

The Case of Nonverbal Learning Difficulties among Greek Students: Existence and Prevalence in North Greece

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Abstract:

Objectives: The purpose of the study is to identify individuals with NVLD and distinguish them from students of other categories e.g. Specific Learning Difficulties (SLD), in order to ensure proper management by the educational and therapeutic community. The development of accurate identification procedures for these individuals is of high importance. The current study aims to utilize a specific procedure for the identification of students with NVLD for the first time in Greece and investigate if the diagnostic tools and procedures used in the said study can differentiate Greek students with NVLD from other Greek students with SLD.

Methods: This is the first study conducted in NVLD in Greece so researchers had to set battery test for identifying the NVLD group. In order to qualify for inclusion in the NVLD group of the study, students had to meet specific criteria based on the work of Mammarella and Cornoldi (2013). After the Practical Intelligence Quotient (PIQ) and the Verbal Intelligence Quotient (VIQ) of the students were measured, only students with $PIQ < VIQ$ and Intelligence Quotient (IQ) ≥ 80 proceeded to the next stage of the study. At the second stage of the study, visuospatial memory, visuomotor coordination, mathematical and reading achievement and psychosocial skills were measured.

Results: According to the criteria mentioned, 16 students (7 boys and 9 girls) were found to meet the criteria for NVLD. The average age was 9.12 years (SD 1.05) and the students were attending the third, fourth and fifth grade of primary school. NVLD students were 0.27 % of the general student population.

Conclusions: This study proposes that the NVLD group exists; and that increased awareness of their assets and deficits is going to enlighten their differentiation from other Specific Learning Difficulties (SLD) and hence, allow NVLD individuals to access appropriate therapeutic and educational programs.

Keywords: nonverbal learning difficulties; visual spatial deficits; prevalence; north Greece; specific learning difficulties.

1 Introduction

Syndrome of Nonverbal Learning Difficulties (NVLD) was described for the first time by Johnson and Myklebust (1967) who talked about a group of children exhibiting specific symptoms that had not been researched adequately up until then. Specifically, the researchers mentioned a subtype of Specific Learning Difficulties (SLD) with two subgroups: 1) a subgroup with specific difficulties in math and 2) a subgroup with difficulties in social awareness. It was argued that the two subgroups shared common features such as: (a) higher Verbal Scale Intelligence Quotient (VIQ) than Performance Scale Intelligence Quotient (PIQ), which was confirmed through standardized measurements of intelligence quotient, (b) difficulties in visual spatial awareness and organizing, (c) problems of spatial orientation, (d) disturbed body image and (e) deficits in social awareness and judgement.

Rourke shed light on the topic of NVLD and identified features of this group through a series of research studies (e.g. Rourke, 1988, 1989, 1995; Rourke, Dietrich, & Young, 1973; Rourke, Fisk, & Strang, 1986). Rourke (1993) suggested a hierarchy of primary, secondary and tertiary characteristics, which comprise the assets and deficits of people with NVLD, by creating an NLD model. According to the model, primary deficits in tactile/visual perception and complex psychomotor lead to secondary deficits in attention and exploratory behavior, which lead to tertiary deficits in memory and Executive Functions (EF).

Table 1 below contains the most important characteristics of people with NVLD -based on frequency- that are observed in recent bibliography and are generally acclaimed.

Table 1: Characteristics of people with NVLD (Rourke, 1993)

Sector	Assets	Deficits
Neuropsychological	-Auditory perception -Rote material -Simple motor	-Visual/spatial skills -Complex psychomotor -Novel material processing -Concept formation -Problem solving -Abstract thinking -Executive Functions
Verbal/ Neuropsychological	-Verbal repetition -Verbal output	-Prosody -Semantics -Pragmatics
Learning/Academic	-Word decoding -Spelling	-School performance -Reading comprehension -Science
Socioemotional		-Adaptation -Activity level -Social competence -Emotional stability

