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This work is dedicated to...

My parents, my wife Eman and my children Khadija and Hager

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List of Abbreviations

KIGGS-Study	Studie zur Gesundheit von Kindern und Jugendlichen in Deutschland
MODALIS	Motor Development across the Life Span
PISA	Program for International Student Assessment
OECD	Organization for Economic Co-operation and Development
Mo-Mo	Motorik-Modul Study
M	Mean
SD	Standard Deviation
N	Number of Sample
SQ	Sum Quadrat
df	Degrees of Freedom
MQ	Mean Quadrat
P	Significant value
η^2	Eta Quadrat
MPA	Motor Performance Abilities
DMT 6-18	Deutscher Motorik Test 6-18 (German Motor Test)
KFT 1-3	Kognitiver Fahigkeitstest 1-3 (Cognitive Abilities Test)
BMI	Body-Mass-Index
R	Correlation
S	Second
P	Point
M	Meter
CM	Centimeter
PE	Physical Education
AE	Aerobic Endurance
AnE	Anaerobic Endurance
ME	Muscular Endurance
MS	Maximum Strength
SS	Speed Strength
AV	Action Velocity
SR	Speed of Response
CT	Coordination Under Time Pressure
CP	Coordination With Precision Requirement
F	Flexibility
H	hypothesis
α	Cronbach's Alpha

List of Contents

B. Quasi Experimental and Investigations

List of Figures

List of Tables

1. Introduction

Motor performance abilities (MPAs) are considered most evident of the level of motor development, which has vital impact on children's general development. The importance of the role of MPA in the development of cognitive functions has been re-established and broadened (Thelen, 2000b). In Germany, the importance of movement for cognitive development and academic learning has also been noted (Hüther, 2007; Wrobel, 2004; Zimmer, 2004a, 2004c). Particularly, in the last decade the evaluation of the outcome from the educational system during early childhood in Germany has been forced as a result of Programme for International Student Assessment (PISA) and Organization for Economic Co-operation and Development (OECD) studies in developing early education policies (OECD, 2004a, 2004b).

In addition, it has been widely accepted that the growth process and the development of a child function simultaneously according to rhythm that is established by genetic inheritance and environmental factors. Although, the stages of motor development are the same for all children worldwide, the developmental rate is influenced by the special characteristics of the environmental conditions in which the child grows (Barros et al., 2003; Brooks-Gunn et al., 1997; Giagazoglou et al., 2007; Griffiths, 1984; Huston, McLoyd & Garcia-Coll, 1994). Moreover, the level of MPA and the body composition are more influenced as individual competency is considered in motor learning (Schott, 2008).

Several studies around the world have focused on the importance of MPA and motor fitness attitude in children and adolescents. However, this interest has been observed exclusively in developed countries. Studies by Kuntzleman et al., (1992) in the USA, Craig et al., (1994) in Canada and (Booth et al., 1997; Tomkinson, 2004) in Australia are the first few once that reported a decrease in MPA (Kretschmer, 2012). In Germany as well, some authors made similar claims (Bös, 2003). Moreover, the number of children and adolescents with motor abnormalities has increased, with amount of physical inactivity and obesity (Bös, 2003; Dordel, 2000; Eggert et al., 2000; Raczek, 2002; Rusch & Irrgang, 2002). Although, some empirical research, at least for the primary school- aged children, revealed that no secular trend, about children having a general deterioration in motor performance could identify (Kretschmer, 2003a, 2003b).

Lack of exercises and a sedentary lifestyle plays the central role in a lot of health problems. In addition, it is widely accepted that the children who have better MPA are more physically active and less likely to be sedentary than those with poorer MPA (Booth et al., 1997). Moving efficiently can be viewed in terms of whole body coordination or that of specific skilled movements. The efficiency in a range of fundamental motor skills is an indicator of long-term engagement with physical education (PE), sport, and physical activity (Booth, 1997; Clough, 1993).

The potential MPA to target in children basically include activities involving running, speed, agility, jumping, balance, and visual motor skills as well as abilities that are a part of school PE program, because fun and developmentally appropriate activities for children at any level

of MPA can be easily practiced and are most relevant and effective (Buffalo, 2006). In addition, addressing the physical and motor needs of children is one of the most important requirements for the development of PE curriculum (Kelly, 2010).

The interactive effects between of motor abilities and health development as well as possible genetic differences become one of the most important scientific fields to define the expected disease, which may be related to later growth and development (Gallahue & Ozmun, 2006). Studies by Bryan et al., (2006), Gordon-Larsen et al., (1999) and Kretschmer, (2001) suggested that the level of MPA is culturally different. For children raised in Western cultures, like those with an European origin, higher physical activity rates and achievements have been found in comparison to those growing up in non-Western cultures, like those from the Near and Middle East, and South and Southeast Asia.

1.1 Research problem

It is clear that fundamental changes from the first years of life to the adolescence are the results of interaction and exposition among children and their environment. In recent studies about motor and cognitive performance of school beginners, adolescence was found to be deficit in their motor and language development skills. This adolescence suffers from being overweight, lacking coordination and having difficulty concentrating (Augste & Jaitner, 2010; Hempel, 2006; Dordel et al., 2003).

In addition, other possible causes could be that children move less presently, because of the increased use of media with associated changes in leisure behavior, especially in the younger generation in Germany (Opper et al., 2007). This problem was particularly useful in shaping the curriculum for the primary consideration, which calls for explicitly enough opportunities for physical activity and playing in free and organized groups outside of PE classes. These results confirm that children have only one primary school hour a day in which they move about. These findings are consistent with the fact that only a few children perform their daily moves by bike or by foot (Opper et al., 2008). Actually, these results lead to a new political discussion on the state of motor development of children in Germany (Bös et al., 2009).

Comparative studies have been performed to recognize and improve knowledge by identifying the differences and to suggest some solutions. In addition, it becomes increasingly important due to the possibility of learning from other systems and orientations (OECD, 2001). Wagner et al., (2009) observed, according to their review for selected cross cultural fitness studies with German involvement, a low number of this kind of studies in primary schools, which should be compensated by a wider range of age in future investigation. Moreover, the anthropometric characteristics are necessary to because only the knowledge about the complex interactions among person, behavior and environment allows targeted and sustainable interventions. Presently, there is an increased interest in the concept of international comparison studies in the field of motor abilities especially for the typical development in children from different countries (Kretschmer et. al., 2012).

Although, studying the effect of age and gender factors in the change of children's MPA have constituted a popular field of research in the last decade, particular interest has been shown in results of relative studies in terms of age and gender effects in the output during school age. It has been widely discussed that there is a direct relationship among motor skills and academic learning. Students have to follow a lot of structured daily school routine, are confronted with new motor and cognitive requirements and practice in a group sitting of mostly unknown peers in new and unfamiliar situations. This is based explicitly on a connection among the motor and cognitive functioning. Moreover, in terms of 6 and 7 years old mentioned in the repeated findings, a relationship between cognitive processes and movement in the beginning of the school age or only to modest degree of it has been noted (Eggert & Lütje-Klose, 1995; Kirkrndall, 1986; Willimczik, 1978).

In addition, the difficulties in the transition from kindergarten or from preschool to primary school occur more intense especially when the new experiences are completely different from the previous one. To adapt with the new tasks, various conditions are required that are associated to the social conditions, which constantly changes. Today's children need to acclimatize to not only the changing social conditions, but also the physical and mental conditions in everyday school. It is paramount, especially to functional sensory organs, an age-appropriate development of nervous system and brain, to ensure adequate cognitive and motivational development of children as well as the expression of reasonable social behavior (Nickel & Schmit-Denter, 1991). In fact, the coping with the needs within and outside the school require certain for performance conditions relating to coordination, cognition and motivation (Nüske, 1993).

Consequently, we found the effect of age and gender factors on the level of MPA for children aged 6-8 years a necessary concern. This age means the first years of primary school, which is very important years in the development of the children's basic performances, to reach the heights' level of motor development from age 9 to 10 years (Bös & Ulmer, 2003). Moreover, it is a step forward to developing the PE curriculum of primary schools by providing comparison among German children (from European country with Western culture) and Egyptian children (from a Middle East country with Arabic culture). In addition, to investigate particularly the results of some review of the global situation of PE in schools, which defined the differences in the equality of boys and girls in PE by (33%) in the Middle East countries and by (94%) in the European countries (Hardman, 2009).

This kind of research provides important information about children's needs, according to their strengths and weaknesses on the level of motor and cognitive performance, based on accepted research related to physical, motor, and cognitive attributes as well as the needs of individuals and groups. In addition, this study is to equip PE teachers with the necessary information for planning and for application to provide students with an appropriate, safe and effective PE programs used for various domains of learning in PE (NCATE, 2008).

1.2 Research Aim

This is a cross-cultural study that aims to investigate the differences in motor and cognitive development of Assiut and Magdeburg children aged 6-8 years in primary school.

1.3 Research Questions

Subject 1: Motor development

Are there differences in motor development among Assiut and Magdeburg children aged 6-8 years in primary school?

Questions 1.1

Are there differences in body composition among Assiut and Magdeburg children aged 6-8 years in primary school?

Questions 1.2

Are there differences in motor development among Assiut and Magdeburg children aged 6-8 years in primary school in comparison to the German norms?

Questions 1.3

Are there differences in motor development by age among Assiut and Magdeburg children aged 6-8 years in primary school?

Questions 1.4

Are there differences in motor development by gender among Assiut and Magdeburg children aged 6-8 years in primary school?

Subject 2: Cognitive development

Are there differences in cognitive development among Assiut and Magdeburg children aged 6-8 years in primary school?

Questions 2.1

Are there differences in cognitive development among Assiut and Magdeburg children aged 6-8 years in primary school in comparison to the German norms?

Questions 2.2

Are there differences in cognitive development by age among Assiut and Magdeburg children aged 6-8 years in primary school?

Questions 2.3

Are there differences in cognitive development by gender among Assiut and Magdeburg children aged 6-8 years in primary school?

1.4 Research Hypothesis

Hypothesis 1: Motor development

There are differences in motor development among Assiut and Magdeburg children aged 6-8 years in primary school.

Hypothesis 1.1

There are differences in body composition among Assiut and Magdeburg children aged 6-8 years in primary school.

Hypothesis 1.2

There are differences in motor development among Assiut and Magdeburg children aged 6-8 years in primary school in comparison to the German norms.

Hypothesis 1.3

There are differences in motor development by age among Assiut and Magdeburg children aged 6-8 years in primary school.

Hypothesis 1.4

There are differences in motor development by gender among Assiut and Magdeburg children aged 6-8 years in primary school.

Hypothesis 2: Cognitive development

There are differences in cognitive development among Assiut and Magdeburg children aged 6-8 years in primary school.

Hypothesis 2.1

There are differences in cognitive development among Assiut and Magdeburg children aged 6-8 years in primary school in comparison to German norms.

Hypothesis 2.2

There are differences in cognitive development by age among Assiut and Magdeburg children aged 6-8 years in primary school.

Hypothesis 2.3

There are differences in cognitive development by gender among Assiut and Magdeburg children aged 6-8 years in primary school.

