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Use of Motor Skills Assessment Tools in Greek Preschoolers: A review of literature

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Abstract

Evaluation of preschool children's motor skills within the school context is an integrative part of the most recent national curriculum for the Greek Kindergarten, all though so far performed by non-standardized methods. This review reports on the most used in research standardized tools of motor skills assessment that could potentially be used in this evaluation process. Information is provided about the tools' origin (international, local), their scope, content, duration of implementation and equipment needed, as well as their psychometric properties (validity, reliability). The results of Greek researches, with use of these tools in preschool population samples are also reported. Next, a critical review of these tools is performed, according to their appropriateness for use in a within school assessment process that involves all domains of development (physical, personal, social, knowledge base). Finally, suggestions are made towards the form and the content of tools fit for "educational motor skills evaluation" so as to abide by the guidelines provided by the national curriculum for the kindergarten.

Keywords: Motor Skills; Evaluation; Tests; Validity; Reliability; School Readiness.

1 Introduction

According to the most recent National Curriculum for the Kindergarten, preschoolers in Greece should be educated in five fields: personal and social development, language, mathematics, arts, physical education, natural sciences, social sciences, and information and communication technologies (IEP, 2014b). Physical education includes three areas of learning: motor skills and physical condition, knowledge on movement and health, and also self-expression and social interaction. The area of motor skills and physical condition, among others, includes goals of improvement in skills of body stabilizing, body moving, and manipulating objects, as well as motor skills concepts development and the application of motor skills and motor skills concepts in various sports and activities (IEP, 2014b).

As a part of their duties, the kindergarten teachers in Greece perform some sort of assessment throughout the year, whether formative or final for school readiness at the end of a preschooler's first year attainment in kindergarten (IEP, 2014a; P.D.200/1998, art.7, par.7). School readiness is evaluated for five purposes: a) to improve learning, b) to identify children with special needs, c) to evaluate programs, d) to monitor trends over time, and e) to use for educational placement (Maxwell & Clifford, 2004). This assessment is usually performed through observation and the use of check lists and reflection diaries;

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also, the child's portfolio, such as drawings, drama sessions, etc. (Aggelou & Kapagiannidou, 2015). This type of assessment is called informal, based in observation, description and the teacher's experience (IEP, 2014a).

In an informal investigation during pilot studies in Greece, kindergarten teachers faced difficulties in identifying preschoolers with motor skills difficulties, by using informal/authentic assessment (Skafida, 2009; Skafida, 2012). Within this frame, it would be very useful to create short yet comprehensive assessment tools for the kindergarten teacher to use, based in a more standardized assessment, for purposes of identification of children with special education needs and the use for educational placement and decision making about services. This type of assessment is the formal assessment. Formal assessment is one of the three types of evaluation performed in preschool age, along with informal assessment and authentic assessment Formal assessment in early childhood education includes use of standardized tests with comparative performance tables for the prevention (screening tests), preparedness (school readiness tests), diagnosis (diagnostic tests) and performance (achievement tests). These tests are very useful in identifying children with difficulties and also indicate the type and extent of their difficulties. The advantages of the tests are the standardized procedure, the numerical scores, the norms, and the valid and reliable results (Gullo, 2010). This type of assessment could be proven very useful when a choice is made for a preschooler to move up to elementary school or attend kindergarten for a second year, as it is provided for by the Greek law (P.D.200/1998, art.7, par.7). It would be also useful when the preschool teacher communicates the results of the assessment to the preschooler's parents (IEP, 2014a), as it is based in norms and had an established validity and reliability. The motor assessment test results could be combined with the assessment of other important factors such as the learning environment, the learning goals, the learning processes and the school curriculum.

As it is here proposed to implement formal motor skills assessment in preschoolers within the Greek kindergarten, to help teachers decide upon their pupils' school readiness, it is necessary to evaluate the research tools suitable for this purpose. Within this scope, the present review reports on the use of well-known motor skills assessment tools in Greek preschoolers. These tools are reviewed according to seven criteria, that are: a) the tools form and content fit for preschool age, b) the time, place and equipment needed in their implementation, c) their psychometric properties, d) their fit for purpose of motor readiness, e) their fit for Greek population, and their f) fit for use by kindergarten teachers. Discussion focuses on potential gaps to be filled in the area of "educational motor skills evaluation". These terms depict the need to have valid yet useful assessment tools inside school, apart from a laboratory or a research field. These tools should connect to the curriculum in a way that their results lead to the selection of appropriate intervention activities.

2 Method

Widely used research databases were included in the search of motor evaluation tools used for motor development evaluation of preschoolers, within the school context. The databases chosen reflected every aspect of professional concern in motor development: pediatrics, psychology, education, physical education. Specifically, the databases chosen were: BioMed Central, CINAHL Plus, ERIC, Medline, Psychinfo, Scopus, SportDiscus. Only research articles were included in the recording of the results, not books, theses, conference papers, editorials etc. There was no chronological limitation to the search, other than that defined by the database itself. Specific search terms included: motor skills, psychomotor development, gross/fine motor skills, assessment, tests, preschool; also,

equivalent terms. Several tests, questionnaires and checklists emerged. Questionnaires and check lists were not included, as they are not related to the purpose of this study. Not all tests found were included in this review, as well. Selection criteria for the tests listed below is worldwide recognition and use of these tests and, also, use in Greek samples of preschoolers.

The final results included seven assessment tools. These tools differed with each other in the reasoning and the structure. Following the classification of psychomotor development assessment tools of Burton and Miller (1998), these tests were organized as follows:

1. Motor skills tools (batteries, tests). This category includes tests containing various motor sub-tests, single or separated in groups. The sub-tests usually are specific exercises/games/drills for the child to perform, with or without equipment. These sub-tests, through factor analysis, are grouped into overarching factors that represent the motor skills involved in motor testing. A score for each factor and a total score are derived. The scores are compared to norms. Four tests were found in this category, namely:
    1.1. Bruininks-Oseretsky Test of Motor Proficiency (BOTMP & BOT-2).
    1.2. Movement Assessment Battery for Children test (M-ABC & M-ABC2).
    1.3. Motoriktest Für Vier Bis Sechs Jährige Kinder (MOT 4-6)
    1.4. Democritos Movement Screening Tool for Preschoolers – (DEMOST-PRE©).
2. Neurodevelopmental tools (scales/checklists/questionnaires). This category includes a number of tools in the form of assessment scales containing a catalogue of displayed behaviors. The emergence of behavior is connected to the child's chronological age. They are the so-called developmental scales. These scales check whether, after birth, a child undergoes the evolution of motor stages, on the typical order of succession and at the typical age period. The same applies for other areas of development, such as social or personal development, language, logical-mathematical thinking etc. Two tests were found in this category, namely:
    2.1. Denver Developmental Screening Test (I & II-Revision).
    2.2. Griffiths Mental Development Scales (Original I & Extended II, the ver. III revision has not yet been implemented in Greece).
3. Fundamental motor skills tests. This category includes tests that examine the degree of maturity of fundamental movement patterns, which are movement standards related to body locomotion, to the transfer of body weight to space, to the movement around the axes of the body and to the controlling of objects with the upper and lower extremities. This examination is implemented through performance criteria, specific for each fundamental pattern. Only one test was included in this category, namely:
    3.1. Test of Gross Motor Development (ver. I & II, ver. III has not yet been implemented in Greece).

