order on PF originality was found, $F_{(4,151)} = 2.95$, $p = .022$. Fluency scores in DT and PF as well as originality scores in DT were non-significant. Regarding the interaction between birth order and family size, a significant interaction effect between them was observed in PF originality scores, $F_{(4, 151)} = 3.20$, $p = .015$.

Post-hoc analyses indicated significant differences between later-borns (i.e., fifth) and first- (MD = 5.313, $p = .016$), second-(MD = 5.537, $p = .012$), third-(MD = 6.381, $p = .005$), and fourth-borns (MD = 6.358, $p = .005$), in favor of the later-borns. As for the interaction between birth order and family size, the differences were in favor of the fifth-borns from smaller (vs. larger) families (MD = 4.216, $p = .023$). In other words, those who scored higher in PF originality were from smaller families.

Discussion

This was the first investigation to examine the effect of birth order and family size on academic achievement, DT, and PF in the Arab culture as represented by Kuwaiti sample. Based on previous literature, it was predicted that most gifted children in our sample would be first-borns. The results confirmed such a prediction—nearly half the participants in this study were first-borns. First-born participants had higher GPAs than did other-born students, and students were more likely to have higher GPAs when they were from smaller-sized (vs. larger-sized) families.

The findings are consistent with seminal works that were conducted with both gifted and non-gifted samples, which showed that first-born children are higher achievers than other-born children. For instance, Adams and Phillips (1972) studied differences between first-born and later-born elementary school students and concluded that first-borns scored significantly higher than did later-borns on four different measures of intellectual and academic performance. Moreover, Paulhus et al. (1999) studied the effect of birth order on personality and achievement. They found that first-borns were more achieving compared with later-born students.

Several explanations for first-born children being higher academic achievers than later-borns are offered in the literature, which include (a) higher parental expectations of first-borns compared with middle- and later-borns, (b) first-born children have more opportunity to interact with adults than do later-born children, and (c) parents tend to be stricter with first-born children regarding their academic achievement (Adams & Phillips, 1972; Altus, 1965; Olszewski et al. 1987). It seems that these factors are cross-cultural; meaning, that gifted parents, regardless of what culture they belong to, place higher expectations on first-born children.

The second prediction-that gifted children from small families will have higher academic achievement scores compared with gifted students from larger families—was also supported. This makes sense because the amount of time and resources parents spend on their gifted children will be quite different when they have two or three children compared with families of seven or eight members. This finding was also supported by an investigation that concluded that the average family size observed in gifted children is no more than three (Olszewski-Kubilius et al. 1987).

Hypothesis 2a was only supported for originality in PF. DT and birth order were not related, which is consistent with some previous studies (e.g., Szobiova, 2012; Wilks & Thompson, 1979) yet contradictory to others (e.g., Comeau, 1979; Gaynor & Runco, 1992; Runco & Bahleda, 1987; Yang et al. 2017). Future research might clarify why gifted students who possess high levels of PF originality (i.e., those who could find and discover novel problems) are more likely to be later-born as opposed to earlier-born children.

Limitations of Study

We conclude our study with two limitations. First is that our sample is considered a relatively small sample to represent Arab culture. However, it is not our intention to represent the whole Arab culture since this will require collecting data from more than twenty countries. By Arab culture, we mean the context of Arab culture, not the whole culture. Thus, we recommend that authors from other Arab countries replicate our study and examine potential differences between Kuwait and other Arab countries. The second limitation worth mentioning is that we were restricted by the information provided to us by the Giftedness Academy. Future research might extend our work to include information such as socioeconomic, parental education, and other demographic variables that might help gain a better understanding of the effect of birth order and family size on academic achievement, DT, and PF.