1.5 Research Construction:

The research was divided into six parts as follows:

1) Introduction and presentation of the research problem (Chapter 1),
2) Theoretical-based part (Chapter 2),
3) Methods (Chapter 3),
4) Results (Chapter 4),
5) Discussion (Chapter 5),
6) Conclusion (Chapter 6).

2. Theory

2.1 Motor Development

In this part of the study, the aspects of motor development have been discussed to address various disciplines related to this term. Motor development, which is mainly approached from an analytical perspective of capability, will be explained. The structure of this part consists of the following: first section includes the concept and the constructs of the subject area representing motor development; the second section includes the MPA; and the third section discusses the influential factors of motor development, and, finally, motor tests are discussed.

2.1.1 The Concept of Motor Development

The motor development basically refers to the development of motor abilities. The study of motor development is concerned with the developmental change in motor behavior and the factor underlying those changes. Moreover, the term motor behavior not only refers to distinguish between motor learning and motor development, but also to provide a relatively broad conceptual definition (Haywood & Getchell, 2005).

Motor development is related to changes of age, regulatory and functionary processes that have positions and movement at their core. This description has pointed out that onto-genetic development is a life-long process and only restricts the concept so far as we discriminate changes (Ulrich & Reeve, 2005). Thus, motor development determines the observable changes of the behavior of movement and their products like time, breadth, as well as the movement's foundational processes. Therefore, according to this perception, motor development may be defined as changes in motor behavior over the lifespan and the process, that underlies these changes, the sequential, continuous, age-related process, where by an individual progresses from simple, unorganized, and unskilled movement to the highly organized, complex motor skills, and finally to the adjustment of skills that accompanies aging (Clark & Whitall, 1989).

Consequently, ontogenetic developments has been much written over generation and the consecutive generations has been raised and live in different socio-cultural contexts' (Montada, 1982). In addition, the traditional model of development treatises contains the interaction between individuals and their differences, although different development from persons under apparently similar circumstances are common for everybody and only different developments provide openness over the development of conditions. The differences from person to person, from family to family, between historical periods and between different cultures give evidence of influential factors that a part of the genetic make-up in the qualities of the development environment (family, school, neighborhood, culture), in specific experiences, specific events (injuries, diseases), or in qualities that are searched by specific persons (Montada, 1987).

For children motor development is considered as the process through which a child acquires movement pattern and skills. It is a seemingly endless process of modification that involves interactions of several factors. In addition, these factors include neuromuscular maturation, which has a significant genetic component. The growth characteristics of the child, such as body size, proportion, and body composition, the tempo of growth and maturation, the residual effects of prior motor experience, including prenatal experiences, and the new motor experiences of these factors occur in the context of the environments within which the child is involved by the social environment as well as the physical environment. Although, the process of motor development appears to be continuing, it proceed in the context of growth and maturation (Malina, Bouchard & Bar-Or 2004).

Furthermore, the interaction concepts of development are recommended because of their theoretical complexity. The interactive model is appropriate as a starting point because of its potential to unlock recognition and to a large degree it is capable of integration (Hurrelmann, 1986). In addition, the analysis of involved factors affecting the level of motor abilities should include the changes in person environment interaction over the lifespan in which the ontogenesis can be grasped in terms of historical, cultural and social developments.

2.1.2 Motor Development, Abilities and Skills

The psychological definitions of ability, skill, and performance should be understood in the context with one another in order to clearly grasp their relationship to motor functions. Since Gundlach (1968), who describes motor abilities as overwhelmingly energetic processes as well the distinguished coordinative processes chiefly as motor modifying abilities, focuses particularly in this area. Bös and Mechling (1983) pointed out that Gundlach's interpretation must be connected to Rubinstein's psychology with a slight change in the original concept with regard to conditional energy abilities; since these do not fit the mentioned approach. Motor abilities are fashioned after the approach from Arnold (1987) as structural components and conditions for moving action and as a result of movement to the characterized moving/movement performance. Gundlach's (1986) system should be distinguished among conditional energy abilities and coordinated abilities.

The differences between the concepts of ability and skill basically consider ability is, for the most part, genetically determined and largely unchanged as a result of practice and experience, but, as a conclusion, the level of person skill's is ultimately ability to achieved in particular, which depends on the level of the person's abilities that are relevant to the activity and on the quantity and quality of the person's practice experience (Schmidt & Lee, 2008). In addition, movements are sometimes described in the context of pattern and skills. A pattern is the basic movement. Thus, many children can perform the basic movement pattern in jumping with levels of proficiency. In contrast of the movement pattern, skill emphasizes accuracy, precision, and economy of performance. The motor pattern is more general concept, but motor skill is more specialized concept (Malina, Bouchard & Bar-Or, 2004).

2.1.2.1 Definition of motor performance ability

MPA is most commonly used in sport's science to describe abilities that comes from the discipline of psychology. This concept can be generally seen as the totality of the necessary conditions to complete the motor performance. The conditions for this performance are the personal specific qualities of an action of physical abilities, which makes a person more or less equipped for a certain activity. Arnold (1987) defined abilities as similarly the totality of psychical conditions necessary for the completion of an activity. The content of the activity is a system of universalized psychical processes, which regulates an activity process. In contrast to these views, which seem to define the process as fairly complex, Rubinstein (1973) understands the definition as the ability to perform an activity and obscures the boundary between ability and skill.

Abilities should be seen as constructs, which are somehow responsible for individual variation. Claub (1976) is also in agreement with this opinion; for him abilities are relatively fixed and are more or less generalized for the specific qualities of the activity. Abilities are therefore distinct, but universal foundations for action, which, in individual variation, restrict observable behavior, action and performance. Abilities are therefore the foundation for skills. Also abilities can be seen as the requirements for performance in the sense of how to optimize the results of an action. They can be provided to an individual through genetic inheritance or can be acquired through practice and increased effort (Kirchem, 1992).

In addition, the concept of performance is most frequently used concepts in research geared toward human beings. This term can be defined as there is a strong consensus that performance in the social context is not only the product of actions but also the process of effort of social standardization. It depends on the situation and on the values of the relative standard that are factors to be considered. Nevertheless, the external conditions for the development of abilities as well as skills could either restrict or promote it.

From the pedagogical standpoint, a performance is defined as a judgment of a behavior, which sets up a standard of values. Heinemann (1975) saw judging of performances as a socially determined process through which the selection of dimensions of activities, the comparison of activities according to systems of value along with reflection of points of reference, in which the activity is carried out by Heinmann (1975), can be done. An action can only be judged when a level of difficulty is established and when the possibility that the action will be successful or unsuccessful is present. This judgment of performance actually depends on the following factors: first, the relationship among the individual abilities and the result of the action and, second the degree of effort by the acting person. The concept of performance is to be understood as a multidimensional term; it can be seen in many branches of theory and in many semantic dimensions (Kircheman, 1992).

2.1.2.2 Conditional energy abilities

According to Grundlach (1968) and other authors, we have discussed the conditional energy abilities, because auxiliary clarifies that the realization of these abilities is always bound up with the supply and provision of energy. This systematizing becomes summarized as the abilities of power, speed, and endurance in conjunction with all authors, who dealt with the topic of motor abilities, turning into conditional energy abilities. In addition, comparatively unwieldy are the efforts to describe the coordinative ability. As Hirtz (1976 a) found 150 publications with 80 different conceptual understandings of the coordinative ability, it is worthwhile to distinguish between general and specific abilities. The general part is more or less fundamentally a matter of movement activity (Kirchem, 1992).

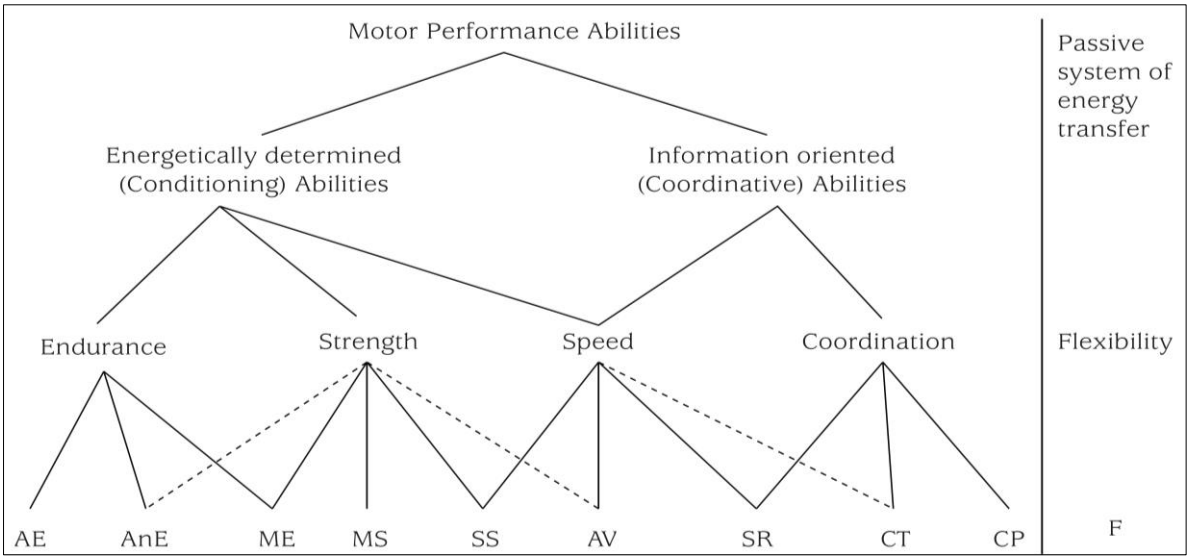


Fig. 1: Differentiation of MPA (Bös, 1987, 94; Lämmle, 2010, 42), AE = aerobic endurance; AnE = anaerobic endurance; ME = muscular endurance; MS = maximum strength; SS = speed strength; AV = action velocity; SR = speed of response; CT = coordination under time pressure; CP = coordination with precision requirement; F = flexibility.

The conditional abilities (Fig. 1) describe the internal processes of energy provision and supply without which sport action is possible. This restriction of the concept sets the complex of the condition in a close relationship with energy processes, whereupon the use of the concept of conditional energy abilities becomes a specification of the main concept. In addition, use of the concept “ conditional energy abilities ” describe the ability as a complex or matrix fashioned after the concept from Grundlach (1968), which described the complex as energy conditional, thereby reversing the emphasis. The abilities power endurance and speed will be set under the category conditional energy abilities. Flexibility and agility will also be included under this category (Kirchem, 1992).

The conditioning abilities of strength and endurance are differentiated because of duration and intensity of workload into aerobic (AE) and anaerobic endurance (AnE), as well as maximum strength (MS), speed strength (SS) and muscular endurance (ME) (Hollmann & Hettinger, 2000). MS and SS are mainly determined by muscular (number of fibers, fiber

cross-section, and fiber structure) and neurophysiologic (recruiting and rate coding of motor characteristics) conditions (Bührle & Schmidtbleicher, 1981).

