MASTER'S THESIS

The association between birth order and self-reported personality characteristics of siblings in a within-family design

Christin P. Consten

University of Twente

Enschede

The Netherlands

Psychology, Technology and Health

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Examination committee:

Dr. F. Chakhssi,

Dr. L. E. van Zyl

UNIVERSITY OF TWENTE.

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Abstract

Introduction. The current study aims to investigate the association between the birth order position of siblings and different personality constructs. Specifically, the birth order effect that states that birth order leads to the development of different personality characteristics among children. Most studies examining the birth order effect compared individuals from different families (between-family design), whilst this study used a within-family design to compare a minimum of two fully biologically related siblings with self-report questionnaires on the big five personality traits, risk taking, interpersonal trust, optimism, self-efficacy, fear of negative evaluation, and shyness and sociability with each other. It was hypothesized that successive siblings differ from each other compared to non-successive siblings who are alike on these variables. Also, it was hypothesized that the number of siblings in the family is associated with birth order.

Method. 75 German participants, with a mean age of 24.7 years and a standard deviation of 6.9*,* filled in online questionnaires. First-, second- and thirdborn siblings' results were correlated. Also, the children from families with two siblings were compared to the first two children in families with three or more siblings.

Results. No significant correlation could be found between birth order and the measured personality constructs, but trends were observed. Different associations were found in families with two and three or more siblings. In the first group shyness was negatively related for the first two siblings, in the second group fear of negative evaluation, shyness and sociability were found to be positively correlated.

Discussion and conclusion. In the current sample, no confirmation for a birth order effect on the measured personality constructs was found. A different association in families with two and three or more children between birth order and the measured personality characteristics was found. The within-family design may be a well-fitting design to detect the birth order effect. More research in larger samples using a within-family design should be done.

Introduction

The current study is concerned with the birth order of siblings and its association with personality characteristics. The association between the number of siblings in the family, birth order and personality characteristics was also studied. In the past, the birth order effect was mostly studied using a between-family design, which compares children from different families, with contradictious results. However, a few studies have examined this issue with a within-family design. The aim of the current study was to find out whether Sulloway's model, which states five psychological mechanisms playing within families as basis for the birth order effect, could be confirmed and an association between birth order and personality characteristics could be detected. This study is the first one examining the effect in a within-family design with self-report questionnaires of different personality characteristics in families with two and more siblings.

Definitions

Siblings, Birth Order and Birth Order Effect

Siblings always got special attention in research because of their environmental and genetical similarities. In this study, siblings are defined as fully biologically related children with the same father and mother. Neither half siblings nor stepsiblings nor adopted children are considered. Birth order of siblings is the position of the child in the chronological order in which the siblings were born.

Furthermore, the order in which a child is born might have an effect on different variables, such as personality (Bleske-Rechek & Kelley, 2014), intelligence (Barclay, 2015), income (Bertoni & Brunello, 2016) and after-school activities (Price, Simpkins, & Menjívar, 2017): the birth order effect. An important model which explains the underlying mechanisms behind the birth order effect is Sulloway's family-niche model. Rohrer et al. (2015) summarized the theory behind the model as siblings' adaption to divergent roles within the family system, which has the goal to reduce competition and to facilitate cooperation. This process is assumed to push siblings to develop stable personality differences depending on the position in the birth order (Rohrer et al., 2015). Five psychological mechanisms are said to underlie the birth order effect. These are differences in parental investment, sibling dominance hierarchies, niche specialization, deidentification and sibling stereotype (Sulloway, 2007). Subsequently, they are described in detail.

The first psychological mechanism, namely the difference in parental investment, describes the U-shaped distribution of parental investment in their children. That means that

first- and lastborn children receive more resources than middle children. This manifests in the firstborns being favored over the other siblings because of their role as the first and oldest child. The last child is favored because of being the last child the mother will ever bear. Both, the first- and the lastborn child, undergo times in which they experience phases of being the only child at home, which can lead to special investment of parents in their child (Sulloway, 2007).

The second mechanism is about siblings dominance and means siblings creating natural dominance hierarchies based on age, body size and power (Sulloway, 2007). Older children take over leadership roles due to their natural dominance. Being of higher rank in the family hierarchy brings advantages for the older children.

Through the third psychological mechanism niche specialization children take up different roles in the family based on genetic disparities, sex, position in birth order and the 'principle of divergence'. This principle, based on the principle of divergence by Darwin, can be described as younger children having to specialize themselves in other areas than their older siblings to reduce competition. That makes for parents the comparison of the children harder, which is beneficial for the younger children (Sulloway, 2007).

Deidentification proposes the assumption that children try to differentiate themselves with their closest siblings in age. This means that younger children try to develop characteristics and interests which differ from their closest siblings (Sulloway, 2007). For example, if the older child loves to read books, the younger develops an interest in sports. In that way, it is more difficult for parents to compare their children which guarantees special attention for each individual child.

The last mechanism states that there are birth order stereotypes. These stereotypes are widely observed in society. Stereotypes are sanctioned. The siblings are consciously or unconsciously pushed into the prescribed roles, which society expects them to take up (Sulloway, 2007).

The Big Five Personality Traits

The position in birth order is thought to have quite a particular relation towards the personality of siblings. Classically, the association between birth order and the big five personality traits is studied. The big five personality traits, which is also called the five factor model of personality, is a comprehensive taxonomy of individual differences. The empirically-derived model of personality is the standard framework in psychology (Sharpe, Martin, & Roth, 2011; Rohrer et al., 2015). This five factor model consists of the constructs

openness to experience, conscientiousness, extraversion, agreeableness and neuroticism (González Gutiérrez, Jiménez, Hernández, & Puente, 2005). Subsequently, they are described in detail.

As all big five personality traits, openness to experience concerns multiple aspects. Among others it involves openness for ideas, feelings and actions (Rammstedt, Kemper, Klein, Beierlein, & Kovaleva, 2014). Persons with this characteristic could be described as tolerant, curious and have widespread interests (Satow, 2012). Sulloway (1995) stated in his meta-analysis well-studied and general accepted hypotheses about the big five personality traits and their relation to the birth order of siblings. When it comes to openness to experience, firstborn children tend to be ’more conforming, traditional, and closely identified with parents’ (p. 4, Sulloway, 1995). The oldest children share the most time with their parents and often enjoy their undivided attention. This could lead them to adopt the parental beliefs towards the world and thus make them less open for new ideas and experiences than their younger siblings.

The second personality trait conscientiousness includes constructs such as discipline, tidiness and duteousness (Rammstedt et al., 2014). Persons with such a manifestation are orderly and work in a systematic way (Satow, 2012). Following Sulloway (1995) an often-studied hypothesis was that firstborn children ‘are more responsible, achievement oriented, organized and planful’ (p.4, Sulloway, 1995). Firstborns usually have a special role in many families. They are often principal heir of the family and it is expected that they fulfill this role. Therefore, it is necessary that they are disciplined and dutiful.