It is also worth mentioning that despite the rise of public awareness and interest in NVLD, this category has yet to be included in any classification system. In particular, neither the International Classification of Diseases (ICD) nor the Diagnostic and Statistical Manual of Mental Disorders (DSM) provide a description or criteria in order for the NVLD to be diagnosed. Nevertheless, the term is mentioned in research and chapters of various researchers. Additionally, there is a continuous production of knowledge on the issue since many experts argue that the existence of NVLD should be widely accepted, even though they disagree on the criteria for their definition (Drummond et al., 2005; Mammarella et al., 2006; Pelletier et al., 2001). The non-profit organization "Non-Verbal Learning Difficulties

Project" (NVLD Project) deserves special mention. It aims at raising awareness and finding solutions for children and adults with NVLD. Its main objective is to prove that NVLD is a separate diagnostic entity, and that they should be classified in the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association (DSM-APA, 2013). Moreover, it conducts research through different institutions, including the medical center of Columbia University and Children's Hospital Los Angeles. Findings argue for the existence of NVLD as a separate diagnostic category (Cardillo, Garcia, Mammarella, & Cornoldi, 2017; Mammarella et al., 2014).

It is estimated that the frequency of NVLD in the general public is 0.1%- 1 % on a global scale

(e.g. Roman, 1998; Thomson, 1996; Wajnsztein et al., 2016). This study proves that the NVLD group exists. In fact, NVLD individuals were found among the general student population and not only among students that have SLD. The aim of this study is to use the aforesaid data in order to inform teaching staff and healthcare workers about this particular group, aiming that chance of misdiagnosis decreases.

In my country, NVLD has been mentioned in literature. In particular, there are references to NVLD in books (Agalotis, 2013), articles (Karapetsas & Xatziefrimidou, 2009; Tziviniou, 2015) and in subsections of papers (Aggelopoulos, 2017) where one can read about the characteristics of the group. However, it appears that no official research has been conducted on any function of NVLD participants in Greece.

In summary, NVLD is part of the heterogeneous category of Specific Learning Difficulties (SLD). This necessitates clarifying their identification as well as the characteristics of educational programs designed for individuals with NVLD in order to ensure proper management by the educational and therapeutic community. Consequently, it is important to distinguish the functional traits of students with NVLD from those of other categories, particularly in areas related to the organization and content of educational programs. Therefore, developing accurate identification procedures for these individuals is deemed essential.

Therefore, there has been an attempt to bridge the gap surrounding the data for the prevalence and tracking of people with NVLD in my country as well as worldwide, and to present these data.

The current study aims to utilize a specific procedure for the identification of students with NVLD. This is implemented for the first time in Greece and seeks to determine whether these students can be distinguished from others with SLD.

A question that arises is the following:

- **Can the diagnostic tools and procedures used in this study differentiate Greek students with NVLD from other Greek students with SLD?**

1.1 Hypotheses

1st hypothesis:

- Null hypothesis: The procedure does not help differentiate students with NVLD from students with SLD.

- Alternative hypothesis: The procedure does help differentiate students with NVLD from students with SLD.

2 Materials and Methods

2.1 Research Design

A descriptive approach is a common research strategy, particularly in cases where the main goal is to describe, analyze and compare people or phenomena that have not been thoroughly studied or are being examined for the first time (Cohen, Manion, & Morrison, 2008). It is based on the collection, analysis and comparison of data which are used to examine an area or a phenomenon for which sufficient information is not available. Descriptive research uses large scale data; nonetheless, small volume data can be used albeit with some restrictions with regards to the ability to generalize (Cohen et al., 2008). This type of research aims at tracking as well as describing thoughts, emotions, knowledge and behaviors of a particular group of people at a given time (Filiass, 2000). An objective researcher and careful organization are also vital in order for descriptive research to be trustworthy and accurate (Filiass, 2000). Descriptive research was applied in this study because its objective is to identify a group of people and their characteristics that have not been sufficiently researched.

2.2 Identification Criteria

There are many different opinions about the diagnostic criteria for NVLD individuals (Peteliet, Ahmad, & Rourke, 2001) which showcase the need for more systematic studies related to this complex phenomenon.