Action velocity (AV), as the sport-specific occurrence of speed, cannot clearly be assigned to the conditioning or coordinative ability dimension. In contrast to (AV), the speed of response seems to be a relatively self-contained motor ability (Lämmle et al., 2010). Coordination ability is understood as performing fast and/or precise body movements (Lämmle et al., 2010). Bös (1987) has used this differentiation of coordination. In this differentiation, coordination under precision demands includes balance tasks and coordination under time pressure includes agility tests (Bös & Mechling, 1983).

Briefly, in consideration of MPA, more diagnoses are required to have a stronger process and functionally oriented access with the help of sport medicine measuring processes. We distinguished the level of MPA of energy and information into conditional and coordinative abilities. On the second level, the basic qualities of endurance, strength, speed, coordination and agility are measured. The conditional abilities including speed, strength and endurance in the development phase of middle childhood are marked by the following discussion. The coordination ability and agility should be considered as well (Bös & Ulmer, 2003).

2.1.2.2.1 Speed

Speed is one of the nerve-muscle-systems ability to effectively carry out motor actions in the given conditions and in a minimum period of time (Blum & Friedmann, 2002). The speed is influenced by peripheral neuro-muscular structures and functions, as well as from the central nervous system (CNS), and determined from the cognitive control mechanisms (Hohmann, Lames & Letzelter, 2007). It can be regarded as a specific skill within the coordination framework, which was manifested in open and closed movement situations meaning the ability to coordinate under time pressure (Hohmann, Lames & Letzelter, 2007). It is subject to many factors, including morphological and physiological factors, like the speed of stimulus acquisition and processing, intra-muscular coordination, strain, fatigue condition of the muscles, and achievement motivation (Van der Schoot, Geist & Bauer, 1990).

In addition, the concept of speed is used in sports and in the training theory to provide movement (action speed) actions in which high intensity values are achieved and reaction processes occur in a very short time (Hauptmann, 1997). Frequency speed is the ability to move (repeating the same movements) at top speed against low resistances (tapping, skipping, and flying sprints). Speed movements are often repeated at short intervals, which play an important role in MPA. Responsiveness is the ability to react to a stimulus in the shortest time possible. A distinction is drawn between response (crouch start) and response selection (in table tennis, fencing, boxing, and goalkeeping). The measurable expression of the speed is the response time (the time breakdown of placing a stimulus until adequate muscle contraction) (Grosser, 1991).

At the fastest possible cyclical movements, an increased use of force (about 30%) is required. It is called quickness and explosive power. Action speed considers the ability acyclic movements at top speed against low resistances. In other kind of speed movements a greater force application (over 30%) is required. It is called strength speed and explosive strength.

Children aged 10-12 years have a high plasticity of the CNS. On one hand, a high excitability of nerve control processes, and, on the other hand, weak differentiation inhibition. High sensitivity is the cause of rapid response, high frequency capability, and almost ideal motor learning. Various finding of the age between 8-12 years also confirm these facts (Hollmann & Hettinger, 1980). Thus, resulting in the 8-12 year olds, a sensitive period for good reaction speed development and high-frequency speed growth and for motor learning processes for the formation of fast movements, therefore, important movement techniques (start techniques and, running techniques is more complex and combined movements techniques) (Grosser, 1991).

2.1.2.2.2 Coordination

The coordination abilities can be defined as performance requirements, which are particularly effective for high and complex motion requirements alone or in bundles (Rieder, 1991). For Krahl-Rhinow (2004), the coordination is important for the control of the body and the execution of movement. By promoting the coordination skills the perception is sharpened, execution of the movements are refined, and the responses are improved. The coordination of movement is basically created by the interaction of nerves and muscles.

The coordination of movement means that the movements are coordinated. This is especially true when multiple body parts are involved in the movement (Neumaier, 1983), although, it is difficult for the numerous coordination abilities to systematize. In different studies, different classifications are made according to basic and special skills to complex and specific sports, according to upper and lower-order skills, according to observable and unobservable skills (Kosel, 2005). For school sport, it attempts to hierarchically organize and present interrelationships in an illustration. This distinction is recognized by most authors, and they fall back on the specialist literature (Hirtz, 1985).

According to Bös (2001) coordination skills can therefore be information-oriented functions of magnitude on the type of sensory regulation and functions of the requirements of the movement in one action, the ability to coordinate under time pressure, and an ability to accurately control of movement’s distinguished. These two areas covered include dimensional analysis against each other, but are not statistically independent of each other (Bös, 2001).

Moreover, considering the coordination abilities from the viewpoint of task-related increase in the motor component, you get in line with Roth and Winter (1994) to a differentiation of coordinative abilities, which looks like this cognitive tasks (visual-spatial), intentional performance, simple acoustic reaction times, visual-motor reaction times, fine motor precision performance, and gross motor coordination services. In addition to co-ordination skills (responsiveness, rhythm skills, spatial orientation ability, kinesthetic differentiation ability and balance ability), agility and dexterity are also included (Teipel, 1988).

Basically, the skill in this case is considered as a synonym for gross coordination. Skills can be used as a synonym for fine coordination. The fine motor skills are reflected in the general skill, which also includes the fine motor coordination. Finger plays, isolated body movements or the precise versions of these exercises promote fine motor skills. At the age of 4 years, children start receiving training for fine motor sequences such as the opening of buttons or zippers and holding forks and spoons. The skills are expanded until the enrollment and the fine motor abilities are refined, therefore the children are able to cope with all the manipulations of everyday life in fine motor tasks (Krahl-Rhinow, 2004).

The gross motor skills involve movement speed, and elasticity of the body's responsiveness when running games, sweepstakes, or exercises to device attachments. The gross motor activity can be seen in children aged 1 year and who are the crawling and learning to walk. Gross motor skills, also includes body coordination, which are acquired only in kindergarten with activities like, crossover and rotational movements. They require an act that appeals to both sides of the body with different tasks (Krahl-Rhinow, 2004).

Other authors have mentioned that coordination is a very complex ability and that several differentiations of coordination (Roth 1982; Hirtz, 1977). One possibility for such a differentiation is because of the kind of sensory regulation. On the other hand, it is dependent on the task profile of the movement. Roth (1981) used inductive approaches as dimension-analytical approaches and distinguished between the two areas of coordination under time pressure and coordination under precision demands. This means that the coordination is understood in performing fast and/or precise body movements.

According to Bös (1987), in this differentiation, coordination under precision demands includes balance tasks and coordination under time pressure includes agility tests. Flexibility cannot clearly be assigned to conditioning or coordinative abilities, and flexibility is not seen as an ability, rather as an anatomically determined as passive systems of energy transfers (Bös & Mechling, 1983).

2.1.2.2.3 Strength

Strength is a neuromuscular ability to develop physical strength. The strength capability is a benefit, provided to overcome resistance by muscle activity or external opposition to counteract external forces (Thiess & Baumann, 1980). In addition, many other morphological and physiological, coordinative psychics effective factor that give rise to the power of intervention in the athletic movements of importance are of no great importance for the further strength properties. These factors are, first, energy metabolism (as a physiological factor); second, coordinating the work of the muscle contraction (as a coordinative factor); third, the muscle mass relative to the body weight (as a morphological factor); fourth, a psychodynamic, effective factor (Martin, 1988).

Strength can be divided into the maximum strength, explosive or speed strength and endurance strength. Subdivide the maximum force here represents a basic variable that affects both the explosive strength as well as muscular endurance (Schmidtbleicher, 2003). From a variety of strength training studies it is also known that the components maximum strength, speed and endurance cannot independently develop. Thus, improving the maximal strength in previously untrained amateur athletes can increase the explosive strength as well as the muscular endurance (Schlumberger & Schmidtbleicher, 2004).

Maximum strength is the maximum force that can be exerted against a dynamic or static random resistor. It depends on the muscle cross-section (Spring, 2005) of the inter-muscles coordination and muscle fiber composition.

Speed strength or explosive strength is the ability of the nerve-muscle system to overcome resistance with a maximum contraction velocity of <200 ms to a very great impulse or necessary impulse. It is therefore a maximum power delivery in a very short time unit (Frey & Hildenbrandt, 2002). Explosive strength, as Graf and Rost (2002) and Martin (1988), is the ability of a neuromuscular system, to overcome resistance with high contraction speed. It depends on the basic factors, strength and coordination. Thus, it can be described as the ratio of maximum force (Graf & Rost, 2002; Martin, 1988). The explosive power is thus the ability of the neuromuscular system, which is possible great impulse to develop within a short time. It is mainly dependent on the intra-muscular coordination (Slomka et al., 2005).

The muscle cross-section is determined by the number and the thickness of the muscle fibers. The anatomical muscle cross section corresponds to the cross-section of the simple total muscle, while the physiological cross-section represents the sum of the individual muscle fiber cross-sections. Muscles cross-section are anatomically and physiologically of the same size, the feathered muscle physiological cross-section is significantly larger. This is because in the feathered muscle, the muscle fibers are oblique to the longitudinal axis of the muscle. The force developed is proportional to the physiological muscle cross-sectional (Spring et al., 2005). The inter-muscles coordination is the interaction of the agonist with the antagonist muscles during a movement sequence.

Endurance strength is the ability to sustain higher loads with a higher heart frequency over a defined period (Schlumberger & Schmidt, 2004). In addition, the strength endurance is the resistance of the muscles to fatigue during long or repeated strength-lactic services with predominantly anaerobic energy production (Spring, et al., 2005). Frey & Hildenbrandt (2002) added that the reduction of power surges or voltage loss should be minimized. Consequently, the strength endurance is also determines the fatigue resistance. Good fatigue resistance is seen during repeated power loads. Over a defined period, the sum pulse is as high as possible, and at a certain submaximal load, high number of repetitions can be achieved (Schlumberger & Schmidtbleicher , 2004).

The development of strength ability in the early stages occurs very slowly; the rise in these abilities (maximal strength, speed strength) can be seen every year. The gender-specific differences are slightly in favor of boys. Since the development of strength is bound up with a hormonal restructuring process, greater (gender-specific) differences emerge, related to a greater trainability and also with puberty. Now, it should be noted that strength during childhood can be considerably increased through training processes (Baur, 1994).

In addition, this development because of the otherwise often resulting posture a significant factor. Responsible for this is a poorly trained muscle in the torso, shoulder and hip. Up to puberty there is little difference between boys and girls in the muscle mass and muscle strength. The muscle percentage of total body size is about 27%. By hormonal changes, the percentage of muscle increases for boys until the end of puberty to about 42% and, in girls to 36%. In early school age, the urge should be aligned, so that the muscles and especially the movement of muscles are strengthened is dynamic. In the late school age, systematic exercises with your own body weight and small additional weight to should be carried out (Martin, 1988).

2.1.2.2.4 Endurance

Endurance is the ability, a stimulus for termination or reduction of stress prompts as long as possible to be able to resist (Frey & Hildenbrandt, 2002). Under endurance is understood as the mental and physical fatigue resistance of an athlete. This refers to the ability to prevent fatigue postpone, and to be able to hold a given load as long as possible. This includes quick recovery after loading (Frey & Hildenbrandt, 2002; Hollmann & Hettinger, 2000; Martin, 1988). Thus, the endurance is equal to fatigue resistance combined with the ability to recover (Grosser et al., 1993; Roth, 1999).