Extraversion for example includes activity, warmth and assertiveness (Rammstedt et al., 2014). Generally, extravert persons are more outwards oriented. It is also associated with sociability, talkativeness and adventurousness (Satow, 2012). Following Sulloway (1995) a common stated hypothesis about extraversion was that the firstborn children ‘are more extraverted, assertive, and likely to exhibit leadership qualities’ (p.4, Sulloway, 1995). An explanation could be found in the firstborns’ role in the sibling constellation. They are the oldest ones and therefore need to take care of their younger siblings. They self-confidently take a leading role in that constellation.

The fourth personality trait, agreeableness, consists among other facets of the constructs trust, altruism and modesty (Rammstedt et al., 2014). Highly agreeable persons are good team-players and likely to be popular. One reason for their popularity is that these persons care about others and steadily try to help them (Satow, 2012). The hypothesis about agreeableness which was mentioned in Sulloway (1995) was that laterborn children ‘are more

approachable, popular, and easygoing' (p.4, Sulloway, 1995). Because of two reasons the upbringing of laterborns is in many cases more eased than that of their older sibling. On one hand, the parents are more self-confident in and used to raising children. On the other hand, both family and society have less expectations of younger children. It usually is not their role to for example take over the family business. Therefore, they can concentrate on more than just their family duties and be more popular and easygoing.

Among others, anxiety, impulsivity and vulnerability can be subsumed under the to the last personality trait neuroticism (Rammstedt et al., 2014) or in other words emotional instability. Persons who are highly neurotic are often seen as nervous, anxious and tense. They are intensive thinkers, tend to doubt themselves and their actions and are less able to cope with stress. Because of that, they are vulnerable for developing different psychological diseases (Satow, 2012). Following Sulloway (1995), firstborn children 'are less well-adjusted and more anxious, neurotic, fearful, and likely to affiliate under stress' (p.4, Sulloway, 1995). Because of their role in their family as principal heir and leader of their siblings, firstborns tend to be more under pressure and are expected to behave a specific way. For many of them this might lead to the development of fears and inflict more stress on them than on their younger siblings.

Between-Family Design

In birth order research studies using a between-family design dominate. This design compares individuals from different families with each other according to their birth order position (Marini & Kurtz, 2011; Rohrer et al., 2015). That means that all firstborns, secondborns or laterborns are compared in order to find a general pattern in their personality structure.

As mentioned before, studies using a between-family design to examine the association between the big five personality traits and birth were compared in a meta-analytical review by Sulloway in 1995. The review was a comparison of 196 findings and it was stated in how many studies the above-mentioned hypotheses could be confirmed. With 49 percent of all studies the hypothesis about openness to experience was most likely to be confirmed. This was directly followed by conscientiousness (44%), agreeableness (39%) and neuroticism (29%). For extraversion the fewest studies could confirm the hypothesis (17%) (Sulloway, 1995).

Since these opposing results of the meta-analysis of Sulloway (1995), were published many studies were published which could not find such an effect or whose authors doubted the existence of the birth order effect. For example, Marini and Kurtz (2011) as well as

Rohrer, Egloff and Schmukle (2015) examined birth order effect on the big five personality traits and claimed that the previously found results could not be confirmed. Summarizing, the results of the meta-analytical review and other studies raise the question whether there is a general birth order effect after all.

Within-Family Design

Despite the contradicting results, Healey and Ellis (2007) found support for Sulloway's model and thus for the birth order effect. Here, the psychological mechanisms were studied in a within-family design. Rohrer et al. (2015) considered studies examining Sulloway's theory. They found that most studies based on a between-family design only partly supported Sulloway's hypotheses and all studies which approved Sulloway's model and hypotheses used a within-family design (Rohrer et al., 2015). This implies and it is stated that a within-family design is more suitable to detect birth order differences (Sulloway, 2007; Rohrer et al., 2015; Marini & Kurtz, 2011).

The within-family design relates the siblings of the same family among themselves, in opposition to the between-family design comparing all siblings based on their position in the birth order of different families with each other. To study Sulloway's family-niche model, whose psychological mechanisms are apparent when observing family internal processes, the within-family design is indispensable.

Until now, not much research has been done using a within-family design. Only five articles could be found which applied the within-family design to study the association between birth order and the big five personality traits. In most of them, a methodological problem could be found. Next to the above-mentioned article by Healey and Ellis (2007), three other studies (Sulloway, 2010; Sulloway, 1999; Paulhus, Trapnell, & Chen, 1999) received their data from one sibling scoring his siblings and himself or herself. This way of gathering data was criticized by Sulloway (2007) by bringing up that studies which use this kind of rating could include a "contrast effect", which is 'a tendency for parents and children to magnify true differences in rendering such comparisons' (p. 11, Sulloway, 2007), or that such studies 'may also confuse differences in personality with differences in family role' (p. 11, Sulloway, 2007).

The study of Bleske-Rechek and Kelley (2014) was the only study available which examined the birth order effect and used independent ratings of all siblings applied in a within-family design. This study did not succeed in finding a birth order effect, which could be due to the small sample size of using 69 sibling pairs (Rohrer et al., 2015). Another

possible explanation could be the use of a paired-samples *t*-test, which does not pose an adequate statistical instrument to find a birth order effect. The paired-samples *t*-test examines whether two connected groups differ significantly from each other. It checks whether one groups scores collectively higher on a value than the other (Field, 2013). This states that there is in all families the same pattern, for example that all firstborn score higher on a personality trait than the secondborn children. Sulloway's model (2007) states family internal mechanisms, where no general tendency could be found but where in each family another pattern is visible.

Complementing Constructs

In the above-mentioned studies, the association between birth order and the big five personality traits was examined. But literature implies some personality constructs not being covered by the big five personality traits or being associated with multiple big five personality constructs. Here can be thought of risk taking (O'Neill & Hastings, 2011), optimism (Sharpe et al., 2011) and self-efficacy (Wang et al., 2014) Nevertheless, they are relevant when examining the birth order effect (Sulloway & Zweigenhaft, 2010; Gençoğlu & Kalkan, 2015; Mortimer, 2003).

Additionally, some constructs are covered by the big five personality traits, but their relation with birth order is examined separately (Rotter, 1967; Salmon, Cuthbertson, & Figueredo, 2016; Staples & Walters, 1961). In that way, they were also included within the current study as separate constructs to further specify some of the big five personality traits.

Risk taking, interpersonal trust, optimism, self-efficacy, fear of negative evaluation, and shyness and sociability additionally have been included in the current study. Subsequently, a definition of each construct and studies indicating their importance for the birth order effect are given.

