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The Effect of Consanguineous Marriage on Dyscalculia in the Arab Community

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Abstract
The aim of the present research is to examine the effect of consanguineous marriage on the dyscalculic rate among four groups, consisted of Dyscalculic children of first cousin parents, second cousin parents and several generations parents, in comparison to children of nonrelatives parents. Therefore, a dyscalculic test consisted of the four mathematical skills was prepared by a team of experts and given to the children on their schools. The dyscalculic test included the four basic mathematical skill: addition and subtraction, completing the series, multiplication and division and reading task.

The findings of the study revealed the effect of consanguineous marriage on the dyscalculic rate among children of related parents. The failure among children of relative's parents was significantly greater compared to children of nonrelatives parents on the dyscalculia recognition test. Moreover, the study found a significant differences among the Several generations cousins' group compared to the other groups. The Several generations cousins group performed significantly lower at all four mathematical skills compared to the other groups.

Keywords: *Dyscalculia, Arab Community, Blood related marriages, parents as cousin, Unrelated parents.*

INTRODUCTION

The present study examined the effect of consanguineous marriages on Dyscalculia disabilities of offspring in the Arab community. Consanguineous marriages are between blood relatives. According to the World Health Organization Guidelines, a consanguineous marriage is defined as a marriage between people who are second cousins or more closely related (Modell & Darr, 2002). Consanguinity is a well-known risk factor for genetic disorders, including diseases and syndromes that present with intellectual and developmental disabilities (Abu Saad, Elbedour, Hallaq, Merrick & Tenenbaum, 2014).

It is estimated that globally about 20% of the human population live in communities with a preference for consanguineous marriage, and that at least 8.5% of children have consanguineous parents (Modell & Darr, 2002). The study has investigated whether the rate of dyscalculia would be higher in offspring of first-cousin parents, children of second cousin's Parents, children of Cousin parents for several generations in comparison to children of unrelated parents**.**

Dyscalculia is one of the less well-known learning problems in mathematics due to lack of exposure and researches. Children with dyscalculia usually face arithmetic and symbolic number comparison issues, with about 3%-6% percent of individuals affected (Mahmud, Mohd, Zainal, Rosli &Maat, 2020). In addition, Grant, (2017) claims that even though there are various types of learning

problems such as dyslexia, attention deficit hyperactive disorder (ADHD), and autism, not many know that there are also learning problems that involve learning mathematics known as Dyscalculia.

According to the American Psychiatric Association (2013) DSM-5 which is the fifth edition update of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, dyscalculia is now referred to under the umbrella term of Specific Learning Disorder (SLD) with an impairment in Mathematics. The lack of wide-ranging studies about identifying the main reasons of dyscalculia and how to cope with it could be a serious problem because it can pronolog up to adulthood (Mahmud, Mohd, Zainal, Rosli &Maat, 2020).

The American Psychiatric Association (2013) showed that Dyscalculia is an alternate term used to refer to problems characterized by the processing of numerical knowledge, the acquisition of arithmetic facts and the performance of correct calculations). Dyscalculia is a difficulty in acquiring basic mathematical skills and knowledge of numbers, arithmetic facts and calculations. This difficulty may interfere with subsequent mathematical learning ability (Henik, Rubinsten & Ashkenazi, 2011). The American Psychiatric Association (2013) claims that If dyscalculia is used to specify the particular pattern of mathematical difficulties, it is also important to specify any additional difficulties that may arise, such as difficulties with math reasoning The study focused on the failure of processing numerical knowledge and the performance of correct arithmetic operations in dyscalculic children of related parents compared with age-matched children of unrelated parents.

LITERATURE REVIEW

Consanguineous Marriage

Consanguineous marriages have been practiced since the early existence of humans, meaning marriage between close relatives. Even though consanguineous marriage has cultural and socioeconomic advantages, their offsprings have an increased risk for recessive disorders. The risk is not the same in all cases and it varies based on several factors (Neelam, Jaideep, Ashwani & Wahied,2022). The consanguineous marriage is one of the cultural related events worldwide, particularly in low-income countries (Oniya, Neves, Ahmed & Konje, 2019).