Mammarella and Cornoldi focused their research on identifying students with NVLD, conducting a literature review of 35 studies published from 1980 until 2012. They were all conducted in English and published in scientific journals. In these studies, the group of students with NVLD was compared to a typically developing group or another clinical group.

Based on the results of the research, four symptom areas are suggested for individuals with NVLD:

1. Difficulties in visual-spatial organization and reasoning
2. Difficulties with complex psychomotor skills
3. Difficulties in academic performance
4. Socio-emotional deficits.

Five pilot criteria for diagnosing children with NVLD are proposed.

The criteria are essentially these: Performance Intelligence Quotient (PIQ) < Verbal Intelligence Quotient (VIQ), deficits in visuomotor integration, deficits in visual-spatial working memory, emotional or social deficits.

In this case study, there is use of the criteria suggested by Mammarella and Cornoldi (2013) since they are recent, effective and have also been applied successfully in a cultural environment that shares some traits with the Greek one (Italy).

It is important to highlight that my doctorate thesis was the stimulus for the development and examination of screening tools and a diagnosing procedure for NVLD students for the first time in Greece. The criteria used at this research specifically were the following:

1. Performance Scale Intelligence Quotient (PIQ) lower than Verbal Scale Intelligence Quotient (VIQ) and Full-Scale Intelligence Quotient (FIQ) higher or equal to 80 in WISC-III
2. Performance in visuomotor integration at least one standard deviation below average
3. Poor math performance contrasted with relatively good reading performance
4. Visual spatial deficits
5. Emotional and/or social deficits

It is essential that the students meet the first criterion and at least two out of the criteria 2-4 in order for them to be included in the NVLD group of the study. The fifth criterion was optional.

Exclusion criteria included having a case history of any syndrome (Asperger, Epilepsy syndromes, etc.) neurological and/or sensory processing disorders, brain injuries or any other medical conditions (Mammarella & Cornoldi, 2013).

2.3 Procedure of Collecting the NVLD Group

The study took place in primary schools of a big urban center in northern Greece and specifically in the municipality of Thessaloniki due to the researcher's easy access to schools in the area.

The aforementioned study was conducted as part of the researcher's doctoral thesis. She was granted permission by the Ministry of Education and Religious Affairs reg. no. Φ15/831/179097/Γ1 to access primary schools in Greece. She came in touch with all primary schools in the municipality of Thessaloniki where the research was conducted. 87% of the schools that were contacted by the researcher answered positively to taking part in it.

There were approximately 6,200 students in these schools. In order to determine the number of the NVLD population, teachers of special and traditional classes were asked to name the students who had been diagnosed, by a relevant public body that assesses people with Special Educational Needs [Center for Interdisciplinary Evaluation, Counseling and Support (KEDASY), or Medical education centers], as people with mild learning needs. Then, parents of these participants were given a consent form in order to complete in order to declare that they agree their kid to participate in the said research. Moreover, through the use of a questionnaire, they were asked to name the students that were facing particular difficulties with math and visual-spatial skills (after some examples of visual spatial difficulties were offered to them). In total, 1,136 students were suggested. A letter with the aims of the research was sent to their parents and their written consent was needed in order for their offspring to participate in the following stages of the research. 1,077 signed letters came back (94. 8%). Students, whose parents had given their consent, were the original study population and were examined by the researcher so as to determine whether they belonged to the NVLD group.

After that, the procedure was focused on determining the number of students with NVLD. This particular category of special needs is not included in the list of special educational needs and disabilities that are acknowledged by the Greek educational system (N. 3699/2008). Due to this, there are no procedures and screening tools for students that belong to the category, and the public diagnostic bodies of special needs do not offer evaluations on the matter.

In order to determine the students with NVLD, a psychology graduate, who was unaware of the research purposes, took charge of the administration of the Greek edition of Wechsler Intelligence Scale for Children (WISC-III, 1997). Children that had a lower PIQ than VIQ and at the same time Intelligence Quotient (IQ) ≥ 80 proceeded to the following examination stage. It is worth mentioning that, at this stage, the two examination groups included both typically developing children and NVLD children in order to make sure that the $VIQ > PIQ$ difference that is common in the NVLD group does not pertain to any other groups.