After spotting the internationally recognized tools of motor evaluation used with preschoolers in Greece, for research purposes at least, a second control was performed as: a) to the tools fitness for purpose, i.e. the evaluation of all motor skills used when a preschooler attends the kindergarten program, and b) to their feasibility for use in school settings by educational personnel. By these criteria, the tools of the second and the third category were ruled out. Tools of the second category, namely developmental scales a) do not measure only motor development, but other developmental areas as well, and b) are more fit for a formal assessment outside school by specially trained personnel, with a

solid theoretical background on development (development specialists). Also, the tool of the third category was ruled out, because a) it measures only gross motor skills, whereas fine motor skills are essentially needed in preschool education as well, and b) its scoring is based in performance criteria, rather difficult for a kindergarten teacher to rate, as she is not specialized in physical education testing.

A second stage of research query was then performed, among grey literature materials in Greek academic institutions. Four motor skills assessment tests, those aforementioned, were then chosen to proceed with reviewing. The review of these tools of motor skills assessment follows. Please note that the first two assessment tools are essentially batteries, including a test and a checklist as well. The complete batteries are described, although check lists are consisted of referrals by third persons and not by the children themselves.

3 Tools of Motor Assessment used in preschool age

In this section, four assessment tools are referred. The review focuses in their form and content, requirements of time-space-equipment needed, psychometric properties and use in research samples of preschoolers in Greece.

3.1 Bruininks-Oseretsky Test of Motor Proficiency

This tool, in its original version, was created by Bruininks (1978) and is based on Oseretsky Tests of Motor Proficiency (Doll, 1946, in Bruininks, 1978). It can be administered in children of ages 04:06-14:06. It was created for use by teachers and clinicians to control for motor development, to identify serious motor deviations, to create intervention programs and to take placement decisions in an appropriate education/rehabilitation context. The tests are the same for all age categories and are administered in an appealing way. Norms of typical values per half a year of age, percentage rankings, rankings per performance and age-depending norms are offered (Bruininks, 1978). The test is available in a long and a short form. The long form is administered in approximately 45-60 minutes. The categories of the sub-tests (in the long form) are running speed and agility on the run (one sub-test), balance (eight sub-tests), bilateral coordination (eight sub-tests), power (three sub-tests), coordination of the upper limbs (nine sub-tests), speed of response (one sub-test), visual-motor control (eight sub-tests) and also manual speed and dexterity (eight sub-tests). This form produces three scores, a total, one for gross motor skills and one for fine motor skills. The short form is administered in approximately 15-20 minutes. It produces a total score and is used for screening purposes. It consists of 14 sub-tests, which were selected based on the degree of correlation to quotients of the long form, their clinical usefulness, the age range they cover, and the ease and speed of administration.

The original version of BOTMP presented problems in the construct validity (factorial structure; Broadhead & Bruininks, 1983). It also produced reliability coefficients lower than the desired level (Sattler, 2002). The test seems weak in screening and identifying, as well as in placing in an educational context, because of psychometric weaknesses and differences between the short and the long form. Also, this test is not at all oriented towards the process of execution of movement (quality output) but is merely oriented in the final performance (quantitative result), thus it becomes difficult to establish an intervention program based on the test results. There is no justification for the separation of performance between fine and gross motor skills and no provision is made for children with disabilities (Venetsanou, 2007; Burton & Miller, 1998). Despite the above-mentioned objections, BOTMP has been widely used worldwide to evaluate motor development in typical populations and also populations with special needs. Also, considered as the gold

standard, this test was used in many studies to test the concurrent validity with similar tools (Venetsanou, 2007).

In Greece, research by Kambas, Aggeloussis, Proviadaki, Mavromatis and Taxildaris (2004) revealed validity weakness of the BOTMP on Greek population. In the research, 403 children of preschool and primary school age from the Macedonia and the Thrace areas were tested. The factor model did not confirm Bruininks' initial study, although internal consistency between sub-tests was rated as adequate. In a following study, the factor structure of the short form of BOTMP was administered to 377 preschoolers and primary school children 5:00-8:03 years from urban areas of northern Greece. The results, similar to a previous analysis, revealed three factors responsible for 54.1% of the total variance. Furthermore, almost all tests, except one, correlated significantly with the total score. Age appeared to significantly influence half of the sub-tests, a result that also correlates with a previous analysis. Therefore, the test was considered valid for use on the Greek population (Kambas & Aggeloussis, 2006). Subsequently, Venetsanou, Kambas, Aggeloussis and Fatouros (2006) compared the short form and the long form of BOTMP, regarding the possibility of screening children with motor difficulties. They measured 144 children between 4:05-5:05 years. The correlation analysis of the results revealed a high correlation of scoring between the short and the long form, especially in the gross motor skills score. The correlation with the score on fine motor skills was average. On a second level of analysis, it appeared that the short form produces significantly higher scores compared to the long form. Accordingly, 27.8% of children identified through the long form, were not identified through the short form. Researchers have proposed amending the scoring system and further examination of the test. In 2008, Spanaki, Nikolopoulos, Skordilis and Koutsouki, used a mix of short and long form of BOTMP to examine the relationship of motor and graphomotor performance of kindergarten and elementary school children with high, average and low motor performance. Some of the gross motor skills were proven to be of a predictive value for graphomotor performance. Concluding with psychometric properties research in BOTMP for Greek population, Venetsanou, Kambas, Aggelousis, Fatouros and Taxildaris (2009) studied the validity of BOTMP in its short form to test preschool children. They studied 318 preschoolers aged 48-71 months. Age had a significant effect on 13 out of the 14 sub-tests. Four sub-tests were found to have a high percentage of zero scoring (the phenomenon of "floor" as it is called in statistics, because of the difficulty of the tests). A modification of the scale with respect to these sub-tests was proposed. Additionally, concerning the implementation requirements of BOTMP, Venetsanou (2007) states that the individual sub-test Running Speed & Agility is very difficult to implement on the Greek kindergarten because of the large area required.