Although marriage between biological relatives is preferred in many parts of the world, there is still a great lack of knowledge about this central feature of human kinship structure (Bittles,2001). Recent studies show that 10.4% of marriages in the world occur between blood relatives. This type of marriage has been historically accepted in many populations in the Middle East, West Asia and North Africa, as well as among emigrants from these populations now living in North America and Europe (Fared & Afzal, 2017).

The specific types of preferred family marriage can vary greatly between and within different countries, religiosity, ethnicity and local or tribalism play a key role at the local and national level. The most common reasons for the popularity of family marriage can be summarized as follows: a strong family tradition of family marriage; maintaining family and property structure and strengthening family ties; financial benefits associated with dowry or wealth payments for the bride; ease of marriage arrangements and closer relationship between the woman and her mother-in-law; and greater marriage stability and resilience (Bittles 1994; Husain 1999). In communities with high consanguinity rates, sociological studies indicate that consanguineous marriage could enforce the couples' stability due to higher compatibility between husband and wife who share the same social relationships after marriage as before marriage, as well as the compatibility between the couple and other family members (Neelam, Jaideep, Ashwani & Wahied, 2022).

Of the major populations studied so far, the highest rates of family marriage were associated with low socioeconomic status, illiteracy, and rural residence (Bittles, 1994). Genetic diseases are significantly higher in many consanguineous marriages which suggests that couples may have deleterious lethal genes, inherited from a common ancestors and when transmitted to their offspring, they can lead to prenatal,

neonatal, and child morbidity or mortality. So public health education and genetic counseling are highly recommended (Rabah, Solaf, Mouchira, Sahar & Ferihan, 2013).

Consanguineous Marriage in the Arab Community

Among the major population surveyed, the highest rates of inbreeding marriages have been observed in the Arab world (Bittles & Hamamy, 2010). Among Arabs, consanguineous marriages are customary and constitute 20-50% of all marriages and First cousin marriages constitute almost one-third of all marriages in many Arab countries (Hamamy, 2003). Thus, the prevalence of consanguineous marriage remains high among the Arab population in Israel, like in other Arab societies (Rajech, Khatib, Ahmad Sheikh, Mahajnah & Zalan, 2021).

Intra-family marriages are popular with the Arab community in Israel, almost all of whom live in villages inhabited by several founding families. A previous study in Taibeh, a large Arab village located 30 km from Tel Aviv, showed a significantly higher rate of malformations among infants. In addition, this study, combined with previous studies on the same population, indicates a significant public health problem related to Arabic family marriage and the need for specific genetic counseling (Jaber, Merlob, Gabriel & Shohat, 1997).

The prevalence of consanguineous marriage among the Arab population in Israel increased significantly from 36.3% to 41.6% in the decade from 2007 to 2017. First-cousin and closer marriages constituted about 50% of total consanguineous marriages in the two periods surveyed (Rajech et al., 2021). Several factors may have an influence on the consanguinity rates in Arab countries. These factors include urban/rural residence of families within the country, education levels of parents, religion, and time trends. (Hamamy, 2003).

Learning Disabilities in Mathematics

Specific learning disabilities (SLDs) are highly relevant to the science and practice of psychology, both historically and currently, exemplifying the integration of interdisciplinary approaches to human conditions (Elena, Lynn, Erik, Donald, Richard & Jack, 2020). learning disabilities can be defined as an adverse developmental outcome resulting in unexpected and significant difficulty with basic academics (Stephen & Brent, 2006).

The term 'learning disability' generally focuses on the long-lasting and general type of learning difficulty which is related in general to special education (Cappelli, 2018; Lenhard & Lenhard, 2013). It occurs due to genetic and neurological differences in brain structure and function, and affects one's ability to receive, store, process, retrieve, or communicate information (Cortiella et al., 2014; Soares et al., 2018).

Statistical data on special education categories indicates that specific learning disabilities (SLD) are among the most commonly observed disabilities in special education (Balikci & Melekoglu, 2020). Between 1976 and 1977 and 1998–1999, the number of students identified with a learning disability doubled to more than 2.8 million, representing just over half of all students with disabilities (Mercer & Hallahan, 2002).