References

Abdulla, A. M., Paek, S. H., Cramond, B., & Runco, M. A. (2020). Problem finding and creativity: A meta-analytic review. *Psychology of Aesthetics, Creativity, and the Arts*, *14*, 3–14. https://doi.org/10.1037/aca0000194

Adams, R. L., & Phillips, B. N. (1972). Motivational and achievement differences among children of various ordinal birth positions. *Child Development*, *43*(1), 155-164. https://doi.org/10.2307/1127879

Albert, R. S. (1980a). Family positions and the attainment of eminence: A study of special family positions and special family experiences. *Gifted Child Quarterly*, 24, 87-95. https://doi.org/10.1177/001698628002400208

Albert, R. S. (1980b). Exceptionally gifted boys and their parents. *Gifted Child Quarterly*, *24*, 174-179. https://doi.org/10.1177/001698628002400409

Altus, W. D. (1965). Birth order and academic primogeniture. *Journal of Personality and Social Psychology, 2*(6), 872-876. https://doi.org/10.1037/h0022705

Barton, V. (2005). Myers-Briggs type inventory, birth order, and the association between the two variables in high school gifted students (Order No. 3179005). Available from ProQuest Dissertations & Theses Global. (305027364). Retrieved from https://search.proquest.com/docview/305027364?accountid=26303

Belmont, L., & Marolla, F. A. (1973). Birth order, family size, and intelligence. *Science*, *182*(4117), 1096-1101. https://doi.org/10.1126/science.182.4117.1096

Ben-Artzey Schieber, N. (2019). The gifted child as an equal partner or minority in the sibling relationship: The parents' perspective. *Child Indicators Research*, *12*(6), 2151-2171. https://doi.org/10.1007/s12187-019-09632-8

Boling, S. E., Boling, J. L., & Eisenman, R. (1993). Creativity and birth order/sex differences in children. *Education*, *114*(2), 224-226.

Breik, W. D., & Zaza, H. I. (2019). Coping strategies adopted by adolescents: A comparative study in relation to gifted status, gender, and family size. *Gifted Education International*, *35*, 3-19. https://doi.org/10.1177/0261429418824118

Breland, H. M. (1972). Birth order, family configuration, and verbal achievement. *Child Development*, *45*(4), 1011-1019. https://doi.org/10.1002/j.2333-8504.1972.tb00639.x

Chan, D. W. (2005). Self-perceived creativity, family hardiness, and emotional intelligence of Chinese gifted students in Hong Kong. *Journal of Secondary Gifted Education*, *16*, 47–56. doi:10.4219/jsge-2005-471

Cicirelli, V. G. (1967). Sibling constellation, creativity, IQ, and academic achievement. *Child Development, 38*(2), 481–490. https://doi.org/10.2307/1127304

Colangelo, N., & Dietmann, D. F. (1983). A review of research on parents and families of gifted children. *Exceptional Children*, *50*(1), 20-27. https://doi.org/10.1177/001440298305000103

Comeau, H. A. M. (1979). *An examination of the relationship between birth order a creativity* (unpublished Master's thesis), Kean College of New Jersey.

Cox, C. M. (1977). Background characteristics of 456 gifted students. *Gifted Child Quarterly*, *21*, 261-267. https://doi.org/10.1177/001698627702100220

Das Gupta, M., Zhenghua, J., Bohua, L., Zhenming, X., Chung, W., & Hwa- Ok, B. (2003). Why is son preference so persistent in East and SouthAsia?A cross-country study of China, India and the Republic of Korea. *The Journal of Development Studies*, *40*, 153–187. doi:10.1596/1813-9450-2942

Damian, R. I., & Roberts, B. W. (2015). The associations of birth order with personality and intelligence in a representative sample of U.S. high school students. *Journal of Research in Personality*, *58*, 96-105. https://doi.org/10.1016/j.jrp.2015.05.005

Datta, L. E. (1968). Birth order and potential scientific creativity. *Sociometry, 31,* 76–88.

Eisenman, R. (1987). Creativity, birth order, and risk taking. *Bulletin of the Psychonomic Society, 25,* 87-88. https://doi.org/10.3758/BF03330292

Eisenman, R., & Schussel, R. (1970). Creativity, birth-order and preference for symmetry. *Journal of Consulting Clinical Psychology, 34,* 275-280. https://doi.org/10.1037/h0029008

Farley, F. H. (1978). Note on creativity and scholastic achievement of women as a function of birth order and family size. *Perceptual & Motor Skills*, *47*(1), 13-14. https://doi.org/10.2466/pms.1978.47.1.13

Feldhusen, J. F. (2005). Giftedness, talent, expertise, and creative achievement. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 64-79). Cambridge University Press. https://doi.org/10.1017/CBO9780511610455.006