During the second stage of evaluation the students had to undergo a series of tests that included visuomotor integration, visual spatial

memory, math and reading performance while their parents and teachers filled the questionnaire of (psycho-social) Strengths and Difficulties (Goodman, 1997). Adaptation to the Greek language Mpimpou-Nakou, Stogiannidou, Kioseoglou, & Papageorgiou, 2002 and the Child and Adolescent Scale of Participation (CASP) (Bedell, 2004). Three 20-40-minute sessions were needed in order to administer all the measurements for the diagnosis of students with NVLD.

Collecting the sample needed for the study lasted 2.5 years. In addition, Ethical Guidelines for Educational Research (BERA, 2018) were followed.

2.4 Demographic Profile of the NVLD Group

There were 16 students in the group with NVLD, 7 of whom (42.75%) were boys and 9 (56.25%) were girls. The average age of the participants was 9.12 (SD 1.05). All the participants were students at the primary school. 9 of them (56.25%) were third grade students, 3 (18.75%) were fourth grade students and 4 (25%) were fifth grade students.

Given that this study is the first systematic study of NVLD in Greek schools, it is worth noting the frequency of students with NVLD in the general school population. In the current study, the percentage of such students in comparison to the general school population was found to be 0.27%. This percentage falls within the limits of 0.1% - 1% which is the frequency of NVLD worldwide according to estimates (Roman, 1998; Thomson, 1996)

These students represent 1.41% of the population with mild learning difficulties. It is slightly lower than 1.72% which is mentioned by Wajnstejn, Bianco and Barbosa (2016). These researchers studied files of individuals referred to a diagnostic center in Brazil for learning difficulties. This percentage differs from 0.45% which is mentioned by Venneri, Cornoldi and Garuti (2003). Any discrepancies can be attributed to differences regarding research structure. Nonetheless, it can be stated that in the vast majority of NVLD studies, the number of participants is quite limited and frequency assessment is also challenging (Cardillo, Mammarella, Garcia, & Cornoldi, 2017; Garcia, Mammarella, Pancera, Galera, & Cornoldi, 2015; Garcia, Mammarella, Tripodi, & Cornoldi, 2014; Mammarella, Meneghetti, Pazzaglia, & Cornoldi, 2014).

2.5 Research Tools

The following tools were used to identify students with NVLD: the Greek edition of WISC-III, Grooved Pegboard Test, a screening test for Math, Test A for reading, Rey Complex Figure Test, Strengths and Difficulties Questionnaire, Child and Adolescent Scale of Participation (CASP).

(a) The Greek edition of WISC-III (Georgas, Mpezevegkis, Paraskevopoulos, & Giannitsas, 1997) was used in order to measure Performance, Verbal and Full-Scale IQ. During the main phase of the research (2014-16) there was no updated edition of this tool in Greek (Agaliotis, 2016). Each participant was assessed using two verbal (vocabulary and information) and two practical (block design and object assembly) sub-scales of WISC. A general IQ score was then calculated, following the guidelines provided by Sattler (2001).

(b) Grooved Pegboard Test (Klove, 1963) was used to assess visual motor coordination. This test has been widely used to identify people with NVLD. Moreover, it can help distinguish students with NVLD from typically developing children and from children with other learning difficulties (Durand, 2005; Galway & Metsala, 2011; Harnadek & Rourke, 1994). During the time of the research there was no assessment tool for visual motor coordination standardized in Greece. Therefore, existing norms in the tool were used, following the paradigm of researchers abroad (Galway & Metsala, 2011; Heald, 2011; Knights & Moule, 1968). The test is structured in the following way: the student has in front of them a small board with openings that have notches. Additionally, there are "pegs" that fit into the notches of the openings. The task requires placing the pegs into the correct holes as quickly as possible. School-age children are asked to place only ten "pegs". The test primarily focuses on the dominant hand and secondarily to the non-dominant hand. The examiner times the participant. The score is calculated by taking into account the time in seconds, the number of pegs placed correctly, and the number of unnecessary or redundant movements made for any reason (e.g., if a peg falls or slips from the hand and must be picked up again). If the participant uses their non-tested hand, the test stops, and a "D" is marked.