In addition, endurance ability is defined as a function of fatigue. The first definition points out that the endurance ability of an athlete to create a given load without appreciable signs of fatigue over a long period. The second points out that the endurance is the ability, despite clear signs of fatigue entering the sporting activities, continues up to the individual stress limit (extreme fatigue). The third points out that the endurance ability occurs in both phases

as well as in reduced stress breaks during competition or training and that, after completion of that, it quickly regenerate.

The limiting factors of endurance are physiological factors such as the cardiovascular system, respiratory, metabolic capacity, and energy stocks; psychological factors, such as mood, activation, motivation, and persistence; and external factors such as time of day, and weather. Not that better interaction with the coordination skills, lower is the energy consumption for a given performance. Good stamina can therefore be economic movement coordination in longer hold (Van der Schoot, Geist & Bauer, 1990).

Furthermore, the classifications of the endurance are about the nature of the primary energy supply (lactic anaerobic, aerobic or anaerobic lactic), the duration of exposure (short term, medium term, and long-term), the operation of the skeletal muscle (static and dynamic), the circumference of the stressed muscles (local and general) and the connection with other conditional abilities (endurance, speed endurance, speed endurance, and sprint endurance) (Zintl, 1990).

In a static muscular strain energy is only provided aerobically when the burden of the maximum static strength is less than 15%. In more than, the compressed capillaries perfusion is reduced and, there is shortage of oxygen and substrate. Also, in 50%, the perfusion comes to a complete halt. In contrast, under dynamic loading, the energy can be provided aerobic, such as by the use of 30% of the maximum force, because under dynamic stress, perfusion is less hindered.

2.1.2.2.5 Agility

Agility is the ability to perform movements with large amplitude (Blum & Friedmann, 2002). It is the degree that is determined by the functioning of the joints, muscles, tendons, ligaments and the neuromuscular control processes. But agility is also not a way to exact assignment conditional or coordinate feature area. Problems can arise in this case primarily from the different scope determination. In a narrow definition of agility, it is the amplitude of the joints', but a largely anatomically determined personal power of the passive systems of energy transfer is required (Bös & Tittlbach, 2002).

In addition, agility consists of two components. Flexibility is determined by the properties of the joints and spinal discs, while elasticity is determined by the muscles and tendons. Agility is characterized largely by motions and depends on three factors:

- The freedom of the straight joints and the joint surface form,
- The elasticity of the muscles, tendons, ligaments, and joint capsules,
- The force of the moving muscles (Spring et al., 2005).

These factors besides age, gender, psyche, warmed or cold musculature, daytime, and clothing, should be considered on the level of achievement on agility (Kutzner, 2002).

Furthermore, agility is influenced by the inter-muscular coordination. Better is the quality of coordination in a movement, less is the unwanted (joint) innervation of antagonistic muscles, which means that it is more extensible and with less resistant to the movement. This provides a larger range of motion and allows increased power delivery (Van der Schoot, Geist & Bauer, 1990).

There are several types of agility depending on the distinction between active and passive movements. Active agility is when a movement of action muscles is stretched arbitrarily. On the other hand development of external forces, for example a careful or withdrawing partner, means passive agility. In this case, the amplitude of motion is greater than for the active voluntary motion. The difference between active and passive movement is also known as agility reserve (Frey & Hildenbrandt, 2002).

Active agility is the maximum amplitude of joint's motion, which can be realized by an athlete independently. Passive agility is the maximum possible movement of deflection in a joint, which can be achieved by additional exposure for the outside (partner, additional load). On the other hand, dynamic agility corresponds to the active agility and affects the achievable dynamic range of motion. The dynamic agility is typically larger than the static agility. The muscles are subjected to strong age-related changes. This increases with age, and the agility gets severely restricted (Blum & Friedmann, 2002).

In the early school age, the agility is usually good, even without proper training. The goal of agility training must therefore be primarily the preservation of motion and does not necessarily improve it (Spring et al., 2005). On the one hand, increases the spinal agility in the hip and shoulder joint - the spine with eight / nine years, most agility on the other side, but occurs in certain directions of movement, as measured by the pre-school age, already a reduction in agility. This mostly affects the legs and the hip joints and the dorsally directed mobility in the shoulder joint (Martin, 1988).

2.1.3 Factors Influencing Motor Development

The interactive understanding of motor development characteristic is because of simultaneous effects of internal and external factors. The internal factors are because of a predisposed influence. These factors are seen as central potential, which firstly sets possibilities and boundaries to action. This potential can be exhausted from the individual, but it can also remain unused. However, the external factors lead to a developmental effect, through which the environmental factors can affect motor development in varying ways, either harmful or beneficial. In addition, development processes can be seen as a product of the effect of these two factor categories.

In sport science this issue was discussed by Baur (1994) as he divided the interactionism explanatory model of motor development into three levels (Fig. 2), which can be distinguished analytically as environmental, personality, and the level of action. According to this model, motor development takes place on the environmental level in concrete social action contexts, in which ideas come from physical activity, established or even be canceled. Headquarters instances of movement socialization in childhood, family of origin, peer group, kindergarten, or school and sport club (Baur, 1994).

Under the personality level, all development-related internal factors can be combined. On one hand, these include basic physical characteristics and the genotype determined, individual varying biogenetic organizations that is realized in action, and perhaps a case in which barriers need to be exhausted or barely used. On the other hand, it represents the personality level, the orientations of the individual and his previously acquired motor skills, which import in the future act of movement and continue to be developed (Baur, 1994; Singer & Bös, 1994). The central assumption in that, in interactionism theories, personality development takes place in response to persistent and confrontation with the environment and personality level (Fig. 2). Activities that are relevant in childhood for the development of motor skills are school sports or sports clubs and informal movement games with peers (Baur, 1994).

The environmental factors, such as origin playgrounds or sports clubs at the residence with its range of sports can not only offer potential opportunities to practice lay particular movement activities, but also affect the individual as a subject capable of acting in its environment, by adopting certain other offers or by seeking ways to satisfy his own interests in movement. Thus, the environment does not automatically bring certain motor characteristics, rather the environmental effects are mediated through action, which results from the confrontation of the individual with the external and internal factors. In movement the action underlies motor abilities and skills, and for further development in the latter, mutual active influencing environmental and personal level remains for a life course of time (Bös, 2003).

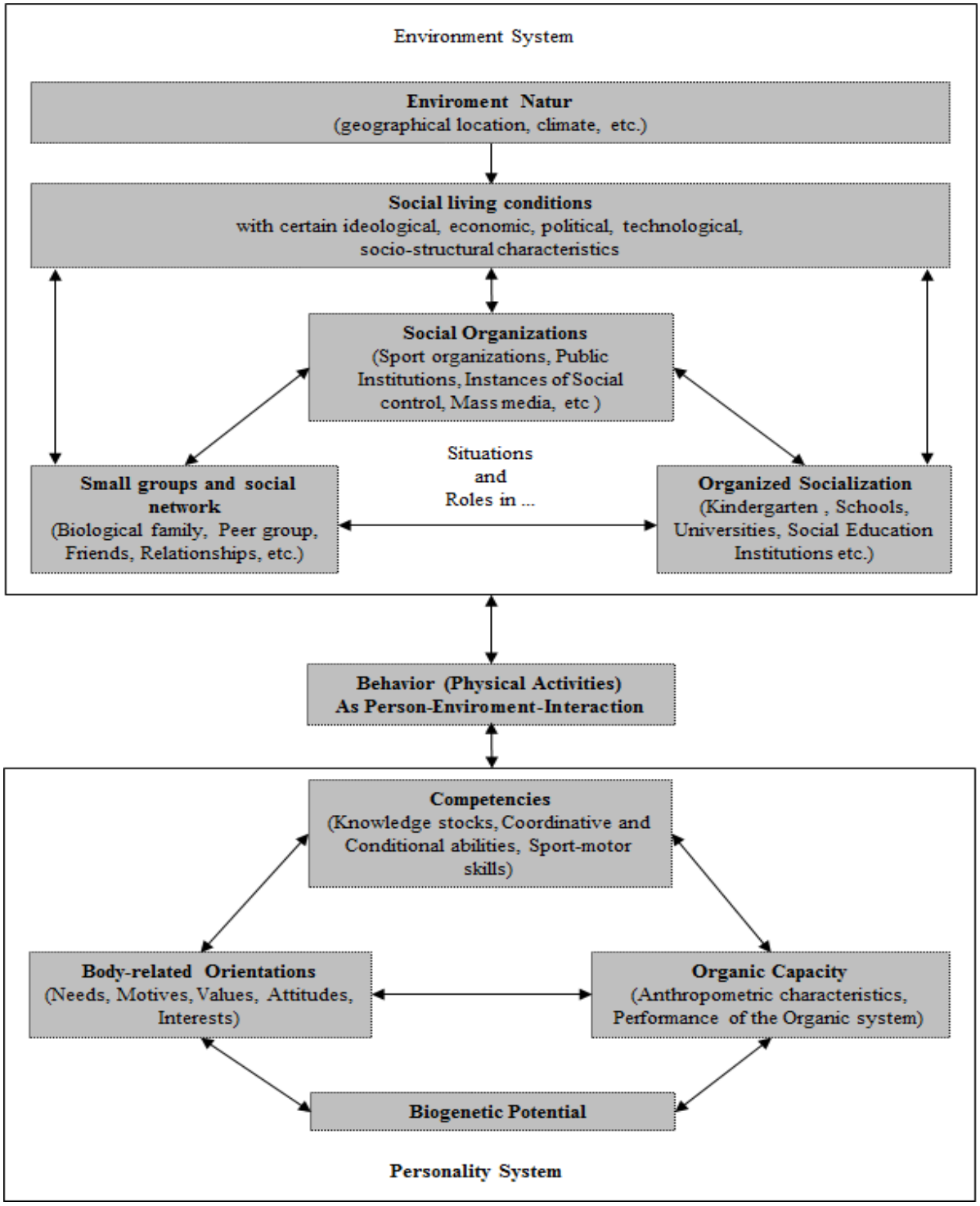


Fig. 2: The levels of person-environment-interaction (Baur, 1994; Bös, 2003, p. 16).

The categories represent a set of structurally different influence factors. For an empirical view, a breakdown of the categories in their singular determinants is necessary to study the influences in motor development. Thus, the goal of the next section is to describe the influence of age, gender, and social-cultural factors on the characteristics of motor development among children in order to illustrate the impact of these factors by age and gender groups.

2.1.3.1 Age factor

Particularly, reaching the school-age children are accompanied by somatic and psychic changes. Keller and Meyer (1982) indicated the reconstructing of the whole body from a small child to a schoolboy as the first main change in the form. The change of the body form includes: longer limbs, the proportion of the head, and the change of the attitude to the world, which are influence of the motor image.

The egoistic subject-determined image of the world turns into an objective-relational perspective of the world. In this restructuring phase, a multi-dimensional movement capability is noticeable; the change accomplishes for better MPA in the total conditions. The characteristic for the movement- behavior in early school-age children is a distinct liveliness and mobility (Winter & Roth, 1994). The compulsion to experiment and play is typical. Children develop the ability to concentrate on certain movement tasks a goal-oriented, situational movement-behavior and increasing performance ability creates a solid foundation for acquiring sport skills.