Risk Taking

Risk taking can be defined, as its name implies, as willingness of a person to take risk. It is a general tendency of a person to either avoid or engage in risky behavior (Beierlein, Kovaleva, Kemper, & Rammstedt, 2015). Risk taking is found to be connected to stable dispositional personality characteristics (Cooper, 2010) and thus can be treated as a personality trait (O'Neill & Hastings, 2011).

Sulloway and Zweigenhaft (2010) studied risk taking. In their study, they assumed that differences in risk taking are a consequence of siblings' strategies in competition for parental investment (Sulloway & Zweigenhaft, 2010). This means that younger siblings tend to engage

in more risky situations, which are normally avoided by the older siblings, in order to increase parental investment.

The personality trait of extraversion is further subdivided with one facet being 'sensation seeking' which is found to be connected to risk taking. Also other personality traits were found to be associated with risk taking, namely openness, low conscientiousness, and low agreeableness (Cooper, 2010). O'Neill and Hastings (2011) stated risk taking being more than what the big five personality traits measure and that risk taking is historically difficult to be placed within those traits (O'Neill & Hastings, 2011).

Interpersonal Trust

Interpersonal trust can be defined as expectations of the individual about the matter of fact whether oral or written statements of others can generally be trusted or not. Trust can differ within an individual over different domains. This personality trait is important to minimize uncertainties in daily life (Beierlein, Kemper, Kovaleva, & Rammstedt, 2014).

It was found that the youngest children in the birth order are the least trusting ones. An explanation for that might be that youngest children have the least interaction with parents and therefore do not accept the adult interpretation of verities of society as their older siblings do (Rotter, 1967). Interpersonal trust is a facet of the big five personality trait agreeableness (Rammstedt et al., 2014).

Optimism

Optimism is the tendentious believe that in the future success and positive results will emerge (Augusto-Landa, Pulido-Martos, & Lopez-Zafra, 2011). There are two ways of conceptualizing optimism. One way is to conceptualize it as a personality trait, which means that a person in general has an optimistic expectation of future events. The second conceptualization is to see optimism as an explanatory style, which means that optimistic people explain the cause of events different from pessimistic people. Negative events are explained by attributing them to external factors and positive events to internal factors (Carr, 2003). In accordance with the above-mentioned definition, for the current study optimism is defined as a personality trait.

In Gençoğlu and Kalkan (2015), the authors compared the psychological birth order with the level of optimism. They found the level of the middle child to be higher than those of the oldest and youngest sibling (Gençoğlu & Kalkan, 2015). Sharpe, Martin and Roth (2011) studied the relation of optimism to the big five personality traits and found correlations with different traits. The study found optimism being related to all constructs but openness. The

other constructs showed medium or high correlations with optimism. The authors described optimism as being a sticky construct, linking multiple personality traits together (Sharpe et al., 2011).

Self-efficacy

Self-efficacy can be defined as a self-management ability. It especially refers to the belief that one can effectively interact with the environment and achieve the own goals. Self-efficacy is also an important factor in motivational processes and is associated with decisions and actions (Tovel & Carmel, 2016). Self-efficacy determines 'the effort a person will invest in preserving and attaining relevant resources and how much he or she will persist in this effort, despite obstacles and difficulties' (p. 646, Tovel & Carmel, 2016).

More parental attention, being given responsibility and higher expectations, makes firstborn children identify with parents' values and, lead them to be achievement oriented and to have a high self-efficacy (Mortimer, 2003). Wang et al. (2014) found self-efficacy to have an positive moderate correlation with all big five personality traits, except for neuroticism, which was correlated highly negative (Wang et al., 2014). This means self-efficacy is not a part of one of the traits, but complements them.

Fear of Negative Evaluation

Fear of negative evaluation is typically part of social anxiety and is defined as fright to be evaluated negatively by an interaction partner. It normally comes along with avoiding situations in which a negative evaluation could occur and negative expectations of coming situations (Kemper, Lutz, & Neuser, 2011).

Gates, Lineberger, Crockett and Hubbard (2001) found firstborns scoring lower on general anxiety scores than laterborn children. But Staples and Walters (1961) state that firstborns are more suggestible in anxiety inducing situations, especially in social situations. Also, they more readily change their opinion when group norms are presented (Staples & Walters, 1961), which can point into the direction of firstborns being more afraid of negative evaluation. Thus, it seems as if firstborns in general are less anxious, but are more fearful in social situations containing evaluations. Anxiety and uncertainty are typically part of the big five personality trait neuroticism (Rammstedt et al., 2014). Therefore, it could be interesting to study especially this facet of anxiety and neuroticism.

Shyness and Sociability

Shyness and sociability are important constructs in determining the way of people to deal with others. Among others, shyness includes having problems to get in contact with strangers, feeling uncomfortable in large groups and generally being more uptight. In contrast sociability includes among others enjoying having many people around, being talkative and liking to work together with others (Asendorpf, 1997).

A relation of sociability and birth order was found. It is implied that being later-born has a positive effect on sociability (Salmon et al., 2016). Both constructs are parts of extraversion. Sociability can be found in people who are very extravert, shyness can be found in people who are more introvert (Rammstedt et al., 2014).

Implications of Literature

The above-mentioned literature allows some implications. On one hand, the methodological approach concerning the study of birth order should differ from most of the research done in recent years. In addition to the problem of most studies using a between-family design to study the birth order effect, the way of collecting data could be an impending factor for finding a birth order effect on siblings. Of all studies that applied a within-family design, only one study was based on self-report questionnaires of all siblings. The findings are contradictory and more studies are needed for examining the effect of birth order in a within-family design with self-report questionnaires.

And on the other hand, a new perspective on the association of birth order and siblings based on Sulloway's model (2007) should be mentioned. The model implicates some substantial assumptions that differ from the view of the effect of birth order on siblings which previously had been in use. The hypotheses on which most studies were based (Sulloway, 1995) are stating that there is a general first-, second- or laterborn sibling. The family-niche model (Sulloway, 2007) bases the personality development of siblings more on family internal processes and mechanisms.

The first psychological mechanism of the model (Sulloway, 2007) implicates that first- and thirdborn siblings are treated in a comparable way concerning the parental investment. The middle child receives less resources. A fundamental similarity between personality constructs of the first and last child could be assumed on base of Sulloway's theory.

Following the third psychological mechanism, children take a special niche in the family, which means that children try to specialize themselves in other areas than their older sibling. The fourth psychological mechanism consists of the second child trying to

differentiate itself from the first child. Both mechanisms imply successive siblings developing personality traits which highly differ from each other.

Summarizing these assumptions, the theory implies that first- and secondborn siblings will supposedly develop personality characteristics that run in a contrasting direction. Because of the comparable parental investment and the attempt of thirdborn children to distinguish themselves from secondborn children, it can be supposed that they differ from the secondborn and are simultaneously more similar to the firstborn of the family.