Recognizing the symptoms in many areas during early childhood and implementing preventive intervention programs positively, affects future learning experiences (Balikci & Melekoglu, 2020). Students with learning disabilities are able to learn strategies tailored to the tasks that enable them to succeed in school (Mercer & Hallahan, 2002). Furthermore, ongoing studies have supported earlier conclusions that learning disabilities may be the result of neurological dysfunction and that heredity is involved in many cases where learning disabilities are diagnosed. (Mercer & Hallahan, 2002). In addition, children who demonstrate learning disabilities during their elementary school years demonstrate early biological vulnerabilities including a genetic liability for mild cognitive delays or low birth weight (Stephen & Brent, 2006). Although each domain varies in its cognitive correlates, treatment and neurobiology are overlapped (Elena, Lynn, Erik, Donald, Richard & Jack, 2020).

Learning difficulty of mathematics is a global issue and it is considered an important and necessary subject in school education due to its everyday uses (Kunwar & Sharma, 2020).The mathematics learning disability is defined as a kind of brain damage that affects digital and mathematical data processing skill (Geary & Hoard, 2001). Alongside this definition, the indications of mathematics learning disability might occur in a great variety of ways, and math related problems that appear in a child, manifest themselves as having difficulty in expressing qualitative and quantitative relationship of the numbers (Geary & Hoard, 2001). Specific math disabilities (SMDs) are differentiated as calculations versus problem solving, which are associated with distinct cognitive deficits and require different forms of intervention (Elena et al., 2020).

Dyscalculia and its Characteristics

The term 'dyscalculia' has Greek as well as Latin origins. The prefix 'dys' in Greek means 'badly', where as 'calculia', i.e. 'calculare' in Latin means to count (Khing, 2016). Dyscalculia refers to a specific and lifelong difficulty in learning mathematics and it has been observed among students from even basic levels of mathematical studies, and its effects regarding mathematical learning are serious(Kunwar&Sharma,2020). In addition,Dyscalculia is defined as substantial underachievement on a standardized test of arithmetic relative to the level expected given age, education, and intelligence which causes disruption to academic achievement or daily living (Butterworth, 2019). Dyscalculia is a developmental disorder characterized by difficulty learning and remembering arithmetic facts (Geary & Hoard, 2001; Rosselli & Matute, 2005; Shalev & Gross-Tsur, 2001). These difficulties or disabilities present in the learners' characteristics include cognitive and neuropsychological profiles, low linguistic skills, a lack of prerequisite knowledge and skills for mathematics learning, and learning difficulties or disabilities (Sharma, 2020).

Pupils who experienced significant challenges in learning Mathematics but no problems learning other areas of the curriculum are known as dyscalculic (Butterworth, 2019). Furthermore, Some students may exhibit the common mathematical difficulties in numerical and arithmetic deficiencies like counting and calculation (Hornigold, 2015). The environmental factors, such as low attendance, inappropriate way of teaching, lack of practice, poor curriculum, low standard of mastery of the subject matter, etc) create much higher difficulty in learning mathematics during the education (Sharma, 2020). Children with dyscalculia usually face arithmetic and symbolic problems in comparing numbers, with about 3%-6% percent of people being affected (Mahmud, Zainal, Rosli & Maat, 2020).

Children with dyscalculia may demonstrate a difficulty in learning quantitative problems, manipulating quantities, learning numbers facts and numerical knowledge, and problems in learning basic arithmetical facts (Butterworth, Varma & Laurillard, 2011). From the cognitive point of view, the research attributes the failure in learning math among children with dyscalculia to the difficulty in understanding the quantitative magnitudes, is which leads to leads to a difficulty in learning the quantitative value of numbers (Dehaene, 2011).

Moreover, students with learning disabilities appear to have problems with many aspects of basic number sense, such as comparing sizes of numbers by quickly visualizing number lines and turning simple verbal problems into simple equations (Jordan, Hanich, & Kaplan, 2003). The dyscalculic children have two types of problems, related to mathematical computation and reasoning (Khing, 2016). Dyscalculia is one type of learning difficulties and it has to be detected as early as possible (Yoong & Noor 2021).

Jacobson (2020) noted some signs that should be noted in children associated with dyscalculia. A young child with dyscalculia has difficulty recognizing and remembering numbers, is slow in counting, does not have the ability to associate the number symbol with the number value, has difficulty identifying patterns and arranging things, always needs concrete or visual aids to help him calculate. Lack of extensive research about the characterization of the condition through studies have hampered progress in

identifying the root causes of dyscalculia and how to best treat it. This problem can be more severe because it can last until adulthood (Mahmud, Zainal, Rosli & Maat, 2020).