The period from sixth through the tenth year of childhood is typified by slow but steady increases in height and weight and progress toward greater organization of the sensory and motor systems. Changes in body build are slight during these years. Childhood takes more time for lengthening and filling out prior to the pre-pubertal growth spurt that occurs around 11 years of age for girls and 13 years for boys. Although, these years are characterized by gradual physical growth, the child makes rapid gains in learning and functions at increasing mature levels in performance of games and sports.

Furthermore, this period of slow growth gives the child time to get used to his or her body and to the typically dramatic improvement seen in coordination and motor control during the childhood years. The gradual changes in size and the close relation between bone and tissue development may be important factors in the increased levels of motor abilities. The following is a listing of the general motor developmental characteristics of the child aged from 6-10 to provide more complete view of the total child and to represent a synthesis of current findings (Gallahue & Ozmun, 2006):

1) Growth is slow, especially from age 8 to the end of this period. There is a slow and steady pace of increments.
2) Boys and girls range from about 44 to 60 inches (111.8 - 152.4 cm) in height and 44 to 90 pounds (20.0 - 40.8 kg) in weight.
3) The large muscles of the body are considerably more developed than the small muscles.
4) Reaction time is slow, causing difficulty with eye-hand and eye-foot coordination at the beginning of this period.
5) The visual perceptual mechanisms are fully established by the end of this period.
6) Children are often farsighted during this period and are not ready for an extended period of close work.
7) Most fundamental movement abilities have the potential to be well defined by the beginning of this period.

8) Basic skills necessary for successful play become well developed.
9) Activities that involve the eyes and limps develop slowly. Such, activities as volleying or striking a pitch ball and throwing require considerable practice for mastery.
10) This period marks a transition from refining fundamental movement abilities to the establishment of transitional movement skills in lead-up games and athletic skills.

In addition, perceptual abilities during childhood become increasingly refined. Practice and experimentation with the maturing perceptual abilities enhances the process of integration with motor structures. Failure to have the opportunity to practice, instruction, and encouragement during this period prevents many individuals from acquiring the perceptual and motor information needed to perform skillful movement activities (Gallahue & Ozmun, 2006).

The individual differences become greater so that the depiction of an age-bound process appears to be always less reasonable. Along with differences in gender and individual differences in bodily development increasingly manifest. The sport-motor abilities are determined by culture through learning and training processes. The appearance of certain skills can only be described in a time continuum. Judgments based on age-based performance norms for sport-motor skills and abilities underline the danger that the MPA will be undermined compared to the development stage of a Primary school-aged children (Baur, 1994).

Entering a school represents the first time that many children are placed in group situations in which they are not the center of attention. It is a time when sharing, concern for other, and respect for the rights and responsibilities of other are established. Kindergarten is a readiness time in which to make the gradual translation for an egocentric, child-centered play world to the group-oriented world of adult concepts and logic. In the first grade, the first formal demands for cognitive understanding are made.

In addition, the major milestones of the first or the second grader is learning how to read at the reasonable level. The 6-years old are generally developmentally ready for the important task of breaking the code and learning to read. The child is also developing the first real understanding of time, money, and numerous other cognitive concepts. By the second grade, children are well able to meet and surmount the broader array of cognitive, affective, and psychomotor tasks placed before them (Gallahue & Ozmun, 2006).

2.1.3.2 Gender factor

The issue of the equality in MPA between boys and girls generally goes to the theoretical approach of gender similarity in the literature assuming that boys and girls significantly differ in a few unknowns in psychology (Lohaus, Vierhaus & Maass 2010). However, the differences in MPA probably most clearly come into play. In the first year of life, the differences by gender are already clear. Thereafter boys show a significantly higher level of performance, when they grow up including increased movement duration and intensity than girls do at the same age.

In addition, other differences in the level of MPA clearly because of body size, endurance and muscle strength, which is found in performances such as throwing, jumping, or holding, in preschool age favor boys (Lohaus, Vierhaus & Maass, 2010). They are superior to the girls in the movement patterns that require physical strength (Baacke, 1995). The boys show their motor behavior with altogether the boys show more physical effort (Griess-Steuber et al., 2009).

In the fine motor area the girls perform at an advantage over boys. In skill exercises, girls perform better than their peer boys (Lohaus, Vierhaus & Maass., 2010). Furthermore, the girls are better in exercises that affect the mobility and flexibility (Alfermann, 2007). In the writing skills, it can be observed that girls are more likely to develop fine motor skills and are able to draw using smaller figures. For boys the gross motor skills that require the use of the whole body are easier (Nickel & Schmidt-Denert, 1991).

Regarding gender differences, Alfermann (2007) pointed three differentiations of classes. First, the developmental differences between girls and boys are based on the biological and genetic factors. Thus, the anthropometric data are considerable. Second, differences development of boys and girls are occurring through the environmental influences. A third group is the cause self-construction processes in which the children do not passively respond to the environment, but active co-development of their own. We can thus state that, between the genders in primary school age, there are minor to moderate differences, especially, in the areas of strength, speed and endurance, as conditional abilities, as well as in the area of flexibility (Alfermann, 2007).

Briefly, the differences among the growth patterns of boys and girls are minimal during the middle years. Both have greater limb growth than trunk growth, but boys tend to have longer legs, arms, and standing heights during childhood. Likewise, girls tend to have greater hip widths and thigh sizes during this period. There is relatively little difference in physique or weight exhibited until the onset of the preadolescent period. Therefore, in most case girls and boys should be able to participate together in activities. During childhood there is slow growth in brain size. The general developmental characteristics of the children from age 6 to 10 by gender includes that girls are generally about a year ahead of boys in physiological development with full energy for both (Gallahue & Ozmun, 2006).

2.1.3.3 Social-cultural factors

In a lot of investigation, socio-cultural factors of the environment have been discussed since population genetic analysis and the inherited estimation derived from it are not very important for developmental psychology and pedagogy. In the following section, the determinants of socio-cultural classes will be described and discussed.

The groups of socio-economic factors deal with all influence scales of the family of the child, who is involved in the social and economic conditions. The trait, which is mainly investigated in this group, is the class or standing. According to Scheid (1994a), the differentiation in socio-economic conditions is substantive, for family, and social environmental. The most important socio-economic factor is the social status or social class as a global indicator of the low motor performance (Eggert & Schuck, 1975; Friedman, 1981; Silva et al., 1984). Willimczik (1983) discovered that, for children of a low social standing there is an impairment of MPA.

The cultural background is more important in this context than the citizenship of the person. Kretschmer (2001) realizes that the MPA for children of Germany is significantly better than that of non-German children (Kretschmer, 2001). It has been already indicated about an indirect effect of the two macro-social factors class and nationality. The social status is closely linked with other socio-cultural factors which, are in contexts to motor development (Scheid, 1994a).

Under the factors of the material environment, a whole set of factor groups are set together; the living conditions can be considered to be quantitative living conditions' and qualitative environment. Accordingly, there is a positive relationship between the MPAs, and the home, large living area, low floor height, frequent use of sports and games equipment and easy accessibility of play areas (Kemper, 1982; Zimmer, 1981). In addition, Kretschmer (2001) investigated the movement/places of play (park and garden) and discovered that these had a positive impact on motor development (Kretschmer, 2001). Scheid (2007) and Kretschmer (2007) confirmed that, the positive effect of sport equipment depends on its availability and the intensity of use. He points especially to soccer balls, tennis rackets, bicycles, and inline skates as being very useful for the development of MPAs.

In the area of family, a positive relationship with the sporting activities and sports interests of the parents and siblings have been noted (Emrich et al., 2004; Scheid, 1994b; Zimmer, 1981). A parenting living style severally limits, the movement possibilities of the children, and it tends to associate with adverse effects on the development of motor skills. In addition, the family environment becomes distinguished by family structure, taking care of the kids' and promotion of sports through the family. Moreover, considering the completeness of the family and rising the child, social environmental factors is very important, for example, the ease of movement kindergarten (Rethorst, 2004), school (Breithecker, 1998) and the recreational activities (membership in a sports club) have a clear influence in motor development (Emrich, 2004; Scheid, 1994b).

A positive influence through the parent's side is only shown in single studies concerning other factors in the group. Only slight connections have been found with family promotion. The factor groups of the social environment deals with the social relationships in which a person lives and which affect a person's development therefore it is clear that the family, as the smallest unit of society, has to count as a social institution.

Socio-cultural factors are also closely related to the general social conditions, thus, illustrating the close link between normative lifetime's bound and normative historical factors. In recent decades, social goals, techniques and organizational forms have changed greatly in the western world. The results have indicated that the differences in motor performance among active and less active children are getting bigger; therefore we have to not only purchase physical activities of daily living but also increase the institutionalized of sport activities (Woll & Bös, 2004).

In studies comparing generations in Germany, a tendency of deterioration in the level of MPA have been noted (Bös, 2006; Bös & Brehm, 2004; Dordel, 2000; Rusch & Irrgang, 2001). Although, the complexities of social change and the motor performance of children has still not been elucidated in details, which is the observed tendency. Deteriorations may be considered in the studies on relationship between motor and cognitive benefits in different generations.

In addition, considering the range of traits, the investigation of motor ability of children in primary schools in Hamburg from Kretschmer (2007) is worthy of attention. He analyzed certain environmental factors such as age and gender, but left out many factors from analysis. With the past knowledge, theory of changed childhood could only being further investigated on an empirical basis. Part of the goal would be to see which areas of child life and motor development (media consumption, lack of movement) changed in the last years. For instance, how the evidence of using the singular factors of media shows that no negative impact can be demonstrated on the motor development of children which is the opposite of what theory suggested about those who watch a lot of television (Daniel, 2007).

2.1.4 Motor Tests

2.1.4.1 Foundations of motor tests

The specified structure of the diagnostic process in methodological and procedural problems with the view of Bös (1987) is not entirely reconciled. He used the terms procedure and method similarly under the term diagnostic methods of data collection.

In addition, to describe the level of MPA of children and adolescents, diagnosis with motor tests is an unavoidable requirement. The instructive action of teachers and trainers requires diagnostic information in order to lead the targeted movement practices for the sport class and club. With motor tests, it is possible to measure the MPA of a single child or of an entire group is possible. They can present information to find out about the state of development the MPA. In addition, PE teachers and exercise trainers possess instruments with which negative and positive changes in the MPA of children and adolescents can be assessed. The diagnostic judgment of teachers and trainers can be logically enhanced. With the help of motor tests, targeted motor strengths and weaknesses can be identified and measures can be offered to children at an early age.

2.1.4.2 Applications of motor tests at school

The school sport may be in line of the definition of training as a complex process act with the aim of understanding the systematic and oriented influence on motor performance development. This understanding of the PE implies a need of planning the lessons of motor control to develop MPA.