Another reason why the thirdborn child would resemble the firstborn in terms of character traits is a lack of competition. Because of the greater age gap between the first- and thirdborn child and them not being direct competitors, there is no need for them to actively differentiate themselves from each other.

Another assumption can be deduced from the theory, namely that these mechanisms have distinct principles of operation in families with different numbers of siblings. The psychological mechanism implying that are the first and fifth mechanisms. The first mechanism suggests that there is a lack of investment for the second child, but this only applies for families where the second child is in the middle of two other siblings. In the case of having only two children in a family, the second child would have the role of the lastborn child and thus would enjoy similar attention and investment of the parents as the last child would according to the theory.

The fifth psychological mechanism indicates different stereotypical roles of the second child in a family with two in contrast with three or more children. In the first constellation, the second child takes the stereotypical role of the nestling, and in the second constellation, the second child is the middle child.

Altogether, this suggests that there are differences in the association between birth order and personality when comparing first and second child in a family with two siblings and in a family with three or more children. This has not been investigated in literature yet. Therefore, it will be explored in the current study. Because of the lack of literature, there is no hypothesis about the direction in which this association will go.

Current Study

Based on the literature review, the current research aims to answer some of the unacknowledged questions. Therefore, the research question is ‘Which association between sibling birth order and personality characteristics controlled for the total number of siblings in

the family could be observed in a within-family design with independent ratings of all siblings?'

This is the first study examining the birth order effect with self-report questionnaires of the big five personality traits and supplementary personality characteristics of all siblings applied in a within-family design in families with a minimum of two children. The following hypotheses for the current research are used:

H1: Successive siblings in the birth order show a significant negative relation between the measured personality constructs, videlicet the big five personality traits, risk taking, interpersonal trust, optimism, self-efficacy, fear of negative evaluation, and shyness and sociability.

H2: Non-successive siblings in the birth-order show a significant positive relation between the measured personality constructs, videlicet the big five personality traits, risk taking, interpersonal trust, optimism, self-efficacy, fear of negative evaluation, and shyness and sociability.

H3: There are different associations between birth order and measured personality characteristics, videlicet the big five personality traits, risk taking, interpersonal trust, optimism, self-efficacy, fear of negative evaluation, and shyness and sociability, in the first two siblings in families with only two siblings compared to families with three or more siblings.

Method

Design

In this cross-sectional questionnaire study, a within-family design was used. Personality characteristics were used as dependent variable. The siblings' position in the birth order was taken as independent variable.

Ethical Considerations

The study was approved by the ethical commission (17183) of the faculty Behavioural, Management and Social sciences (BMS) of the University of Twente, Enschede, the Netherlands.

Sample

A convenience sample was used in this study. The data was collected over a period of 1.5 months in April and May 2017. The study was started off with by 152 participants. 34 participants could not be taken into consideration because of not filling in the complete

questionnaire or the wrong code, 43 because of being the only ones in their family or the fourth and fifth sibling in the birth order. As a result, 75 participants were included in this study.

The age ranged between 18 and 64 with a mean of 24.7 years, a standard deviation of 6.9 and a median of 23.0. The unbalanced distribution of gender should be noted, with most of the participants being female. All participants were German. Detailed information about the demographic characteristics of the participants can be seen in Table 1.

Inclusion criteria were that participants were able to understand German since the questionnaires were administered in German, that participants had access to a smartphone or computer and had at least one biological sibling, who was willing to take part in the study. Furthermore, the individuals should be internally motivated to take part in the study so that results could be taken seriously. Persons were only included when they were older than 18 years. Other exclusion criteria were cognitive or linguistic restrictions or problems with the perception of the items, which would hinder participants from understanding the items.

Before beginning to collect the data, a power analysis was performed. This was done with the program G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) version 3.1.9.2. The aimed height was a moderate correlation above .32, the alpha probability level was .05 and the power was .80. This resulted in a necessary sample size of minimally 59 participants. This means that minimally 59 participants per group had to be found.

Table 1

Demographic information about the participants

	Proportion	
Characteristics	n	%
Gender		
Male	25	33.3
Female	50	66.7
Highest achieved education		
Certificate of secondary education (German Hauptschulabschluss)	2	2.7
High-school diploma (German Realschulabschluss)	4	5.3
Advanced Vocational Certificate of Education (German Fachabitur)	11	14.7
A Level (German Abitur)	32	42.7
University of applied sciences degree	6	8.0
University degree and higher	20	26.7

Table 1 Continued

Characteristics	Proportion	
	n	%
Living situation		
Alone (without partner)	9	12.0
Alone (with partner)	11	14.7
With partner	13	17.3
With partner and child(ren)	1	1.3
With parents	22	29.3
With friends/roommate	16	21.3
With other family members	3	4.0
Family status		
Married	5	6.7
Unmarried	70	93.3

Materials

Within this study, seven questionnaires were administered. Those questionnaires measured thirteen different constructs and had in total 34 items. Additionally, some questions about the family constellation were asked. Subsequently, those questions and the administered questionnaires are described.

Questions About the Sibling-Constellation

These questions were necessary to figure out what the family looks like. First, it was asked how many biological siblings were in the family in total and which number in the birth order was occupied by the participant. Additionally, it was asked for the sex of the siblings in chronological order. Another question was about the age gap between the siblings. At the end, it was asked whether the siblings grew up together for most of their youth.

Big Five Personality Traits (BFI-10)

The ‘Big Five Inventory‘ (BFI-10) was studied by Rammstedt et al. (2014). The self-report questionnaire has ten items. The BFI-10 measures each construct, namely openness to experience, conscientiousness, extraversion, agreeableness and neuroticism, with two items.

The answers can be given on a 5-point Likert-scale ranging from 1 = ‘trifft überhaupt nicht zu’ (strongly disagree) to 5 = ‘trifft voll und ganz zu’ (strongly agree). One item for each construct is formulated positively, for example ‘Ich gehe aus mir heraus, bin gesellig’ (I see myself as someone who is outgoing, sociable), and one negatively, for example ‘Ich bin eher zurückhaltend, reserviert’ (I see myself as someone who is reserved). The negatively

formulated items must be recoded. Thereafter, for each dimension a mean value has to be computed. The resulting values range from 1 to 5, with a stronger value meaning a stronger manifestation of the characteristic.

The psychometric quality of the BFI-10 was tested by Rammstedt et al. (2014). In test-retest reliability over an interval of six weeks, the estimates ranged from $r = .58$ to $r = .84$, which can be scored as sufficient. In another sample, the test-retest reliability was in most cases above the recommended boundary. Content validity could be guaranteed by formulating the items orienting towards the definition and covering the different aspect of the factor. Factor analysis confirmed the five-factor solution for the BFI-10. Construct validity was tested by correlating the BFI-10 with the NEO-PI-R. Results showed high correlations within the same dimensions (Rammstedt et al., 2014). For the current sample, Cronbach's alpha was .59 for openness for experience, .25 for conscientiousness, .79 for extraversion, .24 for agreeableness, and .46 for neuroticism.