Risk Factors of Dyscalculia

In general, studies on the exact cause of dyscalculia are very few compared to studies done on dyslexia and therefore it has been determined that the rate of research on dyslexia versus dyscalculia is 1:14 which leads to a poor understanding of the real cause of this problem (Price & Ansari, 2013). There are many causes for the brain functioning differently in dyscalculic children. This includes both genetic and environmental and an interaction of the two (Babu & Sasikumar, 2019). However, there are findings from previous studies that can be used as a guide to determine if a person has dyscalculia (Price & Ansari, 2013). In addition, it's associated with procedural difficulties as well as neurological dysfunction in arithmetical calculation (Sharma, 2020).

Dyscalculia is due in part to a genetic aspect that is not yet understood at the molecular level, where it is emphasized that the coding variant of the myosin-18B gene has been shown to be related to mathematical abilities and has a special effect in children with dyslexia. Thus, based on this, it seems that dyscalculia appears in families, and genetics can also play a role in influencing the gaps in children's mathematics (Pettigrew, 2015). In 1990s, parental monitoring studies carried out by various researchers, verified the strong hereditary effects on the genetic linkage analyses and specific learning disabilities (Oner, 2007). Besides the common factors where a great number of researches agree on the cause of specific learning disability; it is also considered that many factors such as consanguineous marriage, genetics, metabolic diseases, after-birth diseases, central nervous systems infections and early childhood period might also cause specific learning disability (Aslan, 2015). Learning difficulty is treated as situational, particularly, situated outside the child, and as the consequence of the specific causes, such as physical, educational, emotional and environmental factors (Kunwar & Sharma, 2020).

The study examined the effect of consanguineous marriage on the mathematical skills of four groups which consist of Dyscalculic children of first cousin parents, second cousin parents, several generation relatives, in comparison to children of nonrelative's parents.

Research hypotheses

1. The dyscalculic rate appears to be significantly higher among children of related parents than in children of unrelated parents.
2. Dyscalculic children of distant relative parents should score significantly higher in dyscalculia rate in comparison with dyscalculic children of first cousin parents, second-cousin parents and unrelated parents.

METHOD

Participants and Design

The participants in the study were 143 students, 78 boys and 65 girls. Of these, 60 are in 4th grade, 35 are in 5th grade and 48 are in 6th grade. All participants are neurotypical (i.e. not 'special needs') pupils from four Arab villages and two Arab cities.

All the participants were sampled from a middle socioeconomic status (SES) Arab area. The participants had to answer a mathematics test to identify Dyscalculia. The youngsters' parents agreed to have them participate in the study. Participants were divided according to the degree of relatedness of their parents, grade and gender. 42 participants (30% of the sample) were determined to be children of first cousins, 36 participants (25%) were children of second cousins, 33 participants (23%) were children of distant relatives, and 32 participants (22%) were children of nonrelatives. All the participants in the experiment were classified as Dyscalculic according to the dyscalculia diagnostic test in conjunction with evaluations of their teachers.

A person who suffers from a disability may struggle with numerous efforts to master a wide range of basic mathematical skills such as counting, numerical operations, arithmetic, transcoding between

words, digits and quantities, and spatial number representation (Hornigold, 2015). The disorders make it difficult for sufferers to carry out simple mathematic functions like addition, subtraction, multiplication and division (Khing, 2016).

All the Participants were divided based on to their parents' closeness, grade and gender. they had given a test to identify their control over the four basic mathematics operations. The Participants asked to solve a mathematical questionnaire that diagnoses dyscalculia among elementary school students, the questionnaire included the basic mathematic questions in four arithmetic operations that regular students should fully master. Participants who are able to partially master these four arithmetic operations are potential students with dyscalculia diagnosis.

The questionnaire included the following four arithmetic operations:

1) Addition and Subtraction: One of the issues related to early mathematics skills is that children can perform addition and subtraction procedures quickly by the way of recalling without calculation (Koc & Korkmaz, 2020). It is stated that the students who have mathematics learning difficulties are about two years behind their peers and one year behind their peers in terms of working memory capacity during learning mathematic strategies used to solve simple (4+3) and complex (16+8) addition operations (Geary, Hoard, Byrd-Craven, & De Soto, 2004). Students with learning difficulties in mathematics generally use underdeveloped calculation strategies such as finger counting when performing calculations (Koc & Korkmaz, 2020). In addition, the student is unable to add up the numbers when his fingers were not enough to count (the numbers whose results were higher than 10 in total) and he was unsuccessful in subtraction when his fingers were not enough (Koc & Korkmaz, 2020). Children facing this find it difficult to count and recognize mathematical signs (Khing, 2016).