The second version of the test (BOT-2; Bruininks & Bruininks, 2005), is by 70% the same as the original version in terms of test contents. It is a set of skills that are administered individually and evaluate the motor function of people aged 4-21 years. The review of the initial test was carried out in order to fully include tests to improve measurement at preschool age, to extend the norms at 21 years and to improve equipment and the functional relevance of the content of the test. The purposes of the second edition are the detection and identification of motor difficulties, the diagnosis of motor deviations, the placement in an educational context, the evaluation and improvement of the effectiveness of motor training programs and the assistance to clinicians and researchers. The long form of BOT-2 includes 53 sub-tests, grouped into four categories, namely fine motor precision (7 sub-tests) and fine motor integration (8 sub-tests; Individual test "Fine

Motor Control"), manual dexterity (5 sub-tests) and upper limb coordination (7 sub-tests; Individual test "Hand Coordination"), bilateral coordination (7 sub-tests) and balance (9 sub-tests; Individual test "Body Coordination"), and speed and dexterity in running (5 sub-tests) and strength (5 sub-tests; Individual test "Strength and Dexterity"). The implementation of the long form takes approximately 40-60 minutes. Five indexes are exported: an overall score and four individual scores for each of the categories of fine motor skills, coordination of upper limbs, body coordination and strength/dexterity. The short form of the BOT-2 has also been created with 14 sub-tests, including at least one sub-test from each test of the extensive form. It is usually used for the initial identification of children with motor difficulties. The implementation lasts about 15-20 minutes and produces a comprehensive scoring. Sub-tests were chosen so as to include more skills and produce reliable results. The test results are converted to percentage performances and age equivalents accordingly. These values are compared with norms of standard performance, offered in the test and presented in the long as well as the short form. Norms are also offered for each individual test. In this way, it is possible to identify any potential or difficulty in a particular area (Horvat, Block, & Kelly, 2007). The norms are provided separately for each gender, but also combined norms for both genders are provided. Besides typical performances, comparative performances are provided of children with Developmental Coordination Disorder (DCD), with Pervasive Developental Disorders (PDD), and with mild and moderate Intellectual Disability (ID). The standardization sample underwent good stratification in the US, taking into account the geographical coverage, age ranges, genders, race/ethnicity, socioeconomic status, and disability in each age group. Subsequently, Werder & Bruininks (1988) listed a catalogue of motor skills for primary school students, which accompanies the motor development program and can be used during its implementation, for the purpose of formative assessment.

The second version of the Bruininks test was deemed more improved compared to the first version, because of the expansion of the age range and because of the provision for separate norms per age and gender. It is widely used in the USA and Canada by specialists of adapted physical education, occupational therapy and physiotherapy. Slater, Hillier, and Civetta (2010) ranked it third in frequency of use and popularity among seven other related tools. However, the BOT-2 came in for criticism not only because of the long duration of its implementation, but also because of difficulty to convert scores (Piek, Hands, & Licari, 2012). Deitz, Kartin, and Kopp (2007) claim that some tests are quite difficult for four-year old typical children and five-year-old children with developmental delay and that the test is best suited to children aged six and above. Also, the researchers report that some of the motor composites derived are not stable enough for some age groups, limiting the confidence in the interpretation of results, the scoring process is time-intensive and tedious and the cut-off scores of 1.5 or 2 SD above mean are likely to identify fewer children in need of special education services. Additionally, Peerlings (2007) pinpoints that the test needs thorough training in order to be implemented, needs 18 m long examining space, takes too long for younger children, and, last, it is difficult to record scoring due to differences in order between the test items and the scoring sheet.

In relation to the use of the BOT-2 on children with disabilities, Wuang (2009) studied the psychometric properties and the response of the second version of the test to children with ID. He studied 100 children with ID aged 4-12 years, both before and after four months of a pediatric intervention program. The test exhibited high reliability of repeated measures and internal consistency. All sub-tests functioned well, except for the individual balance test. Furthermore, the analyses revealed a low level of sensitivity but a high level of specificity. In subsequent research, Wuang, Lin and Su (2009) analyzed the validity of the same tests on the same population. They studied 446 children and adolescents with ID aged 4-18 years. The results led to a significant variation of the tests, to the exclusion of

17 tests and to the re-grading of the remaining sub-tests. The final results were not differentiated by age and gender. The modified results exhibited the possibility to distinguish between mild and moderate-severe ID. In some individual sub-tests (coordination and upper limb strength/dexterity) the classification of the tests suited the capability of the sample for low or high performance. In others, however, the individual tests (fine motor control and body coordination) were more focused on low capacity levels. It was proposed to include tests with greater difficulty. The short form of the test in preschool children has not yet been adequately studied (Piek, et al., 2012).

3.2 Movement Assessment Battery for Children (M-ABC)

This tool, in its first edition, abbreviated as M-ABC, is the revised version of the Test of Motor Impairment (TOMI; Horvat, Block, & Kelly, 2007). It consists of a test and a checklist. The M-ABC Test provides norms (percentage intervals, including the 15th and 5th performance interval) and also qualitative information on the child's behavior (concentration, confidence, posture, motor control). The norms are common for both genders. The checklist may be completed by the parents or teachers of the examinees. The M-ABC Checklist has been derived from the Motor Competence Checklist of Sugden and Sugden (1991). It is used to identify children aged 5-11 years who are at risk of developing disabilities or who are already experiencing mobility difficulties, while the test is a more detailed diagnostic process leading to long-term planning. The observation of children takes place in a natural environment; it is performed by teachers or clinicians and can be repeated as necessary. The checklist is often used by clinicians and therapists to diagnose DCD (Clark, Smiley-Oyen, & Whitall, 2004). M-ABC can be used by a plethora of skilled specialists without special training. However, familiarization with the test procedure and especially with the qualitative character of the list is required (Henderson & Sugden, 1992). Both the test and the supplementary checklist are used for clinical diagnosis, for the planning of intervention and for checking the progress of a child aged 4-12 years. The two tools are used interchangeably to detect and identify any children who may need special services and, also, for research purposes (Burton & Miller, 1998). The age groups examined are: 4-6 years old, 7-8 years old, 9-10 years old and 11-12 years old.