Risk Taking (R-1)

The 'Kurzskala zur Erfassung der Risikobereitschaft' (R-1) was developed by Beierlein et al. (2015) and contains one item capturing risk taking. The item on the self-report questionnaire is scored on a 7-point scale from 1 = 'gar nicht risikobereit' (not at all willing to take risks) to 7 = 'sehr risikobereit' (extremly willing to take risks). The item is worded positively and is 'Wie schätzen Sie sich persönlich ein: Wie risikobereit sind Sie im Allgemeinen?' (How do you see yourself - how willing are you in general to take risks?). The raw value is simultaneously the total value of the questionnaire, which means that the total score varies from 1 to 7. The higher the score, the more the individual is willing to take risks.

The psychometric quality of the R-1 was studied by Beierlein et al. (2015) and was found to be good. The reliability of the R-1 is tested by test-retest and was found to be $r = .74$ after six weeks. To test the validity of the R-1 convergent validity was used. The R-1 was correlated with other questionnaire, such as the German version of the UPPS and the I-8, which also measure risk taking. In most cases the R-1 was highly correlated with the other questionnaires, pointing to a good validity.

Interpersonal Trust (KUSIV3)

The scale 'Interpersonales Vertrauen' (KUSIV3) is developed by Beierlein et al. (2014) and contains three items. It measures the construct 'interpersonal trust'. It can be used as a self-report questionnaire.

Items are scored on a 5-point Likert-scale which varies from 1 = ‘stimme gar nicht zu’ (strongly disagree) to 5 = ‘stimme voll und ganz zu’ (strongly agree). The items are worded positively, e.g. ‘Ich bin davon überzeugt, dass die meisten Menschen gute Absichten haben’ (I am convinced that most people have good intentions). The KUSIV3 is scored by computing the scale mean, which can be between 1 and 5 with a higher value means having a more distinctive trust in other people.

The psychometric quality of the KUSIV3 was found to be good. Cronbach’s alpha for the current study is .80. Beierlein et al. (2014) studied the reliability and validity of the KUSIV3. In their sample, McDonald omega was found to be .85. Test-retest reliability was *r* = .57. For estimating the validity of the KUSIV3, the questionnaire was correlated with other known questionnaires and correlations were as hypothesized. This could in both samples be approved.

Optimism (SOP2)

The self-report questionnaire ‘Skala Optimismus-Pessimismus-2’ (SOP2) developed by Kemper, Beierlein, Kovaleva and Rammstedt (2014) contains two items. The SOP2 measures the construct optimism.

A 7-point Likert-scale is used to answer the items. The items are worded positively, e.g. ‘Optimisten sind Menschen, die mit Zuversicht in die Zukunft blicken und meistens Gutes erwarten. Bitte schätzen Sie sich selbst ein: Wie optimistisch sind Sie im Allgemeinen?‘ (Optimists are people who look to the future with confidence and who mostly expect good things to happen. How would you describe yourself? How optimistic are you in general?). The answers range from 1 = ‘gar nicht’ (not a bit) to 7 = ‘sehr’ (very). To interpret the answers the question about pessimism has to be recoded and a mean value of both questions has to be made. The total answer varies between 1 and 7. The higher the value, the more optimistic the person is.

The psychometric quality of the SOP2 was examined by Kemper et al. (2014). Reliability was computed by means of McDonald omega. In different samples, the reliability ranged between .74 and .83. The test-retest stability is *r* = .59. Validity was approved by correlating the SOP2 with other optimistic questionnaires (Rammstedt et al., 2014). For the current sample, the internal reliability was .87.

Self-Efficacy (ASKU)

The self-report questionnaire 'Allgemeine Selbstwirksamkeit Kurzskala' (ASKU) studied by Beierlein, Kovaleva, Kemper and Rammstedt (2014) measures self-efficacy. The questionnaire measures the construct with three items.

The ASKU is scored with a 5-point Likert-scale ranging from 1 = 'trifft gar nicht zu' (strongly disagree) to 5 = 'trifft voll und ganz zu' (strongly agree). The items are positively formulated, for example 'In schwierigen Fällen kann ich mich auf meine Fähigkeiten verlassen' (I can rely on my own abilities in difficult situations). The mean score has to be computed and varies from 1 to 5 with a higher score corresponding to a higher degree on self-efficacy.

The psychometric quality of the ASKU were studied by Beierlein et al. (2014). Reliability was assessed with McDonald omega, which varied between .81 and .86 in different samples. Test-retest reliability was $r = .50$. Content validity can be guaranteed. Factor analysis showed that all items load .77 or higher on one factor, which can be seen as satisfying (Beierlein, Kovaleva, et al., 2014). Cronbach's alpha for the current sample was .78.

Fear of Negative Evaluation (SANB-5)

The self-report questionnaire 'Skala Angst vor negative Bewertung' (SANB-5) by Kemper, Lutz and Neuser (2011) is the short version of the German adaption of the 'Fear of negative evaluation scale' of Watson and Friend (1969). It measures one part of social anxiety, namely fear of negative evaluation, with five items.

The SANB-5 is answered on a 4-point Likert-scale ranging from 1 = 'trifft fast nie zu' (applies nearly never) and 4 = 'trifft fast immer zu' (applies nearly always). The items are all positively formulated, for example: 'Ich fürchte, etwas Falsches zu tun oder zu sagen' (I am afraid of doing or saying something wrong). Evaluation can be done by computing the sumscore or the mean value.

The psychometric quality of the SANB-5 was tested by Kemper et al. (2011). Reliability was tested with Cronbach's alpha. This was found to be between .84 and .94. One-factor structure could be approved. Construct validity was tested by correlating the SANB-5 with its original version with twenty items. The correlation coefficient was between .90 and .92, implying a nearly perfect correlation. It means that the SANB-5 measures the fear of negative evaluation (Kemper et al., 2011). The Cronbach's alpha for the current sample was .86.

Shyness and Sociability (SGSE)

The self-report questionnaire 'Schüchternheits- und Geselligkeitsskalen' (SGSE) was developed by Asendorpf (1997). The questionnaire measures the constructs shyness and sociability with ten items, each construct with five items.

The SGSE is scored on a five-point Likert-scale varying from 1 = 'gar nicht' (not at all) to 5 = 'völlig' (completely). Seven items are formulated positively, for example 'Ich fühle mich in Gegenwart anderer schüchtern' (I feel shy in the presence of others), and three negatively, for example 'Ich gehe ungezwungen auf andere Menschen zu' (I easily approach others). Negative items have to be reversed. Per scale a mean value should be computed. Values vary between 1 and 5, with a higher value meaning that the personality trait is more manifested.