2) Multiplication and division: Division and multiplication materials are often considered one of the most challenging elements for students to understand, and the teaching rarely uses teaching aids (Aprinastuti, Anggadewi, Suharno & Wiyantari, 2020).

3) Sequence: dyscalculia can be of many types, one of them is Sequential; The disorder makes it difficult for the disabled to count numbers in a sequence (Khing, 2016). The difficulty of students, begins with the inability of students to understand the concepts and sequences of numbers. So that also affects other mathematical operations (Azhari, Yacoeb & Irfan, 2020). Dyscalculic children have A very poor sense of mathematical concepts, rules, formulas and sequences (Khing, 2016).

4) Word problems: Educators and psychologists consider word problem-solving as an indicator of employment and wages since it is standing on applying mathematics in everyday life (Fuchs, et al.,2020). Students presenting dyscalculia also have difficulty solving mathematical word problems (Jeya & Albina, 2019).

Tools

A series of tests conducted to evaluate the numerical processing and mastery of the four basic arithmetic operations of dyscalculic children. They were built by a team of experts for the purposes of this study.

The battery of tests consists of four tests, each test consist of several exercises.

Test in addition and subtraction (alpha=0.76)

The students were asked to solve simple and complex addition and subtraction questions which consists of numbers greater than 20 and numbers less than 20; addition and subtraction of even numbers, digit and two-digit numbers, addition and btraction of odd numbers.

Test for calculating the distance of a series (alpha=0.85)

This test used four series, two ascending series and two descending series. Students were presented with an organ-free series and were asked to complete the missing organ. This examined whether the student is able to use addition and subtraction procedures and and be able to complete each given series.

Test in multiplication and division operations (alpha=0.75)

The test consisted of four exercises, two multiplication and division exercises in numbers less than 10, two multiplication and division exercises in numbers greater than 10. The test measured the child's ability to solve the exercises based on the multiplication table up to 10.

Test of mathematical reading task (alpha=0.72)

The test consisted of two reading comprehension tasks that corresponds to the grade level of the student according to the curriculum (and not to the level of the student himself), the participants had to read and understand the verbal problem and answer the requested one.

The student presented a reading task that consist of numbers less than 20 and numbers greater than 20. The underlying goal of the test is that the participant should rely on reading comprehension before he or she begins to solve the exercise which is indicative of normal mental functioning.

The experiment carried out on four groups: Dyscalculic children of first cousins, Dyscalculic children of second cousin, Cousin parents for several generations and dyscalculic children of unrelated parents. The participants were tested based on the rubric mentioned above and the meeting took place in quiet rooms at the participants' schools

PROCEDURE

The parents' questionnaire was sent to the parents with their children. It was distributed to 220 Arab children from grades 4, 5 and 6 in four Arab villages and two Arab cities. 65% of the parents agreed to have their children participate in the study. The children took the Dyscalculia test and were asked to solve the test on their own. The children passed the test in one session at their school in a quiet room which lasts up to 30 minutes. These results were used to test the hypothesis of the study.

A battery of tests was built by a team of experts which included a didactic diagnosis and two mathematics teachers for the purpose of this study. In order to identify children at risk for a weakness in arithmetic (dyscalculia) at an early stage and to adequately support their needs, it is essential to set up a well-functioning diagnosis (Aquil, 2020). The study focused on the effect of consanguineous marriage on Dyscalculic children of offspring; Therefore, the experiment done on Dyscalculic Children of related parents in comparison with Dyscalculic children of unrelated parents on four basic arithmetic operations which were addition, subtraction, multiplication and division.

Mathematical computation-related problems affect an individual's ability to solve mathematical calculations such as addition, subtraction, multiplication, and division problems. Such mathematical problems usually begin at the basic level and continue through the secondary level (Hornigold, 2015). The series of tests contained this four arithmetic in different ways: Test in addition and subtraction operations, Test for calculating the distance of a series, Test in multiplication and division operations and test for reading comprehension mathematic tasks.