More specifically, the M-ABC Test is consisted of 32 sub-tests, eight for each age group. The sub-tests are divided in four categories, namely manual dexterity (3 sub-tests), ball skills (2 sub-tests) and static and dynamic balance (1 and 2 sub-tests accordingly). The tests differ a little in each age group. The administration time is 20-40 minutes. Each test is initially rated on a qualitative level, whether it is unsuitable for the child, if the child did not work or failed to complete it. Next, each test is scored 0-5 (the lower the score the better the performance). An overall motor performance index is derived. Grading is done by age category. The test offers norms (percentile points as well as points for the 15th and 5th performance intervals) as well as qualitative information on the child's behavior (concentration, self-confidence, body posture, motor control). Norms are common for both genders. In order, not to harm a child who cannot meet the test requirements according to his or her age, it is proposed by the manufacturers to examine the child in lower age group tests, to provide assistance and feedback to the child during performance, and to modify the examination conditions. The criticism to the M-ABC test includes its weakness in the reliability of measurements to identify the proportion of children with motor deviations, as well as weakness in the criterion validity. Also, regarding its use for setting up intervention programs, the manual does not include enough studies to demonstrate its

validity in a similar use. Similarly, the test does not include sufficient evidence of the clinical utility of the checklist for setting up an intervention program. Apart from its standardization deficiencies, it remains a useful clinical tool (Burton & Miller, 1998).

The M-ABC Checklist includes 48 questions in four sections, scoring from 0-very good to 3-not performing. Therefore, the highest rating indicates motor difficulty. Grading is based on observation. In each section, a different condition is controlled, such as: a) child stable-environment stable, b) child moving- environment stable, c) child stable-environment changing, d) child moving-environment changing and e) behaviors related to physical education. The results are used to identify specific skills that are difficult for children, to assess performance per section or to compare with norms. The list provides tables with 15% or 5% of children's performance. The checklist standardization sample consisted of 493 preschoolers 4-6 years old and included a) ethnic minorities, b) both genders and c) different geographical distribution in the USA (Williams & Monsma, 2007). The validity of the list was examined by Croce, Horvat, and McCarthy (2001). Burton and Miller (1998) criticize the original check list standardization study in that it does not appear to provide sufficient psychometric features to be safely used in the identification of children. There were problems both in the method used to identify children with motor difficulties and in the mismatch of results between the checklist and tests on the identification of the same children.

Finally, in the context of criticism against the two tools, it should be noted that, in the handbook of the M-ABC battery an extensive reference to the previous tool is made (TOMI of Stott et al., TOMI-Henderson Revision, of Henderson). Although significant modifications were subsequently made (directives diversification, scoring system diversification, norm extension to four-year-olds), validity and reliability studies were not so detailed for the new tool. Also, the standardization for the test comes from the United States, while the standardization for the checklist comes from Great Britain, so possible cultural factors cannot be ruled out. Problems have also been encountered in the stratification of sampling with regards to the geographical distribution, race and educational level of the parents. On the other hand, it should be noted that the two tools provide useful information on the neuropsychological process of the movement, as well as the environmental factors that influence the motor learning process and the connection between these factors and the intervention program. Based on the case studies mentioned, M-ABC could be used as a clinical tool of individual assessment (more qualitative than quantitative) excluding the comparison with norms and the percentage rating of the performance of the child examined. Below, we report some researches throughout the world, indicating the applicability of M-ABC in countries other than USA.

Livesey, Coleman, and Piek (2007) examined the validity of the tool (test and checklist) for its administration to the Australian population. To test the applicability of the norms, researchers examined three-year, four-year-old and five-year-old children from two Australian cities. The results revealed differences between ages and differences between genders in some tests. Four-year-old children from Australia performed better than four-year-old children from the USA, but this difference ceased to exist at the age of five. These differences were not considered as significant, but the researchers concluded that more comparative studies per age category were required. Furthermore, Van Waelvelde, Peersman, Lenoir, and Smits Engelsman (2007) tested the reliability of repeated measures with M-ABC in 33 children aged 4-5 with mild and moderate psychomotor disorders. At the same time, predictability stability was examined based on the percentiles of choice. The reliability of repeated measures was found to be satisfactory. However, since the tests were repeated three times over in three weeks, there was a learning effect from the subjects. Therefore, with regard to the measurements for the assessment of the motor difficulties of children 4-5 years old with already diagnosed

motor problems, the researchers propose not to evaluate with just one measurement. More efforts / measurements should be given to each child so that they have the opportunity to show their true potential. Haga, Pedersen, and Sigmundsson (2007) examined the correlations between M-ABC sub-tests in 91 children aged 4-5, coming from urban areas in Norway. They chose the eight test trials. The test for correlations between sub-tests was significantly low, both among all sub-tests and among the sub-tests that constituted a factor/category of the test. These results call into question whether, by examining a particular test, we are essentially examining a fundamental attribute or whether each skill is learned as such by the organization itself. Also, the structural validity of the test that groups together sub-tests which load on a specific factor is questioned, as satisfactory correlations between the tests are not produced. Engel-Yeger, Rosenblum, and Josman (2010) tested the effectiveness of M-ABC in diagnosing DCD in children aged 6-12 from Israel, as well as the social and other parameters that affect the motor performance of children. Two hundred and forty-nine typical children aged 4: 01-12: 08 were measured. According to the results, the age, gender, maternal education level and socio-economic level have affected children's motor development. In terms of validity, the tool was considered suitable for use in Israel. According to researchers, similar studies shed light on the environmental factors that adversely affect the motor development of children.

In Greece, Kourtessis and colleagues (2003) assessed the test-retest reliability of a Greek version of the M-ABC Checklist, in 200 elementary school children. The check list was completed by 80 physical education teachers with a two-week interval between the two measures. According to the results, the reliability coefficients were high (total score and separate sections scores. In a further analysis of the checklists of children found to face some movement difficulties (score under the lowest 15%), the test-retest reliability coefficients for total and separate sections scores respectively, were high as well. The results seem to support the stability of the checklist when used with Greek elementary school children. At another study, Ellinoudis, Kourtessis, Kiparissis, Kampas and Mavromatis (2008) investigated the construct validity of M-ABC Test in 220 elementary school children in Northern Greece, aged 9-12 years. The results revealed a good internal consistency of the N-ABC test and also similarities in structure comparing to the original test, although there is limited information about construct validity of the original version. An exception was that the construct of the 3rd age band of the M-ABC test (ages 9 and 10) where a five-factor structure was found, uncovering the complex nature of the “ball balance” sub-test. Furthermore, Ellinoudis, Kourtessis and Kiparissis (2008) compared the performance of 200 children from Greece, aged 9-11 year, to the performance of the according normative sample of 247 North American children, with the implementation of M-ABC Test. In the significantly different comparisons found, of the total six tasks, North American children were found to perform better at the five of the six tasks. According to the researchers, these differences may be due to cross-cultural reasons. Also, the discussion raises structural issues such as sensitivity and validity regarding too easy or too difficult tasks and also equivalence of difficulty for similar tasks between age bands. The researchers propose amendments for Greek samples such as raising of difficulty in sub-tests or removing ambiguous sub-tests, while testing these assumptions in a fully representative Greek sample. Subsequently, Venetsanou and collagues (2011) tested the effectiveness of M-ABC in the diagnosis of DCD, based on the research so far in relation to the psychometric characteristics of the method and the information provided in the tool

manual. The researchers conclude that it is not justified to use M-ABC exclusively for the diagnosis of children with DCD and further research in this area is considered necessary.