(c) The screening test for Math for elementary school students (Papaioannou, Sideridis, Mouzaki & Simos, 2011) is a diagnostic scale for assessing the mathematical performance of primary school students. The tool includes a worksheet of

mathematical operations, and the student has to solve correctly as many of them as possible. The student's answer to each problem equals 1 point if correct and 0 if incorrect. The sum of the correct answers is the final score. For first-grade students, the score ranges from 0 to 34, while for older students, the maximum score is 49, instead of 48 as might be expected based on the number of questions, because the 43rd question is marked from 0 to 2 points. In this question, the student is asked to solve an incomplete division with a decimal quotient. If the student provides only the integer part and leaves the remainder, they receive 1 point, but if they continue the division and give the decimal result, they are awarded 2 points. The internal consistency of the individual tests in the tool is considered very satisfactory for the overall sample (Cronbach's $\alpha = .91$). In this study, this tool was used to determine mathematical performance, as a prerequisite for identifying students with NVLD.

(d) Test A (Panteliadou & Antoniou, 2007) is a standardized tool for assessing reading decoding skills and fluency. Three tasks were administered to assess decoding: reading pseudowords (a total of 24 pseudowords), reading real words (a total of 53 words), and distinguishing real words from pseudowords (a total of 36 words). To assess reading fluency, a passage is given to the child who is asked to read for one minute. At the end, the total number of correctly read words is counted. The sum of the correct answers from the three decoding tasks and reading fluency, which corresponds to the Total Raw Scores, is calculated. The examiner then uses Appendix I of the Examination Guide to find the appropriate Performance Standard Table for the child's age, grade, and gender, and identifies the percentile corresponding to the raw score found for each task.

(e) The Rey Complex Figure Test (RCFT) (Osterrieth, 1944) is a widely used neuropsychological test that assesses visual-spatial memory. The test includes the written reproduction of a complex figure, which the participant observes for a certain period of time. Different methods for administering the test have been developed: copy (the figure to be reproduced remains available to the examinee throughout the examination), immediate recall (the figure is presented for a specified period and the reproduction begins after its removal), and delayed recall (reproduction begins after a time interval following the presentation). Copying

assesses visual-spatial ability, while immediate and delayed recalls assess visual-spatial memory (Lezak, 1995). In the present study, immediate recall was used because the goal was to examine visual-spatial memory. The figure was presented on a white sheet of paper (30 cm x 21 cm), and the children were asked to reproduce it from memory onto another white sheet of paper with the same dimensions, with as much accuracy as possible. Regarding scoring, the figure was divided into 18 parts. For each part that the child drew precisely and in the correct place, 2 points were awarded. For incomplete but correctly placed drawings, 1 point was given, and for any recognizable drawing in the wrong position, 0.5 points were awarded. No points were given for absent or unrecognizable drawings. The total score could reach up to 36 points (Karapetsas & Vlachos, 1997; Vlachos & Karapetsas, 2003).

(f) Strengths and Difficulties Questionnaire (Goodman, 1997). Adaptation for the Greek language by Mpipou-Nakou, Stogiannidou, Kioseoglou, & Papageorgiou, 2002) was used in the present study to outline the psychosocial profile of students with NVLD. It is a screening questionnaire answered by adults who are related to the students and focuses on the psychological adjustment and psychosocial functioning of students aged 3-16 years (Garraida, Hates & Higginson, 2000; Goodman, Ford, Simmons, Gatward & Meltzer, 2000b). The questionnaire comprises of questions regarding 25 traits, some positive and others negative, related with: emotional issues, behavioral problems, hyperactivity/attention deficits, peer relationship problems, and prosocial behavior. The 25 questions are divided into 5 scales, each containing 5 questions, which provide separate scores for each of the above categories. In the end, the first 4 categories are added to produce an overall difficulties score. Participants use a 3-point Likert scale to indicate how much each trait defines their child. In this study, the extended version of the tool was used, which includes a supplementary booklet in which participants indicate whether they believe the child is experiencing difficulties, provide information about the child's overall difficulty, their social difficulty, whether the child is a "burden" to the teacher or/and parent, and finally, how long they have been observing the difficulties. The Questionnaire is available in more than 40 languages, and its psychometric characteristics have been regarded as satisfactory in various studies (e.g., Goodman, 1997; Goodman,