The psychometric quality of the SGSE has been studied. Cronbach's alpha for the shyness scale is .80 and for the sociability scale between .66 and .70 (Asendorpf, 1997). A negative correlation (r = -.50) was found for the two scales. Correlations with the NEO-FFI approved the validity (Asendorpf & Wilpers, 1998). Cronbach's alpha of the current sample is .84 for shyness and .72 for sociability.

Procedure

Data collection was done by sending an invitation over WhatsApp, email, handing out flyers personally and using classifieds on eBay Kleinanzeigen. The invitation text contained a description of the study and its goal, the procedure and the link to the website. Participants were requested to pass information of the study and the link to the website on their siblings. Also, the email-address of the researcher was given on the invitation to guarantee that possible questions could be answered. To make sure that the family members could be linked in the data, each family came up with their own code which had to be filled in at the beginning of the list of questionnaires. On the website, information was given which instructed the participants to compile their code out of the first two letters of the first name and the last two numbers of the year of birth of the oldest sibling. For example, when the first sibling is named Theresa and is born in 1985, the code would be 'TH85'. This provided an anonymous way to connect family members and no code had to be communicated, which diminished the error rate. The invitation also contained the appeal to ask friends and family to take part in the study. Thus, a snowball effect was used.

Participation in this study was voluntary and data was collected via the platform Qualtrics. It was adjusted that questionnaires could be filled in via both computer and

smartphone. Informed consent had to be given before getting access to fill in the questionnaires. After approving the informed consent, the code had to be filled in, followed by demographic questions and questions about the sibling configuration. This was followed by eight questionnaires about different personality traits. The whole participation was announced to last circa 15 minutes. The actual time needed to fill in the questionnaire started at approximately five minutes and reached a maximum with 23.75 hours. Mean time was circa 41 minutes. Median was 11.5 minutes. The delay in time was due to the participants got and used the opportunity of not completing the questionnaire in one sitting, but to return later.

Data Analysis

The statistical software package SPSS 21 (IBM, 2012) was utilized to process the data. First, dataset was cleaned and E-mail-addresses separated. Descriptive statistics (means, median, standard deviations, percentage share) was used to describe the sample. Negatively worded items were reversed and mean scores of the constructs were calculated. Siblings were connected to each other for analysis. In order to determine the internal consistency of the constructs Cronbach Alpha was employed (Dooley, 2009). Significance level was set at .70 as an indicator for reliability (Spector, 1992).

For the current study, Kendall's tau was used to determine the relationship between the variables. Because of having Likert-scales as answer-categories, a non-parametric correlation should be used (Jamieson, 2004). Therefore, Kendall's tau was chosen. The first two hypotheses were directionally formulated, thus the test could be done one-tailed. The last hypothesis was not directional, thus the analysis was done two-tailed (Steinberg, 2011). The confidence interval of statistical significance was set at 95% ($p \leq 0.05$). The output of the correlation can be categorized as weak when $r < .32$, as moderate when $.32 > r > .50$ and as high when $r > .50$ (Luteijn & Barelds, 2013). Cohen's d was used as an indicator of practical significance. The cut-off points of $d = .60$ for a medium effect and $d = .80$ for a high effect were set (Rubin, 2012).

Results

Description of the family constellation

Of the persons who were included, 57.3 percent (N=43) in total were two biological siblings in their family, 33.3 percent (N=25) in total three biological siblings and 9.3 percent (N=7) in total four biological siblings. 42.7 percent (N=32) were firstborns, 45.3 percent (N=34) were secondborn siblings and 12 percent (N=9) thirdborn children. 97.3 percent (N=73) had grown up together with their siblings most of their childhood. The age gap between the first and

second sibling was a minimum of zero years and a maximum of six years with a mean of 2.9 and a standard deviation of 1.4 years. The age gap between the second- and thirdborn siblings was minimal 1.5 and maximal 11.5 years with a mean of 3.8 and a standard deviation of 2.6 years.

Correlations

Analyses Regarding Hypothesis 1

In the analyses concerning hypothesis 1 regarding the difference between first- and secondborn and second- and thirdborn siblings, no correlation was found to be significant. In total, 9 of 16 correlation coefficients were negative as expected, seven of them being results of the analyses of the second- and thirdborn children.

It was shown that most of the effect sizes were either weak or medium. The constructs with high effect sizes were risk taking with d = .95, self-efficacy with d = .93 and shyness with d =.80 for the comparison of the second- and thirdborn children. Values of all analyses can be seen in Table 2.

Table 2

Correlations of the personality characteristics in the general group for the first- and secondborn (1,2) and second- and thirdborn (2,3) siblings

Personality constructs	n	r	p	Cohen's d
Extraversion $_{1,2}$	31	-.05	.35	.10
Extraversion $_{2,3}$	8	-.12	.35	.24
Risk taking $_{1,2}$	31	.15	.15	.30
Risk taking $_{2,3}$	8	**-.43**	.09	.95
Interpersonal trust $_{1,2}$	31	.20	.08	.41
Interpersonal trust $_{2,3}$	8	-.12	.35	.24
Optimism $_{1,2}$	31	.15	.15	.30
Optimism $_{2,3}$	8	.08	.40	.16
Self-efficacy $_{1,2}$	31	-.02	.44	.04
Self-efficacy $_{2,3}$	8	**-.42**	.08	.93
Fear of negative evaluation $_{1,2}$	31	.15	.13	.30
Fear of negative evaluation $_{2,3}$	8	-.19	.26	.39
Shyness $_{1,2}$	31	.02	.45	.02
Shyness $_{2,3}$	8	**-.37**	.10	.80
Sociability $_{1,2}$	31	.15	.13	.30
Sociability $_{2,3}$	8	-.20	.26	.41

Note. Correlation coefficients with a medium to large effect size are in boldface.

Analyses Regarding Hypothesis 2

Concerning the results of the analyses regarding hypothesis 2, namely the agreements of the first- and thirdborn child on personality traits, no correlation was found to be significant. Seven of eight results of the analyses were positive.

Two effect sizes were found to be moderate und three to be high. The constructs that had high effect sizes were extraversion with $d = 1.28$, risk taking with $d = .85$, and fear of negative evaluation with $d = .90$. All values can be seen in Table 3.

Table 3

Correlations of the personality characteristics in the general group for the first- and thirdborn siblings

Personality constructs	n	r	p	Cohen's d
Extraversion	6	**.54**	.08	1.28
Risk taking	6	**.39**	.16	.85
Interpersonal trust	6	.25	.26	.52
Optimism	6	**.30**	.21	.63
Self-efficacy	6	.00	.50	.00
Fear of negative evaluation	6	**.41**	.13	.90
Shyness	6	**.36**	.17	.77
Sociability	6	.28	.22	.57

Note. Correlation coefficients with a medium to large effect size are in boldface.