At an edidemiological level, Kourtessis and colleagues (2008) conducted a study on the prevalence of DCD on 364 preschoolers, inhabiting northern and central Greece. According to the results, 1,6% of the total sample were facing DCD, while 10,8% were at risk (moderate coordination disorders). This prevalence rate was lower than those of similar studies, considering the rather small sample size for an epidemiological study. Concerning prevalence between genders, as in similar studies, boys faced more coordination difficulties than girls (2:1 in moderate difficulties and 5:1 in more severe difficulties). In addition, Giagazoglou and colleagues (2011) accepted M-ABC as a valid diagnostic tool for evaluating prevalence of motor development problems in local preschoolers. They reviewed the environmental/demographic factors that influence the psychomotor development of preschoolers as measured by M-ABC. Four hundred and twelve children aged 4-6 years were studied, of which 5.4% were found to have a potential DCD. Statistically significant differences were found among the children according to gender, age, and participation in physical education. Researchers state that the results highlight the usefulness of early diagnosis and intervention to address psychomotor problems and their accompanying effects at older ages. Finally, there was one study on the teaching personnel's ability to use the M-ABC battery for screening purposes. In this study, 20 untrained early childhood teachers, using the M-ABC checklist and test, were able to identify children with developmental coordination disorder (DCD), better than physical education teachers. After attending a short period training program, early childhood teachers enhanced their capacity to identify children with DCD, equally to their physical education colleagues that attended the same training (Kourtessis, Tsigilis, Maheridou, Ellinoudis, Kiparissis, & Kioumourtzoglou, 2008).

The second version of the test (M-ABC 2; Henderson, Sugden, & Barnett, 2007) is a revision of the original version. Geuze, Jongmans, Schoemaker, and Smith-Engelsman (2001) identify it as one of the most commonly used for the diagnosis of DCD by health professionals. The variations of the second edition of the first test report refer to a) the extension of the age range to 3-16 years, b) the clarification of the delivery instructions, c) the establishment of six-month norms for the age group 3- 4 years; d) the extraction of typical values that can be used in research, e) the change or modification of tests to make them more comparable by age group and f) the differentiation of materials from wood to plastic. The test includes eight sub-tests, namely ball skills (2 tests), manual dexterity (3 tests), static and dynamic balance (3 tests). A rating and a typical score for each test are issued. The test time is 20-40 minutes and the test refers to three age categories of 3-6 years, 7-10 years and 11-16 years. The initial score for each skill is converted to standard scores, depending on the age category. The standard scores are added together and a total score is produced for each of the three sections. Alternatively, the initial values for all tests are summed, converted to standard values, and then to percentile scores. Performances up to the 85th interval are considered normal, performances from the 85th to the 94th interval are considered disturbing and performances from the 95th interval and above are considered pathological (Brown & Lalor, 2009; Mayson, 2007; Schoemaker, 2010). The standardization was performed on 1172 children. The information on the psychometric characteristics of the second version of the test is based more in the research on the first issue of the test, as the authors believe that there are no significant changes in the tests between the two editions (Mayson, 2007). Piek and colleagues (2012) report that, so far, there are relatively few studies on the psychometric characteristics of the second version. The two studies reported present acceptable reliability ratios of repeated measurements. Also, the authors of M-ABC 2 report excellent reliability among examiners (Henderson, Sugden, & Barnett, 2007). Mayson (2007) refers to the validity

study in the standardization process of M-ABC 2 by the authors. The apparent validity and the content validity by field specialists were tested, with internal cohesion ranging from 0.64 to 0.75, which was judged to be satisfactory. With respect to the criterion validity, three unpublished small sample studies were reported. These studies examined the cross-term validity and validity of the discrimination and the results of which were judged satisfactory.

In an evaluation of M-ABC 2 and as shown by a number of studies, Piek and colleagues (2012) report that although in the first edition it appeared necessary to make a distinction in the norms between boys and girls, this was not included in the second edition. Also, the fact that the tests differ from one another does not help in the longitudinal study of the development of the children. Finally, Brown and Lalor (2009) confirm that the main weaknesses of M-ABC 2 are related to its psychometric characteristics due to a lack of thorough investigation of the validity and reliability of the particular tool. The results should be used by specialists with caution. However, Slater and collagues (2010) ranked this tool first in use among seven related tools, drawing, though, the users' attention to its psychometric weaknesses. Later on, Psotta and Brom (2016) confirmed the tri-factorial structure of age band 1 of M-ABC 2, stating that different exercises may record different aspects of a motor skill. This way, derivation of an overall factor in agreement by different tests could be challenging. Additionally, Wagner, Kastner, Petermann, and Bos (2011) examined the constructional validity of the battery in age band 2. They screened 323 children from Germany aged 7-10 years. The confirmatory factor analysis indeed confirmed the model of the three factors of the standardization study. Due to lack of control of concurrent validity and discriminant validity, the researchers propose that the test should not yet be used in the German population to diagnose psychomotor deviations. Finally, in 2016, Kita, Suzuki, Hirata, Sakihara, Inagaki and Nakai examined the applicability of the M-ABC 2 test-age band 2 to 132 typically developing Japanese children. The results, concerning the internal consistency and the factorial validity were reported form acceptable to high. Also, a comparison between the Japanese and the normative sample revealed differences in the Manual dexterity and the Balance sub-categories, in which categories girls were found to perform better in comparison to boys.

In Greece, Ellinoudis and colleagues (2011) tested the validity and reliability of M-ABC 2 in age group 1. The study included 183 children aged 36-64 months. The reliability of internal consistency and the reliability of repeated measurements were tested. Also, a confirmatory factor analysis, as well as the extraction of correlation coefficients of each sub-test with the overall score was performed. The results of the analyses revealed satisfactory psychometric properties, by the confirmation of the factorial model and the satisfactory to moderate reliability factors. The researchers concluded that M-ABC 2 can be used safely in Greek children aged 3-5 years.