The participants of this study were 143 dyscalculic children from 4th grade to 6th grade that were diagnosed by their teachers through a didactic diagnosis in their schools. During the study dyscalculic children of related and unrelated parents were chosen, after searching for them in several elementary schools along with their teachers and the Didactic diagnostician. I contacted the parents, who were given a wide explanation about the research. The meeting with the parents was at the school in order to confirm their children participation in the study.

To test the research hypothesis, the children were asked to solve the series of tests, written for the purpose of this study, measuring the Dyscalculic rate among the children. The results of the test were evaluated to discover which group of Dyscalculic Children performs within the normal range in the tests and which group performed significantly lower than the other groups in the didactic diagnoses test, the final score was the number of correct answers on all the tasks. The differences among the tests scored by the four different groups were tested by a MANOVA and a post hoc Tukey test.

RESULTS

The results are presented in reference to the research hypotheses.

The first hypothesis: The dyscalculic rate appears to be significantly higher among children of related parents each one of the groups compared to children of nonrelatives parents.
The differences between the four groups were tested by a two way ANOVA test Including the group and grade as independent variables. Grade was considered a control variable. The Anova model was significant [F (5,137) =57.15, P<0.0001]. Significant differences were found between the four groups [(F (3,137)=73.67, p<0.0001)]. multiple comparisons were performed to detect the differences among the groups using Tukey-Kramer adjustment. All groups were found to be significantly different from each other, the nonrelatives had the highest-level grades significantly different from all other groups. Furthermore, The differences between the 4th, 5th and 6th grades in the final scores were also significantly different] (F(2,137)=30.37, p<0.0001)].

Table 1. Means and standard deviation of the final score at the dyscalculic test of grades 4, 5 and 6 as a function of parental biological relatedness.

Groups	Grade 4	Grade 5	Grade 6
Several generation cousins	38.38 (8.9)	46 (9.9)	45 (8.2)
First cousins	46.9 (11.5)	58.6 (9.8)	67.7 (10.5)
Second cousins	60.3 (13.4)	68.8 (10.4)	73.5 (13.4)
Nonrelatives	71.1 (11.6)	82.5 (12.9)	94.6 (5.0)

[a] Standard deviation are in parentheses.

Testing the second hypothesis. Dyscalculic children of Several generations cousins should score significantly higher in dyscalculia rate in compared to dyscalculic children of first cousin parents, second-cousin parents and unrelated parents.

Two way ANOVA tested the differences between the groups where the grades was included in the model as a control variable. To compare the several generations croup to other groups, multiple comparisons were performed used the Dunett-hsu method. The group of Several generations were found to be different for all other groups.

Addition and subtraction test

The mean score and Standard deviation of addition and subtraction test are presented in table 2. The Anova model was significant [F (5,137)=21.43, P<0.0001]. significant differences were found between the groups [F (3,137)=27.94 P<0.0001)]. in addition, there was a significant differences between the grades [F(2,137)=11.53, p<0.0001]. Multiple comparisons using the Dunnet-hsu method was performed to compare several generation groups to all other groups.

Table 2. least square means for addition and subtraction among the groups in comparison to several generations group.

Groups	Average of addition and subtraction	P valve (compared to	Several generation group)

First cousins	18.928	0.0006
Second cousins	22.035	<0.0001
Nonrelatives	25.627	<0.0001
Several generations cousins	14.335	

Completing the series test

The mean score and Standard deviation of addition and subtraction test are presented in table 3. The Anova model was significant [F (5,137)=20.41, P<0.0001]. significant differences were found between the groups [F(3,137)=30.74 P<0.0001)]. in addition, there was a significant differences between the grades [F(2,137)=11.53, p<0.0174]. Multiple comparisons using the Dunnet-hsu method was performed to compare several generation groups to all other groups.

Table 3. least square means for completing the series test among the groups in comparison to several generations group

Groups	Average of addition and subtraction	P valve (compared to Several generation group)
First cousins	14.142	0.0002
Second cousins	16.702	<0.0001
Nonrelatives	17.850	<0.0001
Several generations cousins	11.136	

Multiplication and division

The mean score and sd of addition and subtraction test are presented in table 4. The Anova model was significant [F(5,137)= 8.821, P<0.0001]. significant differences were found between the groups [F(3,137)=20.97, P<0.0001)]. in addition, there was a significant differences between the grades [F(2,137)=15.59, p<0.0001]. Multiple comparisons using the Dunnet-hsu method was performed to compare several generation groups to all other groups.