Therefore, sport motor tests according to their design have a special significance for the diagnosis in school. In addition, most of the motor tests according to their descriptions are quite easy to apply and have the advantage of quantitative data with an adequate fulfillment of the main good criteria. Moreover, the tasks sport motor test according to their coping capability, and, at the same time the exercise of skill or ability views are also relevant. Kirchem (1992) mentioned the following responsibilities of the motor tests at school:

- The standard condition can be used to plan individual and the group base training. The standard of motor test allows providing the format for teaching sports according to the principles of internal differentiation.

- The motor test procedure allows monitoring of learning and thus the success of the training lessons.

- By setting goals the results of the motor test can quantified as the success of performance motivation.

- Motor tests include training elements and monitoring. Therefore, sport motor tests can be used for evaluation of sport lessons.

2.2 Cognitive Development

In this part of the study, aspects of the cognitive development are discussed to address various disciplines such as neuroscience, cognitive psychology and differential psychology. Cognitive development is mainly approached from an analytical perspective of capability which will be explained. The structure of this part is as follows: firstly, basic definitions and constructs of the subject area cognition. Second, the following section includes the nature of cognitive abilities. Third, the influential factors of cognitive development and cognitive tests will be discussed.

2.2.1. The Concept of Cognitive Development

According to Frensch (2006), there exist three major meanings of the term cognition. First, cognition refers to phenomena within psychology that examine memory, perception, attention, recognition of pattern (Frensch, 2006). Second, cognition refers to a bundle of theories that try to explain cognitive systems. Third, cognition is understood as a methodological approach to explain human behavior (Frensch, 2006). The definitions of cognition are basically linked to a description of phenomena. Solso (2005) gives the following explanation for cognition: cognition is closed to every area of perception, memory and thinking processes as an important attribute of all human beings as well as some cognitive attributes such as attention, knowledge, problem solving, remembering and intelligence (Solso, 2005).

A frequently stated similarity of cognitive phenomena is to a certain degree a foundation on intelligent behavior (Frensch, 2006). Therefore, cognitive development is defined as the evolvement of cognition over life span (Solso, 2005). Therefore, definitions, phenomena and tendencies of development during infancy of the different areas are briefly introduced. There exist different systems to classify the areas of cognitive abilities. These entire abilities can classified as cognitive abilities, but the problem is how to divide these abilities into areas of cognition. The impact of these abilities in the area of cognition and academic learning was distinguished by Solso (2005) as follows:

Perception (realizing sensory signals)/attention/recognition of pattern, consciousness, memory (short-term memory, long-term memory, semantic memory), knowledge representation (knowledge), pictorial imagination, language (language processing, semantic memory, language behavior, reading and information processing) and problem solving, creativity, intelligence, logic, thinking, decision making and rationality.

These processes are clearly not to separate from each other and they occur in isolation from. Therefore, it makes sense to investigate how people remember, attend, perceive, plan and reason in ways that serve people functioning in the world. These processes are closely tied with social goals and with individuals learning to function as participants in cultural communities, which mean that social engagement and communication are a key aspect of cognitive development (ISSBD, 2005).

2.2.2 Cognitive Development Abilities and Skills

Funke (2006a) divided the areas of cognition into perception, learning, memory, thinking, planning of actions, control of actions and language. In general, the systematization of individual areas is difficult because of the fact that all cognitive functions are closely linked together and there exist no generally accepted definitions and even the hierarchical levels are controversial. Therefore, the classification depends strictly on the definitions used and the determination of hierarchical levels as discussed in the following section.

2.2.2.1 Definition of cognitive abilities

Vygotsky (1978) suggests that we should study cognitive development from four interrelated perspectives the micro-genetic, onto-genetic, phlyo-genetic and socio-historical. The micro-genetic refers to the development over short periods of time, minutes and second. Onto-genetic indicates to changes over a lifetime, while phlyo-genetic refers to changes over evolutionary periods. Socio-historical refers to changes that have occurred in one's culture over time, such as changes in values, norms, traditions and technologies throughout the cultural history (Vygotsky, 1978).

Several theories have considered cognitive abilities as a learning process. For example, Piaget's theory of cognitive development includes a theory of learning (Eunicke-Morell, 1991). Overall, the focus of the learning theories in development theories is more on the current behavior changes to recording trends over longer periods (Bergen, 2008). From historical point of view they were in the psychology of learning first behaviorist theories (Pavlov, Watson & Skinner) in the foreground, and then replaced by cognitive approaches (Lefrancois, 2006).

The definition of learning is accordingly depended on the respective theoretical position. From empiricist perspective, learning is seen as a process that generates or rates knowledge when one is exposed to a new pattern and generalizes one's response to other contexts. From rationalist view when this process takes place, the mind applies an existing structure to new experience to understand it from a socio-historical point of view, as a process of being initiated into the life of a group such that one can assume a role in its daily practice (Bergen, 2008).

There are general models that deal with the learning theories, for example, the mechanisms of learning, learning systems and computer models. There are theories that apply to particular areas of learning, such as instruction and expertise or on specific objects of learning relate to language learning (Weinert, 2006). For the present work the theories on motor and cognitive learning are relevant, in particular in regard to the role of motor and cognitive processes in the other learning area. In addition, more general theories, processes and systems both within the motor and inside the cognitive learning can be explained. In order to illustrate the cognitive learn abilities, subsequent, language, memory and knowledge, thinking and intelligence will be considered in the following part.

2.2.2.1.1 Language

Language is defined as a "[…] communication system that uses sound and signs to transfer thoughts" (Solso, 2005). Psycholinguistics includes " a syntactic, semantic and pragmatic point of view on the level of words, sentences and text with regard to language reception, language production and language communication " (Groeben, 2006a).

While theories of sound and the word perception are linked to theories of perception, word knowledge and the mental lexicon are linked to knowledge and memory (Funke, 2006b). In addition, the holistic understanding of language development considered by Grimm (1995) mentioned three groups of basic language components. The first component is called prosodic and covers aspects such as pitch, length and volume. The second group of components can be summarized as grammar and includes phonology (the organization of speech sounds), morphology (word formation), syntax (sentence structure) and lexicon (word meaning). The third group, the pragmatics is primarily the design of social relations between different aspects of speech act (manufacture socially interactive relationships between the communication partners) and discourse (coherent organization of conversational units) can be distinguished. In (Fig. 3) these components of the linguistic competence are summarized.

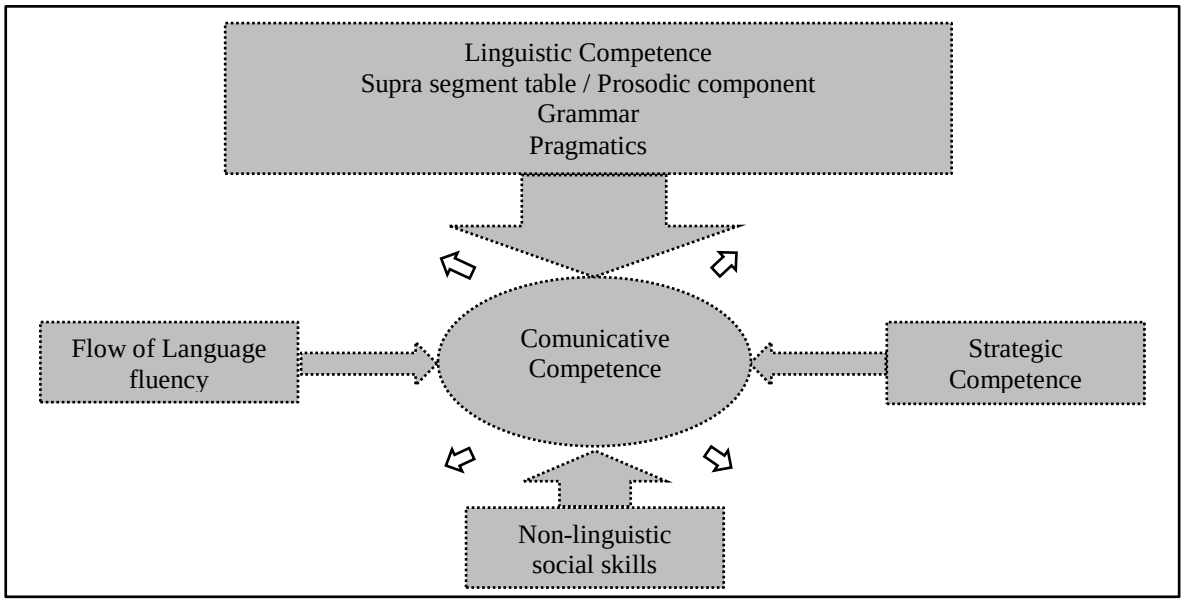


Fig. 3: Competences of communicative competence (Moser & Wenger, 1999; Moser, 2008, p. 140)

In the process of language acquisition, many of the other developing regions are considered. Including the development of movement, perception, cognitive or social development progressed insufficient is a linguistic development very difficult (Berk, 2011). The evolution of language is closely related to the thinking ability, the child learns by speaking, feeling and expressing their wishes to respond to events and situations or objects to assign names as well as in response to facial expressions and gestures from parents and other adults is associated with the spoken language (Herzka , Ferrari & Reukauf, 2001).

The aim of comprehension of the sentence is to extract the meaning from a sentence and to integrate it into the context. Sentences are regarded as words connected to meanings. Therefore, they represent the base unit of language (Irmen & Roßberg, 2004). In the area of texts comprehension, there is a distinction between text surface (word order, grammar) and text basis (meaning, sense). The text base can be the same, even if the linguistic form on the text surface has changed (Solso, 2005). While comprehension of sentences and comprehension of texts refer to the input of language, language production is concerned about the output.

The theory of nativist perspective assumes that language even as a prefabricated structure in the brain of every human being, as well as the newer interaction is perspective for it is part believes that develop the spoken language only develop if there exist a healthy interaction between the environment and internal processes. It names the social interaction as a significant point of development (Berk, 2011). In contrast, linguistic communication includes both components in a dialogic interaction and considers implicit as well as explicit ways of communication (Groeben, 2006b). Reading and writing "[…] belong to the essential cultural techniques. Since they are modes of language reception and language production, they belong to the core area of cognitive psychology" (Richter, 2006).

Some researchers have suggested that words themselves might be regarded as invitations to form categories and to individual different kinds of object (Gentner & Boroditsky, 2001; Xu, 2002). Words undoubtedly direct young children's attention as well as influence how young children recognize relations (Mandler & McDonough, 1993).

Language also can influence cognitive development through its availability as a representational resource. Having a word or phrase for an object, action or relation can draw attention to similarities between cognitive categories across domains (e.g. the notion of "actor" across different types of action like: driving, pushing, picking up, hitting). Language also might enable analogies that allow greater complexity of thought (Gentner & Medina, 1998; Hermer & Spelke, 1997).

Language offers children a way to make explicit different perspectives on the same event. Speakers can present an action from the point of view of the agent (The boy opened the door), the object-affected alone (The door opened), or the object-affected without identifying the agent (The door was opened). Speakers can also identify the same referent in a variety of ways (e.g. the dog, the scavenger, the spaniel, our family pet) depending on the perspective chosen on each occasion (Clark, 1997). The extensive layering in language vocabularies might have evolved in part for just this purpose. Very young children recognize and make use of alternate perspectives on objects (Clark, 1997; Waxman & Markow 1992) and on events (Gleitman, 1992). Finally, children also understand early on that language reflects the speaker's intentions about how to view objects (Bloom & Markson, 1998).