The M-ABC Checklist-2 refers to children aged 5-12 years. It encompasses activities that kids of these age groups perform at home and at school. Compared to the first version of the checklist, in the second edition the number of questions was reviewed and was reduced from 48 to 30. The completion takes 10 minutes. Apart from parents and teachers, the checklist can be completed by the child’s psychologist, pediatrician, occupational therapist or physiotherapist. It is a tool supportive to the test and it is used to complement and provide comprehensive information on the disabilities of the child (Brown & Lalor, 2009; Henderson, Sugden, & Barnett, 2007; Mayson, 2007). Its main aim is to alert teachers about the disabilities of their students, providing identification and description of these difficulties at a mainly qualitative level. Both the test and the checklist examine skills

both when standing as well as when moving. The list produces an overall score, which may fall a) in the standard-normal zone, b) in the worry-risk zone or c) in the severe motor pathology zone (Henderson, Sugden, & Barnett, 2007). Providing qualitative information on the child's motor difficulties, the two evaluations and recording tools are combined with an ecological intervention manual that helps teachers build a psycho-educational intervention program (Henderson, Sugden, & Barnett, 2007).

In 2012, Schoemaker, Niemeijer, Flapper and Smits-Engelsman examined the validity and reliability of the M-ABC Checklist 2, completed by teachers of 383 children aged 5-8 years old. Comparisons were made between the responses in the checklist and the performance of the same children in the M-ABC 2 test. Also, another DCD questionnaire was distributed among parents of 130 of the original sample of 383 children. The researchers deem the study results to be a proof of the checklist's adequate psychometric characteristics, as to internal consistency, construct validity, discriminant validity, and specificity. Concurrent validity and sensitivity were rather low.

3.3 Motoriktest Für Vier Bis Sechs Jährige Kinder (MOT 4-6)

The MOT 4-6 (Zimmer, & Volkamer, 1987) is a motor evaluation tool built in Germany, exclusively for preschool age, unlike the other two tests described above. It can be used with children aged 4-6 years. This test was modified to a Greek version described below, the Komotini-MATPC test, which served as the precursor for the DEMOST-PRE© test, described further below.

MOT 4-6 test's duration is approximately 20-25 minutes. Standard pre-school equipment is used. It consists of 18 sub-tests. The sub-tests have been selected based on content and based on practical criteria (e.g. equipment). The 18 sub-tests examine (partly qualitatively and partly quantitatively) gross motor skills, body coordination, fine motor skills, balance (static and dynamic), reaction ability, jumping ability, speed & accuracy of motor performance, motor control. The exercises can be given to children as a game (Venetsanou, 2007; Zimmer, 2007). During administration, the child's behavioral traits are observed and recorded, (e.g. concentration, understanding, observation, lateral dominance, endurance etc.). Each test is scored with a maximum of 2 points and a minimum of 0 points. All the points are added together and this comprises the raw score. The raw score is transformed into standard score using motor performance indexes based on norms. It is recommended that the battery be administered every six months and also examine children in pairs (Zimmer, 2007).

The standardization was carried out on a sample of 548 children from kindergarten and first grade of primary school in Germany. The battery has been tested for criterion validity (convergent, r=0.78 and discrimination [children with SEN in speech and behavior were identified] and for reliability (test-retest, r=0.85, equivalent types, a=0.80 and interrater a=0.88). The psychometric properties were considered satisfactory (Venetsanou, 2007). In 2010, Cools, De Martelaer, Vandaele, Samaey, and Andries tested the concurrent validity of the MOT 4-6 with the M-ABC. The sample consisted of 48 preschool children (5:05 years Mean). The results of the analysis revealed a high degree of agreement between the two tests (90%). The convergent validity was Kappa = 0.67. A lower degree of agreement was reached in the recognition of motor difficulties (agreement rate of 58%). Regarding the fine motor skills, in particular, there was less correlation between the M-ABC and the MOT 4-6 sub-tests. Researchers conclude that it is preferable to administer the MOT 4-6 on typically developing children aged 4-6.

In Greece, Venetsanou (2007) reports five studies concerning a) standardization and adjustment of norms to the Greek population, b) testing the factors of walking, total body coordination/dexterity, c) testing the factors that affect them, d) testing the motor development and the occurrence of accidents, as well as e) testing the psychomotor

education program implementation. The results revealed significant differences in performance by age category, as well as overall appearance of insignificant differences between genders. The psychomotor education program improved the motor performance of preschoolers, while those who had better motor performance succumbed to fewer accidents. Further, Kambas and colleagues (2012) examined the suitability of the MOT 4-6 on Greek population. Seven hundred and seventy-eight Greek children aged 48-71 months participated in the study. The analysis revealed statistically significant differences between age groups and did not reveal differences for both genders. In relation to the German standardization sample, differences that were identified between the two age groups were considered as insignificant. The levels of performance among children were distinguished through the test, even though there were also some differences in relation to the standardization sample in that field. Moreover, the reliability of internal consistency and test-retest reliability were excellent, reaching the conclusion that the MOT 4-6 is a valid psychometric tool that can be used on the Greek population with the German norms, although there was a slight divergence in performance between the two samples.

3.4 Demokritos Movement Screening Tool for Preschoolers (DEMOST-PRE)

To resolve psychometric weaknesses of MOT 4-6 for Greek population, local researchers created a modified form of MOT 4-6, named Komotini-MATPC. This format contains 13 tests instead of 18, and uses simpler materials. Kambas, Aggeloussis, Fatouros, and Gourgoulis (2001) studied the factor structure and the reliability of MAT PC. It was administered to 755 infants of mean age 50.66 months. The new test exhibited higher psychometric characteristics than the MOT 4-6 and therefore could be used in children aged 48-53 months.