Table 4. least square means for multiplication and division test among the groups in comparison to several generations group

Groups	Average of addition and subtraction	P valve (compared to Several generation group)
First cousins	12.099	0.0021
Second cousins	14.259	<0.0001
Nonrelatives	16.220	<0.0001
Several generations cousins	9.001	

Completing the series task

The mean score and Standard deviation of addition and subtraction test are presented in table 5. The Anova model was significant [F(5,137)= 34.09, P<0.0001]. significant differences were found between the groups [F(3,137)==43.24, P<0.0001)]. in addition, there was a significant differences between the grades [F(2,137)=18.23, p<0.0001]. Multiple comparisons using the Dunnet-hsu method was performed to compare several generation groups to all other groups.

Table 5. least square means for multiplication and division test among the groups in comparison to several generations group

Groups	Average of addition and subtraction	P valve (compared to Several generation group)
First cousins	12.458	0.0259
Second cousins	14.573	<0.0001
Nonrelatives	23.106	<0.0001
Several generations cousins	9.204	

SUMMARY OF RESULTS

The first hypothesis was confirmed. The dyscalculic rate appeared to be significantly higher among children of several generations cousins parents than in children of first and second cousins parents and of nonrelatives parents.

The second hypothesis was also confirmed. The results of the study indicated significant difference at all mathematical skills, between the several generations' cousins' group and the other three groups, the dyscalculic rate appears higher on four mathematical skills: addition and subtractions, completing the series, Multiplication and division and mathematical reading task.

DISCUSSION

The results confirm the first hypothesis. The failure among children of relatives parents was significantly greater compared to children of nonrelatives parents on the dyscalculia recognition test. The study also tested the second hypothesis and found a significant differences between the Several generations cousins' group compared to the other groups. The Several generations cousins group performed significantly lower at all four mathematical skills compared to the other groups.

Dyscalculic Rate Among Children of Relative Parents

The study argued throughout that the children of relative's parents have a greater dyscalculia rate compared to children of nonrelatives parents. In addition, the study also argued that the genetic factor has an effect on the dyscalculic rate among children of relatives' parents. In particular, the dyscalculic test which contained the four basic mathematical skills answered the second hypothesis and found that the several generations group scored significantly lower all the mathematical skills compared with the other groups, which confirms the hypothesis.

The finding of this study highlights the relation between the four mathematical basic skills and the dyscalculic rate, the group of several generations parents showed the lowest performance at the dyscalculic test. This analysis supports the theory that explains the negative effect of consanguineous

marriage on mathematical basic skills even at the lowest grades. consanguineous marriages are closely associated with genetic or congenital disorders (Alanze, 2019). This is in addition to the biological relatedness which was found to be an essential factor in explaining the variance between the different groups (Abu Rabia&maron,2005). This finding supports the difficulty of dyscalculic children in learning the basic mathematic skill of addition and subtraction, the ability to understand and work with numbers, processes and arithmetic contents. Some dyscalculic children have complications to understand mathematical concepts. They work hard to learn and memorize basic numerical data, they can understand what to do in math class, but not why they do it, that is, they do not understand the logic of the process (Scrich, et la., 2017). This finding confirms the greater hazard of genetic disorders appearing in offspring of several generations' cousins.

The failure on the dyscalculic test at basic mathematical skills

Addition and subtraction

The failure in the dyscalculic test among children of several generation parents was higher compared to other groups. It was surprising to find that dyscalculic children of several generation parents found it difficult at the subtraction skill more than the addition skill. In the subtraction task the children felt the need to use a strategy in order to complete the task, they all started to calculate by fingers. After the student understands the essence of subtraction, in order to subtract a number from another one, the strategy of counting backwards from the larger number to the smaller one by using fingers should be taught (Koc & Korkmaz, 2020).

The group of several generation parents indicated that greater relatedness of the parents was associated with scores of their children in completing the series mathematical skill. Weakness in algorithmic thinking is noticed more at the subtraction series. This finding supports previous results that dyscalculic children have difficulty in algorithmic skills. "Algorithmic thinking ability" is a term which describes the capacity needed in order to complete a task using a series of default actions, aiming at completing a process (Futschek, 2006).