Analyses Regarding Hypothesis 3

For the last hypothesis regarding the different associations between the birth order and personality characteristics for the first two children in families with two and in families with three or more children, the main dataset was split for families with two children and for families with three or more children. This resulted in 21 pairs being left for the families with two children and 11 pairs being left for the families with three or more children. Nevertheless, only the personality constructs of the first two children were correlated.

The results of the analyses for hypothesis 5 can be seen in Table 5. In the first group, one negative correlation was significant at $p < .05$. This correlation was shyness with $r = -.34$ ($p = .04$). In the second group on the right column of Table 5, two correlations were significant at $p < .05$ and one significant at $p = .001$. Shyness was found to be the most significant variable ($r = .83$, $p < .01$). Fear of negative evaluation ($r = .54$, $p = .04$), and

sociability ($r = .51$, $p = .05$) were found to be positively associated.

Table 5

Correlations of personality characteristics split for families with two and with three or more children

	Family with two children			Family with three or more children		
Personality constructs	n	r	p	n	r	p
Extraversion	21	-.22	.22	10	.41	.13
Risk taking	21	.03	.87	10	.45	.11
Interpersonal trust	21	.15	.39	10	.00	1.00
Optimism	21	.08	.64	10	.38	.17
Self-efficacy	21	-.03	.87	10	-.18	.50
Fear of negative evaluation	21	.02	.93	10	.54*	.04
Shyness	21	-.34*	.04	10	.82**	<.01
Sociability	21	.03	.85	10	.51*	.05

*$p < .05$
**$p = .001$

Discussion

The current study examined the association between siblings' birth order and personality characteristics overall, and families with three or more siblings were compared with families with two siblings. This was surveyed by means of a within-family design with independent ratings of all siblings. Hypothesis 1 and hypothesis 2 could not be confirmed for the current sample. The results of the analyses for hypothesis 3 show a supposed association between the total number of siblings in the family and personality constructs for the first two children. For the current sample was found that in three children households, the older two children develop similar personality characteristics whereas in two children households they seem not to. Shyness was found to be negatively associated in families with two children. Fear of negative evaluation, shyness and sociability were found to be positively associated in the group with three or more children in the family. Only the third hypothesis could be confirmed for the current sample indicating that the birth order effect is not the pure association of the position in birth order and personality characteristics, but that additional factors, such as total number of siblings in the family, matter too.

Literature Review

Hypotheses 1 and 2

The first hypothesis was about a general difference between first- and secondborn and second- and thirdborn in personality characteristics. In addition to that, the second hypothesis was about the expected agreement between first- and thirdborns in personality characteristics. For both hypotheses, no correlations were found to be significant.

There are studies with which the current results should be compared. In detail, these studies used the within-family design with the big five personality traits which are vital in birth order research. One example would be Healey and Ellis' study (2007). However, they only studied conscientiousness and openness, so a comparison with the current study would not be feasible, due to the insufficient reliability of the two scales for the current sample. Also, Healey and Ellis (2007) did not use independent ratings of all siblings, making the findings generally difficult to compare.

One study using self-report questionnaires in a within-family design was that of Bleske-Rechek and Kelley (2014). The design is comparable to the one used for the current study. Nevertheless, other statistical analyses were used. This could be a reason why Bleske-Rechek and Kelley (2014) were not being able to find proof for an effect of birth order on personality. On basis of a paired-samples *t*-test, it is probably not possible to find such effects. A paired-samples *t*-test analyzes whether there is a significantly higher or lower mean on a personality trait in the second child than in the first. But the theory of Sulloway (1996) never mentioned that the direction of the difference between the means of personality characteristics of the siblings is always in the same direction. The paired-samples *t*-test only shows significant results if those differences are all positive or all negative. In comparison, the utilized correlation shows whether the values of both children behave similarly or go in an opposite direction. Thus, they display the contrasting effect of the psychological mechanisms behind the birth order effect which may have been missed by *t*-tests.

Another difference in the study of Bleske-Rechek and Kelly (2014) was that they did not differentiate between the position in the birth order of the laterborn siblings. They just compared the first child with a laterborn sibling, no matter if that was a second-, third- or fourthborn child. However, Sulloway (1996) hypothesized that the psychological mechanisms act differently between different siblings in different family constellations. For the current study, the differentiation between birth order and siblings was made, making the findings difficult to compare.

After all, an unanswered question remaining is why no significant results could be found in the analyses for the first and second hypotheses. There are several potential reasons. The first reason has a methodological origin. There were fewer participants in all groups than stated by the power analysis. Without that minimal number of participants per group, such an association is more difficult to detect. The second reason is based on the theory of Sulloway. It is possible that the theory applies only for some personality characteristics or specific family constellations. The theory could be too limited to make a general statement about all personality characteristics and influences. The current study points in the direction that multiple factors are important for detecting a birth order effect.

Hypothesis 3

Hypothesis 3 was about different associations between birth order and measured personality characteristics for the first two siblings in families with only two siblings compared to families with three or more siblings. The hypothesis was based on a deduction of the theory by Sulloway (2007). Results were a negatively significant relation for shyness in families with two siblings and a positively significant relation for fear of negative evaluation, shyness and sociability in families with three or more siblings. The current results raise the questions if the psychological mechanisms of Sulloway (2007) actually act differently in families with two and with three or more children. Or more general, whether different family constellations are associated with the position in the birth order, the psychological mechanisms acting within families and personality characteristics.

According to the results of the analyses for the third hypothesis, children tendentiously develop differently from each other when they are only à deux. When a least a third child is in the family, the first two children seem to get closer to each other, so that agreements between them emerge. It seems as if the psychological mechanisms concerning competition between the first two children act stronger in families with two children. One possible explanation is that the first two children suppose that the new competitor constitutes a threat for their parental investment and attention. Fears which the older siblings see as validated as soon as the parents invest more time in the younger sibling, because of the naturally higher demands caused by its infantry. A possible reaction is a stronger bond between the first two children.

Noticeable in the results for the third hypothesis was especially shyness. In the first group, the correlation showed moderately negative significance, in the second group the correlation was highly positively significant. In both groups, shyness had the smallest *p*-value and showed the greatest gap between the values of the correlation coefficients. For the current

sample, in families with two children, the siblings differ from each other concerning their shyness and in families with three or more children, they have a comparable level of shyness. A possible explanation for this phenomenon could be that the first two siblings take on a comparable role when at least one more sibling is in the family. On one hand, the two oldest children need to increase their independence and thus become less shy while parents have to be more attentive regarding the youngest child. On the other hand, the first two siblings are becoming more responsible for younger siblings, thus sharing a role which previously only the firstborn had.

One study (Crozier & Birdsey, 2003) could be found where the association of birth order and shyness was examined. The authors related shyness to the self-reported position in birth order. The differentiation between first- and only child, firstborn with younger siblings and laterborn child was made. In this study, no relationship between the variables was found (Crozier & Birdsey, 2003) but since, the authors did not look at family internal processes, the results are not comparable to the study present.