Gagné, F. (2004). Transforming gifts into talents: The DMGT as a developmental theory. *High Ability Studies, 15*(2), 119-147. https://doi.org/10.1080/1359813042000314682

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Gaynor, J. L. R., & Runco, M. A. (1992). Family size, birth-order, age interval, and the creativity of children. *Journal of Creative Behavior, 26,* 108-118. https://doi.org/10.1002/j.2162-6057.1992.tb01166.x

Gentry, M. L., Pereira, N., Peters, S. J., McIntosh, J. S., & Fugate, C. M. (2015). *HOPE Teacher Rating Scale (manual): Involving teachers in equitable identification of gifted and talented students in K-12*. Waco, TX: Prufrock.

Guo, J., Lin, S., & Guo, Y. (2018). Sex, birth order, and creativity in the context of China's one-child policy and son preference. *Creativity Research Journal*, *30*(4), 361-369. 10.1080/10400419.2018.1530535

Hornberg, J., & Reiter-Palmon, R. (2017). Creativity and the big five personality traits: Is the relationship dependent on the creativity measure? In G. J. Feist, R. Reiter-Palmon, & J. C. Kaufman (Eds.), *Cambridge handbooks in psychology. The Cambridge handbook of creativity and personality research* (p. 275–293). Cambridge University Press.

Inman, T., & Kirchner, J. (2016). *Parenting gifted children 101*: *An introduction to gifted kids and their needs*. Waco, TX: Prufrock.

Kaltsounis, B. (1978). Creative performance among siblings of various ordinal birth positions. *Psychological Reports*, *42*(3), 915-918. https://doi.org/10.2466/pr0.1978.42.3.915

Lichtenwalner, J. S., & Maxwell, J. W. (1969). The relationship of birth order and socioeconomic status to the creativity of preschool children. *Child Development, 40*(4), 1241-1247.

Margot, K. C., & Rinn, A. N. (2016). Perfectionism in gifted adolescents: A replication and extension. *Journal of Advanced Academics*, *27*, 190-209. https://doi.org/10.1177/1932202X16656452

Miedijensky, S. (2018). Learning environment for the gifted--What do outstanding teachers of the gifted think? *Gifted Education International*, *34*, 222-244. https://doi.org/10.1177/0261429417754204

Okuda, S. M., Runco, M. A., & Berger, D. E. (1991). Creativity and the finding and solving of real-world problems. *Journal of Psychoeducational Assessment*, *9*, 45-53. https://doi.org/10.1177/073428299100900104

Olszewski-Kubilius P. (2018) The role of the family in talent development. In: Pfeiffer S. (Ed.) *Handbook of giftedness in children* (pp. 129-147). Springer.

Olszewski-Kubilius, P., Lee, S.-Y., & Thomson, D. (2014). Family environment and social development in gifted students. *Gifted Child Quarterly*, *58*, 199-216. https://doi.org/10.1177/0016986214526430

Olszewski, P., Kulieke, M., & Buescher, T. (1987). The Influence of the family environment on the development of talent: A literature review. *Journal for the Education of the Gifted*, *11*, 6-28. https://doi.org/10.1177/016235328701100102

Parker, W. D. (1998). Birth-order effects in the academically talented. *Gifted Child Quarterly*, 42, 29-38. https://doi.org/10.1177/001698629804200104

Paulhus, D. L., Trapnell, P. D., & Chen, D. (1999). Birth order effects on personality and achievement within families. *Psychological Science*, *10*(6), 482-488. https://doi.org/10.1111/1467-9280.00193

Pearson, N. C. S. (2009). *Advanced clinical solutions for WAIS-IV and WMS-IV*: *Administration and scoring manual*. San Antonio: The Psychological Corporation.

Raven, J., Raven, J. C., & Court, J. H. (1998). *Manual for Raven's progressive matrices and vocabulary scales. Section 4: The advanced progressive matrices*. Oxford, UK: Oxford Psychologists Press; San Antonio, TX: The Psychological Corporation.