Based on the Komotini-MATPC, the Democritos-Psychomotor Assessment Tool for Preschool Children/PAT-PRE was created. Kambas and Zimmer (2004) presented the battery which is the amended version of the German MOT 4-6 and is valid and reliable for the Greek population. The initial test was considered expensive for the Greek kindergarten and also very strict in terms of implementation. It contained two sub-tests with difficult content, as well as many sub-tests where preschoolers demonstated poor concentration. Also, there was lack of motor ability indexes that can be used in intervention programs (Kambas, Aggelousis, Fatouros, & Gourgoulis, 2001; Kambas, Aggeloussis, Proviadaki, & Kelaraki, 2001). The Democritos PAT-PRE consists of 13 sub-tests which examine motor speed, agility and orientation in space, dynamic and static balance, flexibility, body coordination, rhythmic ability, coordination of the upper extremities, visual-motor coordination, response speed, aiming and prediction. In 2004, two studies were conducted on this new tool. In the first study, the validity criterion was tested by administering the Democritos PAT-PRE on 146 children aged 48-53 months, coming from three different regions of Greece. The BOTMP was administered at the same time. The correlation coefficient between the two tests was r=0.951, which was considered satisfactory. In the second study, both versions of the test were administered to 351 preschoolers aged 36-41 months. The two versions significantly correlated, while the average performance of the boys did not differ significantly from that of the girls in the modified version. The reliability coefficient was measured a = 0.889 (Venetsanou, 2007). In 2005, Kambas, Venetsanou and Taksildaris presented a pilot testing of the criterion validity (convergent validity) of the Democritos PAT-PRE battery. They studied 50 children aged 48-53 months. They compared the results of the battery with the short form of BOTMP. The correlation coefficient between the two tests was r=0.81 ($p < .001$). This was followed by similar

studies in other locations in Greece. In 2006, in a pilot study, Venetsanou, Kambas and Ksanthi tested the interrater reliability of the Democritus PAT PRE battery. The battery was implemented by two examiners on 49 preschoolers 48-71 months old. The correlation coefficient was r=0.91, which fulfills the set of eligibility criteria. In the same year, Hondromatidou, Petroktistis, Venetsanou, Ksanthi and Kambas studied the effect of age on the test battery. They studied 84 children of the age groups 48-53 months, 54-59 months, 60-65 months and 66-72 months. The results of the statistical analysis revealed significant differences between the first and the second age group comparing to the fourth age group. In a further study, Kambas, Venetsanou, and Aggelousis (2006) examined the discriminant validity using samples of preschoolers of different age categories and different special educational needs (SEN). Regarding the age groups, 88 pupils without SEN were studied. Their age groups were 48-59 months, 60-71 months, 73-85 months and 86-96 months. Regarding special educational needs, 16 children with learning disabilities aged 75-95 months were studied, and also 14 children who were attending a special school, aged 74-96 months, were studied. The results of the analyses support the discrimination validity of the battery. The typical pupils, aged 86-96 months, achieved the highest score while the pupils of the special school achieved the lowest score. The battery also presents ecological validity because of the playful nature of the tests, the short administration time and the cheap equipment.

Kambas, Venetsanou and Gavriilidou (2013), as a result of previously mentioned studies, created the Democritos Movement Screening Tool for Preschool Children (DEMOST-PRE©), giving evidence of validity (face, content, factorial). The final form of the test battery consists of nine items, as follows: Tapping; jumping repeatedly sideways; running, carrying and placing a ball in a box; toe-to-heel walking in a backward direction; overhead toss to a specific target; picking up coins and placing them in a box; stepping through three vertical hoops; catching a bean bag; standing jump over a stick. The underlying abilities include movement speed, movement accuracy, agility, flexibility, dynamic balance, jumping ability, object control, manual dexterity, prediction, object catching. The administration takes approximately 15 minutes. The test provides norms for the Greek population. Kambas and Venetsanou (2014) presented the content and the factorial validity of this new assessment tool. The researchers state that DEMOST-PRE© is designed to provide preschool educators, clinicians and researchers with information about assessment and screening of the motor proficiency of children aged 4–6 years, as well as the development and control of movement programs. At the first stage of the research, the content of the tool was initially developed, while the face validity control finalized this content. At the second stage, in a factorial validity control, the DEMOST-PRE was administered to 435 children aged 48–71 months. The factor analysis conducted revealed two distinct components, namely “Gross Motor Control” and “Visual Motor Control”. Subsequanlty, Kambas and Venetsanou (2016) examined construct and concurrent validity of the DEMOST-PRE©. Construct validity was examined through correlations between total scores and individual item scores, as well as scores according to gender and age. Concurrent validity was examined by the use of BOTMP-LF as a criterion test. The results supported the psychometric properties aforementioned, enhancing the DEMOST-PRE© validity for use in similar Greek samples. Finally, in 2016, Gkotzia, Venetsanou, Kambas and Pollatou studied the construct validity of the DEMOST-PRE©, by using the criterion of known groups. The results of the study, contrasting scores of typical children and children with intellectual disabilities/autistic spectrum disorders, confirmed the validity of the tool to be used among preschool aged children, for the purpose of motor development screening.

4 Respective academic research in Greece

The query, concerning academic research in Greece on the subject, was performed among gray literature. It revealed 23 studies, mainly in completion of postgraduate theses and dissertations. These studies were all focused in preschool age. The query confirmed the use of non-other than the above-mentioned tools for purposes of motor development assessment. Following the international research, these studies concerned a) the evaluation of the tools' psychometric properties, b) the preschoolers' fine and gross motor development assessment, c) the factors affecting the motor performance of preschoolers and d) the effectiveness of various types of intervention programs. To our knowledge, none of these studies exploited these tools for school use, regarding motor readiness for educational placement. Though, two of these studies connect DCD to learning difficulties (Kourtessis, Thomaidou, Liveri-Kantere, Michalopoulou, Kourtessi & Kioumourtzoglou, 2008), or to specific learning difficulties/dyslexia (Tziva-Kostala, Kourtessis, Kostala, Michalopoulou & Evaggelinou, 2011). One study was found to use M-ABC Checklist 2 for screening purposes, involving the kindergarten teachers directly. This study identified the low sensitivity of the M-ABC Checklist 2 to detect preschool children at risk. As to kindergarten teachers, they exhibited moderate capacity in identifying children with serious motor difficulties, as well as low capacity in identifying children at risk (Plataniti, 2015). These results contradict the study of Kourtessis and colleagues (2008) reported above, yet are in agreement with the study of Kiparissis (2008) and Arambatzi (2015) regarding elementary school teachers. These studies depict the importance of in-service training for educators that will implement formal assessment procedures in their pupils.

5 Discussion of the findings

Table 1 includes a summary of the previously described motor assessment tools, presented by the authors' critical commentary according to important properties. These properties are the content, the time-space-equipment, the validity and reliability, the fit for motor readiness, the fit for Greek population, as well as the fit for kindergarten teachers. The "content" property refers to the eligibility of exercises (items) for preschool age, as to degree of difficulty, cultural appropriateness and, most important, interconnection to the kindergarten curriculum. The "time-space-equipment" property refers to the feasibility and usefulness of the tool in real conditions in today's Greek kindergarten. The "validity" and "reliability" properties are considered obligatory to attempt any administration that which will lead to further diagnostic control and placement decisions. The "fit for motor readiness" property refers to including all possible information the teacher will need to decide if the child is ready to jump up to elementary school. The "fit for Greece" property refers to the tools' standardization for Greek population. Last, the "fit for kindergarten teachers" property refers to these tools use by non-specialized in motor difficulties personnel. That is to be easily implemented, scored and interpreted.