Practical Implications

In addition to the statistical significance of the current study provided, there can also be thought of practical implications based on effect sizes and trends in the data. There are indications that a larger number of personality characteristics might be associated with birth order than those that were found to be significant. These trends and indications should be treated with caution due to their lack of statistical significance.

Effect sizes indicate the practical relevance of the results. They were computed for the first two hypotheses. In the analyses of the characteristics of the second- and thirdborn siblings, risk taking, self-efficacy and shyness were found to have high effect sizes. In practice, a difference of the second- and thirdborn concerning these personality constructs might be perceived. For the second hypothesis extraversion and fear of negative evaluation were found to have a high effect size and risk taking, optimism and shyness were found to have a medium effect size. For these characteristics, an agreement between the first- and thirdborn child might be observed. Following these analyses, shyness and risk taking seem to fit the best to used theory.

For the first hypothesis trends in the data that point in the hypothesized direction were observed for many associations between second- and thirdborn sibling. Here seven of eight non-significant correlations were in the expected direction, with the only exception being optimism. In the comparison between first- and secondborn sibling only extraversion and self-

efficacy were found to have a negative, non-significant correlation coefficient. For the second hypothesis, seven of eight constructs showed the hypothesized tendency. However, none reached significance. In total, nearly 70 percent of all analyses in the general group were in the expected direction. Of those correlations, 40 percent showed moderate and seven percent even high correlation coefficients in opposite to all correlation coefficients in the non-expected direction being weak.

Regarding hypothesis 3, in the first group, no clear tendency could be found. Except for the construct shyness all correlations were weak and not significant. In the second group, a trend was observable. Six of eight correlations were at least moderately positive correlated, three of them were significant. This implies that the psychological mechanisms act differently on the first two siblings in distinct numbers of siblings in the family, or even different family constellations.

It should be noted that optimism was the only constructs that had a positive, albeit non-significant correlation coefficient in all analyses. This might point in the direction that optimism is comparable in all siblings within families. This implies optimism not being associated with birth order, but being a family internal coherent construct. Sharpe et al. (2011) described optimism as being a sticky construct, which could be linked to multiple personality traits. This could be interpreted as optimism being a construct that is beyond personality traits and thus, a steady construct as indicated above. If optimism is not associated with birth order this could mean that it has a genetical basis or that it is based in early childhood education or environmental influences. In an interview with Fred Goodman, Martin Seligman ("The Infinite Mind," n.d.), one of the pioneers of positive psychology, pointed out that optimism is 50 percent heritable. In the book 'Birth order: what your position in the family really tells you about your character', the authors also refers to a study, which found that persons with a specific genetic variation are more optimistic (Blair, 2013). Also it said that optimism is more associated with the parenting style than with birth order (Blair, 2013). This supports the drawn conclusions.

Strengths and Limitations

Strengths

The first strength is concerning the procedure. The snowball-effect worked satisfactory. Many of those who took part in the study also brought in their friends and colleagues. In total, there were nearly sixty participants who wanted to receive the results via email after the study was finished. This shows the participants' real interest in the study, which indicates that they

answered honestly and that they made an effort to fill in the questionnaires truthfully. This heightens the reliability of the current study.

Summarized, the current study was the first one that examined the birth order effect with self-report questionnaires of all sibling for the big five personality traits and other personality constructs with a within-family design in families with two and more siblings. This is the first study that included more personality constructs than the big five and that consulted more than two children with self-report questionnaires within a study of the birth order effect.

Limitations

As a first limitation, the Hawthorne effect should be mentioned which unconsciously makes participants to change their behavior while taking part in a research study. This is unfortunately true for all studies which the participants are conscious about, especially designs in which the participants are asked to fill in questionnaires and where they consciously think about answers to the questions. Since the participants feel observed, controlled or evaluated they might have modified answers according to what they believed is expected of them (Parsons, 1974).

The sample was a convenience sample, which entails that it could not be controlled how many participants of which demographic group took part in the study. Two issues should be mentioned. The first issue was that an unequal number of men and women took part. Two-thirds of the participants were female. The second issue was age. The participants were on average very young. The median lay at 23 and nearly 90 percent were under the age of thirty. Due to the lack of adequate research in that area, it cannot be said which influence these issues had on the results of the current study.

Another limitation is that the minimal number of participants of 59 given by the power analysis was reached, but this did not apply for every group. Reaching the minimal number of participants would have heightened the opportunity to find statistical significance given that the effect does exist in the overall population (McHugh, 2008).

It should be noted that the items for four of the big five personality traits were not reliable enough for the current study. Without those traits, a large part of constructs describing personality missed. The other constructs measured were originally primarily complementary construct to broaden the picture of the whole personality. This reduces the validity of the current study and diminishes the generalizability.

Recommendations

For further research, it is important to use different questionnaires concerning the big five personality traits. Alternatives with more questions for the five factor model would be the B5T (Satow, 2012) or the BFI-S (Gerlitz & Schupp, 2005). Additionally, it would be interesting to study some more personality characteristics to see which effect the birth order has on them, especially other personality constructs that are not covered by the big five personality traits, such as integrity, egotism and manipulativeness (O'Neill & Hastings, 2011).

Not only more or other questionnaires concerning the measured personality constructs could be used for analyses, but research could also concentrate on different variables concerning the demographics of siblings. Here, studies about the age gap and age by itself, but also of children's gender could be possible. It would be interesting to find out whether the competition between the siblings is higher if they have the same sex or different sexes. The number of children in a family could be examined in more detail. Also, the time spent together in their youth is important. Furthermore, it could be thought of an association with non-biological or half-biological siblings. Another interesting topic would be the parents: whether they are divorced, living together, being both the same sex, or how old they were when they got parents.

The term birth order effect should be studied in-depth. There is no clear definition as a basis for doing research. There were only some papers to be found that studied this topic with a within-family design, although Sulloway's theory about the psychological mechanisms in families is already twenty years old. Altogether, the within-family design seems to fit to the question about the birth order and more research about this topic should be done this way.

Another point which should be studied in further research concerns those personality constructs which are not significant for the current sample, but which have a high effect size. These are in the analyses of the first hypothesis risk taking, self-efficacy and shyness. For the second hypothesis extraversion, risk taking and fear of negative evaluation were found to have high effect sizes. Further research regarding these constructs and their relation to birth order should be done.

Conclusion

The current study demonstrated a lack of research concerning the birth order effect. It was the first study examining multiple personality constructs in a within-family design with self-report questionnaires of two and more siblings. The results indicate that Sulloway's theory

about the psychological mechanisms playing within families points in the right direction, but that the theory is too limited. It seems as if the psychological mechanisms are acting differently in distinct family constellations. The study had too few participants to make more generalizable statements. Birth order itself has to be defined and all influential and associated variables need to be studied in further research. Also, more studies using a within-family design should be implemented.

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