Reiter-Palmon, R., Forthmann, B., & Barbot, B. (2019). Scoring divergent thinking tests: A review and systematic framework. *Psychology of Aesthetics, Creativity, and the Arts*, *13*, 144–152. https://doi.org/10.1037/aca0000227

Renzulli, J. S. (2005). The Three-Ring Conception of Giftedness: A developmental model for promoting creative productivity. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 246–279). Cambridge University Press. https://doi.org/10.1017/CBO9780511610455.015

Renzulli, J. S. (2005). The Three-Ring conception of giftedness: A developmental model for promoting creative productivity. In R. J. Sternberg & J. E. Davidson (Eds.), Conceptions of giftedness (p. 246–279). Cambridge University Press. https://doi.org/10.1017/CBO9780511610455.015

Rodgers, J. L., Cleveland, H. H., van den Oord, E., & Rowe, D. C. (2000). Resolving the debate over birth order, family size, and intelligence. *American Psychologist*, 55, 599-612. https://doi.org/10.1037/0003-066X.55.6.599

Roe, A. (1953). A psychological study of eminent psychologists and anthropologists, and a comparison with biological and physical scientists. *Psychological Monographs*: *General and Applied*, *67*, 1-55. https://doi.org/10.1037/h0093638

Runco, M. A., & Albert, R. S. (2005). Parents' personality and the creative potential of exceptionally gifted boys. *Creativity Research Journal*, *17*, 355-367. https://doi.org/10.1207/s15326934crj1704_7

Runco, M. A., & Bahleda, M. D. (1987). Birth-order and divergent thinking. *Journal of Genetic Psychology*, *148*(1), 119-125. https://doi.org/10.1080/00221325.1987.9914542

Sampson, E. E. (1962). Birth order, need achievement, and conformity. *Journal of Abnormal & Social Psychology*, *64*(2), 155-159. https://doi.org/10.1037/h0045120

Seay, M. L. (1985). Creativity, personality, and family variables in gifted children, their parents and siblings. *Dissertation Abstracts International*, *47*, 4198.

Sondergeld, T. A., Schultz, R. A., & Glover, L. K. (2007). The need for research replication: An example from studies on perfectionism and gifted early adolescents. *Roeper Review*, *29*, 19-25. https://doi.org/10.1080/02783193.2007.11869220

Staffieri, J. R. (1970). Birth order and creativity. *Journal of Clinical Psychology, 26,* 65-66.

Sulloway F.J. (2001) Birth order, sibling competition, and human behavior. In: Holcomb H.R. (Ed.) *Conceptual challenges in evolutionary psychology*: *Studies in cognitive systems*, (vol. 27). Springer.

Sulloway, F. J. (1996). *Born to rebel: Birth order, family dynamics, and creative lives*. Pantheon Books.

Szobiova, E. (2008). Birth order, sibling constellation, creativity and personality dimensions of adolescents. *Studia Psychologica*, *50*(4), 371-381.

Szobiova, E. (2012). Some psychological factors of creative development in family constellation: Intelligence and personality traits of artistically—technically gifted adolescents. *Creative and Knowledge Society*, *2*(2), 70-89. https://doi.org/10.2478/v10212-011-0026-0

Torrance, E. P. (1966). *The Torrance Tests of Creative Thinking-Norms-Technical Manual*

Torrance, E. P. (1995). *Creativity research. Why fly?* Ablex Publishing.

Turkman, B., & Runco, M. A. (2013). Quick Estimate of Convergent Thinking [Measurement instrument]. Retrieved from https://www.creativitytestingservices.com/products

VanTassel-Baska, J. (1983). Profiles of precocity: The 1982 Midwest talent search Finalists. *Gifted Child Quarterly*, *27*, 139-144. https://doi.org/10.1177/001698628302700308

Wallach, M. A., & Kogan, N. (1965). *Modes of thinking in young children*: *A study of the creativity-intelligence distinction*. Holt, Rinehart & Winston.

Wilks, L., & Thompson, P. (1979). Birth order and creativity in young children. *Psychological Reports, 45,* 443-449. https://doi.org/10.2466/pr0.1979.45.2.443

Yang, J., Hou, X., Wei, D., Wang, K., Li, Y., & Qiu, J. (2017). Only-child and non-only-child exhibit differences in creativity and agreeableness: Evidence from behavioral and anatomical structural studies. *Brain Imaging and Behavior*, *11*(2), 493-502. http://dx.doi.org/10.1007/s11682-016-9530-9