1999; Goodman, Ford, Simmons, Gatward & Meltzer, 2000b). The questionnaire is available online at: <http://www.sdqinfo.org/a0.html>.

(g) The Child and Adolescent Scale of Participation (CASP) (Bedell, 2004) measures the extent to which children participate in activities in school, family, and community settings. This tool is part of the Child and Family Follow-up Survey (CFFS) (Bedell, 2004), designed for children with injuries and intracranial injuries. Responses are provided by parents and teachers. Both the content and methodology used in the CASP and CFFS are based on the International Classification of Functioning (ICF) of the World Health Organization (WHO) (ICF, WHO, 2001). The scale comprises of four subdomains: participation at home (6 items), participation in the community (4 items), participation at school (5 items), and home and community living activities (5 items). The 20 items are rated using a four-point scale: age-expected (full participation), somewhat restricted, very restricted, no participation. Each item evaluates a broad range of activities or situations. For research purposes, it allows the use of the total score across all items and subdomains, scores from one or several subdomains, or scores for individual items. A higher score indicates greater participation by the child. In this study, subdomain-level scoring was used, enabling the researcher to pinpoint specific activities within each context where the child's participation may have been more or less restricted. The scoring scale is as follows: 1 = no participation, 2 = very restricted participation, 3 = somewhat restricted participation, 4 = full participation. Maximum scores are: 24 for home participation, 16 for community participation and 20 for school participation. These scores are then converted into percentage ratios. The psychometric properties of the CASP are excellent (Intraclass Correlation Coefficient = 0.94, $\alpha \geq 0.96$, and high discriminant validity). Reviews of its use as a core assessment tool for children with acquired brain injuries or other disabilities have yielded positive conclusions (e.g., Badge, Hancock, & Waugh, 2009). For the purposes of this research, the tool was translated

from English to Greek and back, with some linguistic improvements following its pilot implementation.

2.6 Research data analysis

In the present study, the statistical software IBM SPSS 22 was used for data analysis. The mean and standard deviation were calculated for the age. This procedure was followed: the score on the WISC test was marked next to each examinee. Those who had a lower PIQ than VIQ and at the same time Intelligence Quotient (IQ) ≥ 80 proceeded to the following tests. For each participant, there was a list of tools that were administered. Next to each tool, there was the score and also a yes or no which showed whether they met the necessary criteria to be a part of the NVLD group. Students meeting the requirements joined the group of NVLD.

3 Results

The identification process and the use of criteria made the procedure demanding because they required use of various diagnostic tools as well as the involvement of a trained psychologist who was in charge of their administration. Moreover, extra time was needed to score the answers and obtain the results. Furthermore, the procedure was time-consuming as it required three meetings of 20-40 minutes in order to administer the tests and make sure that the examinees understood the instructions through various examples and that they were not mentally exhausted. Finally, the procedure is considered to be effective as it can distinguish children with NVLD from children with other SLD.

The group of NVLD students included 16 students out of whom 7 (43.75%) were boys and 9 (56.25%) were girls. The average age of participants was 9.12 years (SD 1.05). 9 of the students (56.25%) were attending the third grade of primary school, 3 (18.75%) the fourth grade and 4 (25%) the fifth grade. The demographic profile of the participants is shown on Table 2.