Table 1. Properties of motor assessment tools used with preschool age in Greece

Tools	Content	Time	Space	Equipment	Validity	Reliability	Fit for motor readiness	Fit for Greece	Fit for kindergarten teachers
BOTMP	Partly difficult for preschoolers, no provision for disabilities	Extensive	Large	Expensive	Weaknesses in factorial structure, identification and performance separation between fine and gross motor skills	Coefficients lower than desired	Under discussion	Revisions needed	No
BOT 2	Partly difficult for 4-5 year old children	Extensive	Large	Expensive	Low cut off score, further research needed in Greece	Limited stability (original version), further research needed in Greece	Under discussion	Further research needed	No
M-ABC	Partly compatible to the educational needs of preschoolers	Extensive	Large	Expensive	Weaknesses in criterion validity, major test purpose questionable, amendments in sub-tests needed for Greek samples	Results of stability (test-retest reliability) in Greek sample seem promising	Under discussion	Further research needed in preschool age	Effective use under training
M-ABC 2	Partly compatible to the educational needs of preschoolers No norm distinction for boys and girls	Extensive	Large	Expensive	First results of confirmatory factor analysis and correlation coefficient extraction seem promising	First results of internal consistency and repeated measures reliability seem promising	Under discussion	Further research needed	Further research needed
MOT 4-6	Partly difficult for preschoolers and culturally inappropriate	Adequate	Partly adequate	Expensive	Low degree of motor difficulties recognition	Adequate internal consistency and test-retest reliability	Partly	Partly	Further research needed
DEMOST-PRE	Partly compatible to the educational needs of preschoolers	Adequate	Adequate	Adequate	Adequate construct and concurrent validity	Not reported	Partly	Adequate	Further research needed

According to this summary, there seem not to be many options in motor assessment tools for a kindergarten teacher to choose from, so as to use them within her daily practice. Internationally used assessment tools are expensive to buy (Pearson Education, 2017a, 2017b); also, are difficult to implement within the kindergarten context, if they take too long, as well as difficult to score, if they are too complicated (Peerlings, 2007; Piek, Hands,

& Licari, 2012). Plus, the results they produce should always be treated with caution, as the numeric values they come with (validity, reliability, norms) were brought about by using samples, which link to populations from different cultural backgrounds (Giagazoglou, 2001; Mendonca, Sargent, & Fetters, 2016; Sherrill & O' Connor, 1999). Therefore, these tests are not ready for use in another population other than the original, without re-standardization. Validity and reliability is another critical issue, as most of them have received some negative feedback on the subject. Last, coming from another country, it is rather difficult for the content of these tools to be instantly connected to the Greek kindergarten curriculum and readiness goals, as important differences exist between preschool education systems (EACEA, 2015). Concluding, it would be advisable that only specialized personnel used the above mentioned international tools of motor assessment. These specialists are expected to have received postgraduate training in their use and may more easily have access to Greek population data, so as to interpret the results more safely (SEFAA EKPA, 2016). That statement excludes kindergarten teachers, whose basic postgraduate training does not include evaluation in physical education (TEAPI EKPA, 2016-17).

Taking the aforementioned shortcomings of international motor assessment tools into account, the most recently produced Greek tool of motor assessment seems to have amended those shortcomings, for the most part. It may be proven very useful in the physical education field evaluation in kindergarten, as to motor skills part (IEP, 2014b). Although, the content of this new tool does not seem to fully cover for the kindergarten curriculum as to graphomotor skills (IEP, 2014b) so as to be used for the readiness goals (Zervou, 2017). Fine motor development is not represented adequately, so as to reflect school tasks in the kindergarten and the first grade of elementary school. Also, some gross motor development sub-tests could be more compatible to a physical education program outside school and not to a psychomotor kindergarten program inside school. Last, there is no evidence yet on the tool's usefulness for use and easiness of results' interpretation by kindergarten teachers. Still, it is advisable to use a Greek tool of motor assessment, which will surely reflect Greek culture on the subject and also provide comparison values ready for use.

6 Conclusion and Recommendations

Limitations of the present study are the literature search sources as chosen. Through this review, the value of formal motor development measuring of preschoolers as to readiness, reference to services and placement decision seems to be established (Gullo, 2010) so as to investigate for adequate assessment tools, which are valid and reliable. Before local tools were constructed, well known tools from the English-speaking world were used (Bruininks & Bruininks, 2005; Henderson, Sugden, & Barnett, 2007; Zimmer & Volkamer, 1987). This experience, with its pros and cons, led to the creation of the first Greek tool of preschoolers' motor development assessment (Kambas, Venetsanou, & Gavriilidou, 2013). This research effort seems to be promising as it provides a tool as such, ready for use. Yet, further studies needed to be performed on its applicability and usability of its results in the Greek preschool education system.

The practical implications of this study concern the lack of use of standardized tools of motor assessment with specific characteristics, for the school readiness assessment use within the preschool education environment. There were no such tools reported to connect the preschoolers' difficulties in the motor area το specific cognitive-motor abilities

(Koutsouki, 1998, 2008) within the frame of special education assessment within the school context in Greece (national laws 2817/2000 & 3699/2008). Even if these tools existed indeed, research to date has produced contradicting results as to the kindergarten teachers' ability to use these tools and to interpret results, towards motor dexterities or difficulties of their pupils (Kourtessis, et al., 2008; Plataniti, 2015). It is suggested that the tools, already existed or the new tools to be created, should consider the It would, then, be possible to assess those abilities common in other learning areas as well, as reported in the national curriculum (IEP, 2014b). This way, tools of psychomotor assessment could be included in the formal special education needs assessment existed (Laws 2817/00, 3699/08).

According to the authors' opinion and experience in education, other specifications of these tools should involve the selection of sub-tests, so as to represent motor skills needed to perform tasks that are determined by the kindergarten curriculum and are used as a base line for moving to elementary school. Motor skills should reflect physical abilities as well as learned dexterities, so as to evaluate maturation and learning. Secondly, the content of the sub-tests could be derived from the kindergarten's daily practice (altered somewhat so as not to be effected by learning) so as to be more easily comprehended, implemented and explained by the teachers. Last, the favoring should be towards tests that are rather short, portable, inexpensive and not too sensitive to environmental changes. Considering all the above, modifying or building a motor assessment tool for preschool age could be a challenging, but a rather interesting task.

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