Multiplication and Division

The experiment provides a new insight to the relation between multiplication and division difficulties among children of several generations group and dyscalculic rate. The dyscalculic rate appears significantly higher among children of several generation group at multiplication and division test. Individuals display a mathematics disability when their performance on standardized calculation tests or on numerical reasoning tasks is comparatively low, given their age, education and intellectual reasoning ability (Munro, 2003). The study has shown that solving the two problems which includes numbers less than 10 wasn't challenging for the children compared to problems greater than 10. These confirm previous results that found difficulties in counting, especially referring to numbers bigger than ten (10), as well as counting down are noted in these ages (Shalev et al., 2000). In other words, they face troubles in counting orally or even more in writing the number (Richardson, 2008).

Learning Disabilities; the Relation Between Dyslexia and Dyscalculia

The data provides new evidence of the relation between the two learning disabilities: dyscalculia and dyslexia among children of relative's parents. The reading task part found to be the most difficult part among all the groups at all grades. In order to solve mathematical reading task, the children need first to read and understand the task, which is verry hard for dyscalculic children. Many researchers have found that dyscalculic children have reading difficulties. Given that mathematics has its own language that includes special terms, number syntax and symbols, language skills are very important for mathematics achievement (Gordana, Zoran, Jelena, Andeka, Srdana & Dragons, 2013). In addition, reading requirements of textual tasks increase with each year so that many students who have difficulty in reading also have problems in solving the tasks set in words. In addition, the written work in mathematics can be

difficult for children with difficulties in handwriting, grammar and writing composition (Wadlington E & Wadlington LP 2008). In addition, several researchers found that there are many cases of children with dyscalculia but also have some other problems such as ADHD and dyslexia (Haberstroh & Körne, 2019).

In sum, in line with the hypothesis, the dyscalculic rate appears to be significantly higher among children of related parents compared to children of unrelated parents. Furthermore, there are negative effects of consanguineous marriage on the four mathematical basic skills. The first and second cousin group also scored a high rate of dyscalculia compared with children of nonrelative parents. In addition, Dyscalculic children of several generations cousins' parents appears to have higher rate of dyscalculia compared with dyscalculic children of first cousin parents, second-cousin parents and unrelated parents, which explains the genetic effect of consanguineous marriage.

Here are some limitations of the study and recommendations for further future studies:

(1) Although the present study indicated negative results of the consanguineous marriage in relation to dyscalculia in the Arab community, still there is a need for studies that involve medical community to verify these findings.

(2) Although the study reported high rate of dyscalculia among young children of relatives parents, still there is a need for studies that involve high school children of relative parents.

(4) The study reported a relation between dyscalculia and dyslexia among children of relatives parents, still there is a lack of previous studies in the research area.

By all counts, and proven results, the study revealed significantly dyscalculic rate differences among children of related parents compared to children of nonrelatives parents. In addition, the results have identified that the dyscalculic rate among children of several relation parents was significantly higher compared to the other groups, which answers the purpose of this research. This might have potential in future research that involves high school dyscalculic children of several generation parents to determine the effect of Consanguineous marriage on the dyscalculic rate among all grades of children which will be studied in the future.

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Appendix
Mathematical Exam
Instructions for the students:
The test consists of four parts, all sections must be answered.
Do not use a calculator.
You can attach calculation methods on the test page
Student's name: _____

Test 1: addition and subtraction

10+8=
5+3+7=
18-2=
48+11=
50-34- 9=
20-12-3=

Test 2 : series

1) 4, 8, 12, 16, ____, _____, _____

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2) 25, 31, 37, 44, _____, _____, _____
3) 42, 35, 28, 21, _____, _____, _____
4) 72, 64, 56, 48, _____, _____, _____

Test 3: multiplication and division

1) 4 * 9 =
2) 12 * 15 =
3) 9 :3 =
4) 48 :12 =

Test 4 - verbal problems

1) Mother bought pants for NIS 58, and 2 shirts for NIS 20. How much money did mother pay in total?
Solution: _____
Final answer: _____

2) At the beginning of the week there are 20 soccer balls in the store.
At the end of the week, there were 11 soccer balls left in the store.
How many footballs were bought from the store during the week.
Solution: _____
Final answer: _____