Table 2. Demographic profile of the participants

Sex		Age		Grade		
M	F	Avg.	SD	3 rd	4 th	5 th
N(%)	N(%)			N(%)	N(%)	N(%)
7(43.75)	9(56.25)	9.12	1.05	9(56.25)	3(18.75)	4(25)

Given that this study is considered to be the first extensive research of NVLD in Greek schools, it is

worth noting the percentage of students that belong to the group. NVLD students were 0.27 %

of the general student population (6,200 students as mentioned above).

The 16 students diagnosed with NVLD were 1.41% of the mild learning needs population (from 1,136 students). This percentage is slightly less than the 1.72% that is mentioned by Wajnszejn et al. (2016). They studied files of people who were sent to diagnostic centers in Brazil as they had various learning difficulties. On the other hand, this percentage differs from the 0.45% observed by Venneri et al. (2003). These differences in the percentages are attributed to differences in the design of the studies. Nevertheless, it is noted that the majority of studies on NVLD have a limited amount of participants and the evaluation of frequency is quite difficult (e.g. Cardillo et al., 2017; Garcia et al., 2015; Garcia et al., 2014; Mammarella et al., 2014).

Each NVLD student in the study had an SLD diagnosis and specifically, Dyslexia or Dyscalculia.

4 Discussion

This case study focuses on the frequency of occurrence and tracking of NVLD. As far as I am concerned, it is the first official attempt to distinguish and track NVLD children in Greece. Previous research had mentioned a frequency of 0.1% - 1% of NVLD as part of the general population worldwide (e.g. Roman, 1998; Thomson, 1996; Wajnszejn et al., 2016). In this study, 0.27% of the students seem to have NVLD out of the general student population and 1.41% out of the SLD population that were already part of.

Different screening tests and tools were used and were actually effective in tracking the Greek students with NVLD and distinguishing them from their peers with other SLD. Their use was of utmost importance as they helped track students whose profile fitted into the one described by scientists that have dedicated their research to the existence of NVLD syndrome. Needless to say, there should be further research with regards to the diagnostic value of the tests; however, the first indications seem encouraging. The percentage of NVLD students in the study falls within the limits that have been accepted globally.

Generally, it seems difficult to provide information on population prevalence when the group is not explicit. It has been stated that children who met criteria for NVLD had been commonly diagnosed with Attention-deficit/hyperactivity disorder (ADHD), anxiety disorder and specific learning disorder (Escalera et al., 2017).

However, NVLD situation is thought to be highly correlated to spatial deficits. Hence, defining individuals with NVLD and differentiating them from other diagnostic groups, is vital. Moreover, recognition of the NVLD characteristics and inclusion of diagnosis in future official diagnostic manuals may lead to have significant and positive influence on their mental health and it may result in better supporting environments and interventions. That way, they will have access to therapeutic, educational programs that will cater to their needs.

4.1 Limitations

This study has certain limitations that need to be taken into consideration while examining and using its implications.

Firstly, the study took place in only one city. It might be better for future studies to include students from various geographical areas. Another limitation is that some screening tools, which were used while tracking NVLD students, are not standardized in Greece since there were no equivalent Greek tools. Moreover, future research could calculate the existence and prevalence of NVLD individuals including younger and older individuals.

5 Conclusion

This case study dealt with a subgroup of Special Learning Difficulties, known as <<Nonverbal Learning Difficulties>>. It constitutes the first official research in Greece and therefore, there was an attempt to gather and implement particular screening tools and tests in order to track students belonging to the NVLD group. The research tools were effective as, in the end, the NVLD students could be differentiated from other SLD students.

Hence, the above findings would suggest that the term NVLD be considered an official diagnosis as it will have a great impact on daily therapeutic and didactic action and might also have more implementations.

Training mental health professionals, special therapists and teachers is deemed necessary in order for them to be able to track and refer NVLD students to further tests. While there are different stances on the matter, as the theoretical part of this case study suggests, the existence of the NVLD student group is accepted by the majority of researchers.

Other implications could be related to the developing of tools and procedures for the

differentiation of NVLD students and to confirming the findings of this study.

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