2.2.2.1.2 Memory and knowledge

Memory and knowledge are closely linked. In addition, recognizing the relationships between several things is because of the ability of recalling the information from the memory. Memory is defined as "the cognitive system, which encodes stores, transforms and recalls information" (Engelkam & Rummer, 2006). Further classification of different components of memory depends on the underlying model. The multistoried model distinguishes between a long-term and a short-term memory which are partly extended by an ultra-short-term and an ultra-long-term memory (Solso, 2005).

The short-term memory is a temporary memory with different tasks and characteristics than a permanent storage for information (Solso, 2005). It consists of a limited storage capacity (7±2 items in around 12), a limited processing capacity and superior accuracy in recalling (Solso, 2005). It is unclear whether the ultra-short-term memory is an independent sensory storage system, for instance, by iconic and additive storage or whether by it is only a product of fading traces of neurological stimuli (Zimmer & Kaernbach, 2006). The long-term memory is considered as a complex system that stores information (knowledge) permanently and probably without capacity constraints.

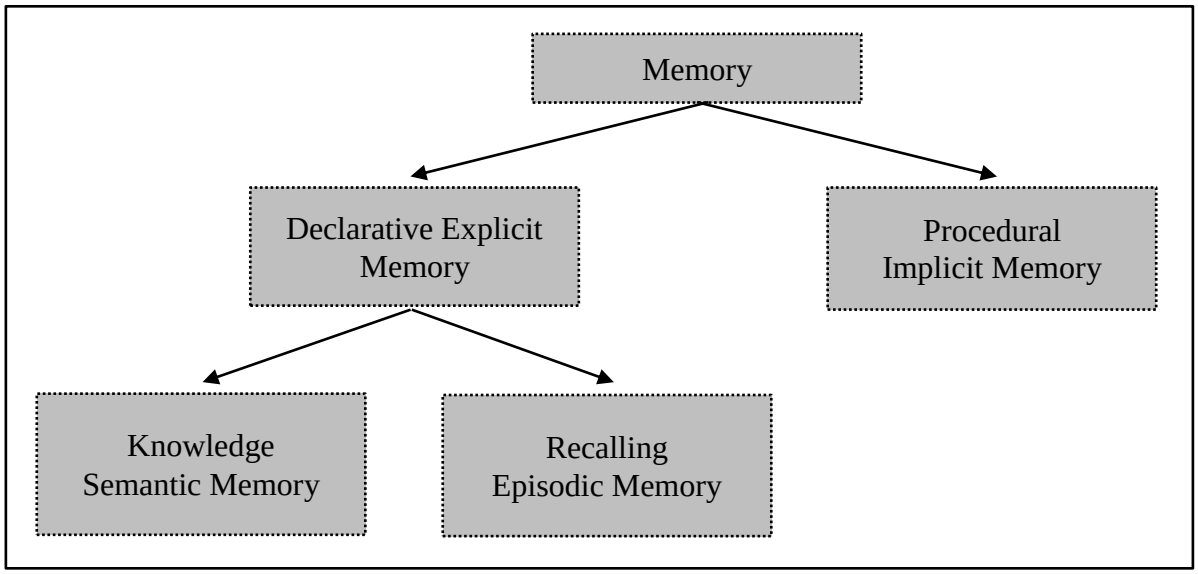


Fig. 4: Declarative and procedural memory (Engelkamp & Rummer, 2006; Funke & Fensch, 2006, p. 297).

In the future, this information can be activated and used to solve various problems. (Van der Meer, 2006). There is still a lack of clarity in some areas with regard to the different storage system when distinguishing between long-term, short-term and ultra-long-term/ultra-short-term memory. An example is the cooperation between the phonologic ultra-short-term and the semantic dependent long-term memory, and the application of this system on non-linguistic areas like the visual memory which is considered as problematic. For instance, there are finding that the visual coding in short-term memory takes place before the acoustic and semantic ones (Solso, 2005).

In addition, the concept distinguish between a declarative (explicit) and procedural (implicit) memory (Fig. 4). The declarative memory refers to the functions that run intentional, while the procedural memory stands for retention activity that is below the level of conscious awareness, as well as it can be divided into functional knowledge (semantic memory) and recalling (episodic memory) (Engelkamp & Rummer, 2006). Within cognitive psychology and neuropsychology the working memory is a system that stores and manipulates information from multiple sources to process the complex demands of learning, understanding and concluding. The term working memory is also used frequently in neuropsychology to describe a storage system (Hagendorf, 2006).

The development of working memory is basically affected by a certain degree of consistency in the multicomponent structure of early infancy to adulthood and qualitative changes of the control procedures during childhood (Hitch, 2006). Regarding to the development of memory during infancy, research assumes that recall processes have already started with birth. Nonetheless, it is doubted that reliable memories can be created and recalled before the second birthday. Sub teenage is characterized by a consistent increase of memory abilities as well as the development of active, planned and spontaneous organization strategies, therefore the most memorial and consciously aware memories are created between the age of 10 and 30 and have close connections between memory and knowledge, thinking and intelligence also between awareness and attention (Solso, 2005).

2.2.2.1.3 Thinking

It is deductive thinking when one has to determine if created or suggested conclusions result necessarily from given premises or not (Klauser, 2006). In addition, he states that inductive thinking in general conclusions is derived from single examples or cases. Problem solving is defined as thinking, which is focused on solving a specific problem, and includes a selection of possible reactions, as well as their consequences (Solso, 2005).

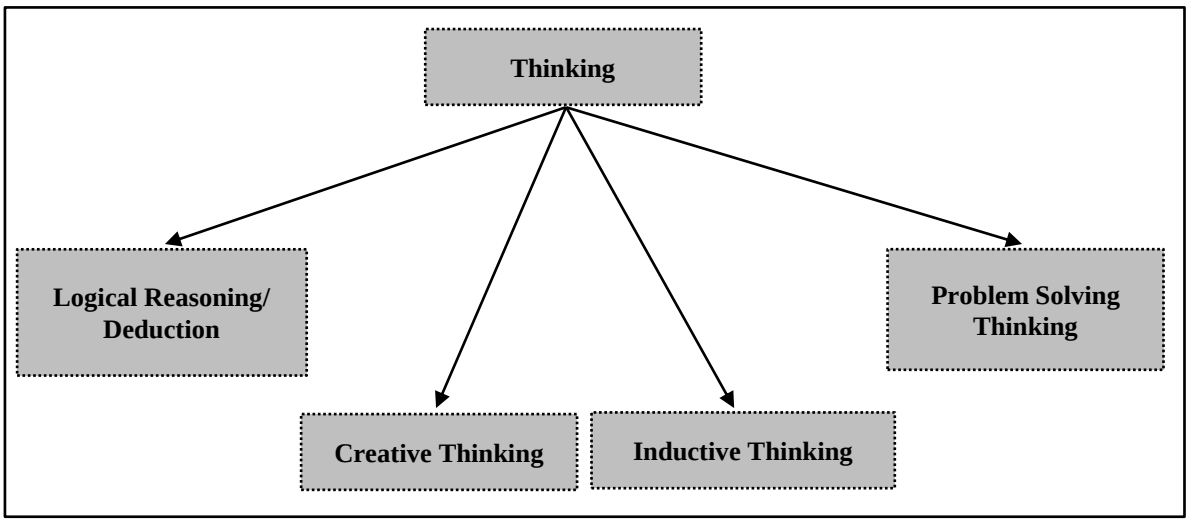


Fig. 5: Types of thinking (Funke, 2006a; Funke & Fensch, p. 391)

In addition, there is a distinction between simple problem solving with completely optimal solutions (Öllinger & Knoblich, 2006) and complex problem solving, which is characterized by dynamic, cross-linking, non-transparency and changing objectives on different levels (Funke, 2006c). Because of its attitude for systematic investigations, in the past simple problem solving was in the focus of research. However, the external validity of these investigations is controversial (Öllinger & Knoblich, 2006).

Regarding the development of problem solving abilities during infancy, a continuous increase of strategy efficiency, problem solving speed and improve adaptation to problem characteristics was found (Siegler, 2006). Closely connected to problem solving thinking is creative thinking (Birney & Sternberg, 2006). According to Solso (2005), creativity is a cognitive activity that leads to new or novel approaches to a problem or a situation (Solso, 2005). Process-oriented approaches distinguish between the following components of creativity suppression of mental existence, restructuration in a new global representation of a problem and the search of memory for innovative solutions (Förster & Denzler, 2006).

2.2.2.1.4 Intelligence

The intelligence defines as “the ability to learn from experience and to adopt oneself to the environment” (Funke, 2006b). In addition, one of the most analyzed and investigated constructs in psychology, is among others such as thinking, problem solving or attention described as well as the construct intelligence, which is also examined in this area, is one of the most analyzed and investigated constructs in psychology (Jensen, 2006). Some evidences for the importance of this construct in Western societies is used synonymously for cognition in everyday speech. However, the definition of intelligence is still difficult and depends strongly on the instruments used to measure it (Funke, 2006b).

In addition, the intelligence is consequently the sum of the influences of heredity and the external environment. General intelligence is also known as the “ability for logic” and can be understood and measured with the help of intelligence tests. Subjects are made with the help of such tests one can make statements about the processing speed of the test subjects. The ability of intelligence, however, can not only be general intelligence. There are other views that differentiate this ability strongly. This is the intelligence of the analytical, creative and practical intelligence and so is united by the interactions of internal and external forces for efficient implementation of the basic skills which intelligence makes possible (Berk, 2011).

Intelligence is regarded as multidimensional and complex (Estep, 2006; Tschacher & Dauwalder, 2003). Estep (2006) summarizes a quantitative, qualitative and a performance part of intelligence within the meaning of embodied cognition. In summary, there exist different approaches that differentiate strongly with regard to their understanding of intelligence (Estep, 2006). While the Standard-IQ aims to measure abstract, non-everyday cognitive capability, the theory of emotional intelligence seeks to predict one's success in life (Jensen, 2006).

In addition, different development patterns of verbal and nonverbal intelligence were observed in the age of primary school. In the verbal intelligence, measured with the Hawik, girls were significantly outperformed by boys, and also the development advantage by birth month was obtained. In nonverbal arose however no gender differences and the difference in performance for the 6 months older children disappeared at the age of 8 years. This course of development of non-verbal intellect is similar to the course of the co-ordination skills in KTK. Again, from the age of 8 years, the influence of gender and month of birth is no longer significant (Ahnert, Bös & Schneider, 2003).

The analytical intelligence basically is responsible for carrying out daily tasks. It is for problem solving and thinking is essential information-processing components. Therefore, the creativity is the ability to contain and deal with new tasks, as well as to solve routine tasks safely. The contextual or practical intelligence takes care of the everyday configuration. Here, the individual must constantly adapt to the environment. In addition, there is the theory of multiple intelligences of gardener, in which the concept of intelligence is divided into eight different ways. These divisions include verbal-linguistic, logical, mathematical, musical-rhythmic, pictorial-spatial, bodily-kinesthetic, naturalistic, interpersonal and intrapersonal intelligence (Berk, 2011).

These intelligences cover the entire field of experience from an individual. Recent research has closely illuminated the emotional intelligence, as the gardeners with inter and intrapersonal intelligences resemblance. It describes, among other things, the ability to perceive emotions and assess (Zimbardo et al., 2008). In the period under consideration, up to the seventh year, it is expected that the development of intelligence is not yet complete. Only with puberty, between 12 and 15 years, this development can be called complete. Until then, all adolescents pass through development phases and it is at highest level that the formal mental operations arrive (Piaget, 2001a). There are two ways to train the mind of a child learning focusing on skill or creativity and learning through imitation (Bruner, 2001).

2.2.3 Factors Influencing Cognitive Development

2.2.3.1 Age factor

The differences among age periods from preschool to school age consider the relationship between psychological functions. Vygotsky's (1987) main point is that a person's psychological functioning is a unitary process. This means that developmental change takes place in various functions, such as in the child's development of perception, logical memory and intentional attention; abstract thinking or scientific imagination influence each other and change the child's conscious relation to the world.

During language acquisition, many other regions too develop. In addition, it's very difficult to include the development of movement, perception, cognitive or social development progress to the linguistic development (Berk, 2011). The evolution of the language is closely related to thinking as an adolescent learns by speaking, feelings and to express their wishes to respond to events and situations or to assign names to objects. The advancement of its own facial expression and gestures as well as the understanding of facial expressions and gestures from parents and other adults is associated with the spoken language (Herzka, Ferrari & Reukauf, 2001).

At the age of 4-6 years, the child pays special attention to the sound and the rhythm of the language, making it easy for a particular enthusiasm rhymes to take place. Preschool age sees the development of language and the formation of ideological and representational thought awarded a significant role. For mental representation, it represents the most flexible means. Until the age of 6, a child has a vocabulary of up to 10,000 words exhibit. The child tries, much like the adult role model in complex want to articulate sentences and an equal interlocutor (Berk, 2011).

Motivation is also related to the child's intentions in specific situations and can be characterized as the dynamic in a child's acting. Participation in different activities can lead to the child's acquisition of new motive orientations, if the activity is motivating. In school, this happens either through its connection to earlier motive orientations, such as being with other children, or being together with an adult exploring the "world". In an educational situation, it is important to be aware of the child's motive orientation so that the activity is directed toward new upcoming motives (Hedegaard, 1995b).

The information-processing approach assumes that a man in his life uses three different systems for storing information. These are divided into the sensory memory, short-term memory and long-term memory. The first mental processes are essential to save objects in the working memory or short-term memory. Storage in working memory is particularly advantage when a small amount of information is underway. Long-term memory is used as a long term storage pool for the knowledge that after a certain time short-term memory is used (Berk, 2011).

Preschool children have ability and knowledge of long-term memory retrieve and are already advanced in simply memory performance situations, which they accomplish with the help of their language from the past. In addition, the possibility of the reproduction ability of the preschoolers to be improved is true, especially given when good language skills are available as pre-requisites. However, the conscious memorization for children is difficult, because they have still not built a decent memory strategy (Berk, 2011).

Between the age of 6 and 7 years, at school entry, the process of learning the basal reading and writing skills begins. Also the listening skills, for example in the telling or reading stories promote imagination of children and their concentration. In this point, the rhythm and the melody of the language have now a major role (Herzka, Ferrari & Reukauf, 2001).

In addition by school age, the strategies in the memory performance are applicable and more complex. The strategy of repetition is follows quickly by the organization to be able to memorize facts better. Moreover, this is the period in which a child increases the knowledge immensely, while, in adolescents they rely more and more on their long-term memory. Therefore, it is also easier for children to store their knowledge and retrieve them again (Berk, 2011).

The following is a listing of the general cognitive developmental characteristics of the child from about age 6-10 is presented to provide a more complete view of the total child and it represents a synthesis of current findings (Gallahue & Ozmun, 2006):

1) The attention span is generally short at the beginning of this period but it gradually extends.
2) They are eager to learn but need assistance and guidance in making decision.
3) Children have good imagination and display extremely creative minds; however, self-consciousness seems to become a factor toward the end of this period.
4) They are often interested in television, computers, video games, and reading.
5) They are not capable of abstract thinking and best deal with concrete examples and situations during the beginning of this period. More abstract cognitive abilities are evident by the end of this period.
6) Children are intellectually curious and anxious to know (why).

2.2.3.2 Gender factor

The gender factor influences the cognitive development on an environmental level by culture as well as on a biological level while the share of each impact remains unclear (Funke, 2006b). As proven by animal testing, the biological cause is mainly explained by hormonal influences on the development of the brain which already starts prior to birth (Nelson , De Haan & Thomas, 2006).

Regarding to school performance, the differences among boys and girls are examined by the educational and psychological researches. Large-scale studies such as PISA study noted that there are almost measurable differences in the academic performance among girls and boys. But there are only small differences in the area of reading and the computational performance (Brandes & Jantz, 2006).

Furthermore, it was found that the girls in Germany enrollment were, on an average younger than the boys (Hovestadt, 2002). This implies a slight time advantage in the development of girls an indication of this is attributable to the lower repetition rate of girls in the first years of primary school (Federal ministry for family affairs, senior citizens, women and youth, 2007). In the fields of chemistry and physics boys are better than girls. In mathematics, boys show higher understanding, when it comes to exercises that require troubleshooting (Lohaus, Verhaus & Maass, 2010). In addition, with regard to language performance, it has been known for a long time that girls are far superior to the boys in this field. Namely, the gender differences relocated temporarily in favor of boys (Hyde & Linn, 1988), but the girls are much developed in terms of eloquence and have many layers of benefits in terms of language skills as compared to the boys (Halpern & Lamay, 2000).

Moreover, proof for a culture dependent component there is a generation difference, expressed by the tendency for a decrease differences among genders during the last decades (Giesen, 2000). The differences assumed are an average increase is perception speed and linguistic intelligence of women and an improved spatial sense and mathematical reasoning of men (Funke, 2006b). With respect to linguistics and mathematics, multiple meta-analyses found no significant differences but partly task and age specific differences were found (Giesen, 2000).

Generally, it can be stated from the known studies that the development of language among young girls is earlier and proceeds more easily than in boys. Consequently, the vocabulary of the girls also grows faster than boys. Currently, a possible explanation for the delayed language development of boys in primary school age is the lack of a role model of male teachers in primary schools. Since, primary education has mostly female teachers, boys are not properly promoted and perceived as lazy (Jenter & Rödde, 2007; Brandes & Jantz, 2006).

2.2.3.3 Social-cultural factors

The description of the relation among the development of competence and motives have been pointed out by Vygotsky's (1998) and presented in different levels of competence with artifacts to illustrate how developmental crises lead to new motive orientations and the development of new forms of competences.

Tab. 1: The relation among institutional practice, developmental age, motive orientation and personal competence (ISSBD, 2005).

Institutions with different practice traditions	**Developmental age**	**Motive orientation**	**Competence**
Maternity ward Home	Crises of the newborn/Infancy	Orientation toward the caregiver (attachment)	Starting acquiring competence with visual orientation, (primary artifacts)
Home	Crises at age one/Early childhood	Orientation to the object and spatial world (object play)	Competence with action Representation (enactive)
Kindergarten	Crisis at age three/Preschool age	Orientation towards other children and to the adult word (role play)	Competence with visual representation (iconic)
Primary School	Crisis at age seven /School age	Orientation tow ards mastering the adult world and to academic learning	Symbolic representation
Secondary School	Age of puberty/Crisis at age 13	Orientation to youth, life and friends	Connected system of knowledge (competence with secondary artifacts)
Work/Higher Education	Crises at age 17/Adolescence	Societal orientation	Experimentation within representational systems – (competence with tertiary artifacts)

The socio-cultural conditions of growing up are important factors in the level of cognitive development. Children first meet the knowledge in family and community practices and through participation in this practice the child appropriates societal/collective knowledge. Collective knowledge is transformed into personal knowledge through the child's own activity, and personal knowledge continues to develop whenever the child is introduced to new practices in the home, school, community and other institutions. Knowledge connected to practice is not only personal but transcends the single person and the person adopts "ideals" in the form of collective societal knowledge (Iljenkov, 1977).

Other studies verify the positive effect of improved access to education in early childhood on the cognitive performance and success in school as well as in the success in job (Jensen, 2006). It has to be taken into account that success in a job as well as in school do not only depend on cognitive abilities but also on social and motivational aspects. Therefore, success in school is an area that is heavily influenced by socio-cultural factors.

For instance, the impact of residential area (Singh, 1988) and the way how breaks are filled (Pellegrini & Davis, 1993; Siegler, 2006) on success in school have been proven. Also, success in school depends on culture. In a comparison between American, Chinese and Japanese children, a larger social interest in school and therefore a larger integration of school in society was found in the Asian countries. This was linked to higher expectations of parents with regard to the educational institutions as well as the performance of their children (Stevenson & Lee, 1990).

Furthermore, there were culture dependent differences in the assumption about the importance of effort on success in school (Stevenson & Lee, 1990). Such differences in norms and values between societies and differences in organizational conditions of the education systems have to be taken into account when cross-cultural studies are conducted. The cross-cultural differences with regard to the conditions of growing up (e.g. media consumption, access to information and education) are closely linked to socio-cultural differences and have to be taken into account when different cultures or different generations are compared.

Some researchers have focused on variations in modes of culturally organized activity inspired by cultural-historical psychology like Scribner and Cole (1981), whose work show the central role of the organization of activities in shaping the cognitive consequences of literacy, Gaskin (2000), whose work show cultural variations in play activity that challenges Eurocentric notions about the role of play in cognitive development, and Rogoff (2003), whose work shows intense observation as an important mechanism of learning in Guatemalan peasant communities.

In addition, a great deal of within-culture work has been conducted on the dynamics of learning and development in pre-school and school contexts, both focused on the mastery of new meditational means, such as writing systems, new modes of organizing, the social organization of instructional activity (Gallego, Cole & LCHC, 2001; Hedegaard, 1995b; Paley, 1981; Rogoff, 2003), as well as in new ways of organizing developmental changes in work processes among adults (Engeström et al., 2002).

2.2.4 Cognitive Tests

2.2.4.1 Foundations of cognitive tests

The cognitive diagnostic lies on abilities analyzing approaches that use psychometric procedures (Aslin & Fiser, 2005). These methods are based on test theoretic concepts of psychology and are defined as scientific routine procedures to investigated one or multiple empirical distinguishable personality traits whose main goal is quantitative measurement of individual traits (Lienert, 1969).

The diversity of classification systems for psychometric procedures exceeds the ones for moto-metric procedures. Anglo-Saxon literature often distinguishes between ability-test (general intellectual abilities and specific ones), attitude-tests (to forecast the success in the job or a learning situation) and achievement tests (Validation of the knowledge gained through schooling or practicing) (Groffmann & Michel, 1982).

2.2.4.2 Applications of cognitive tests

Cognitive test procedures include standardized and non-standardized observation and interview methods like diary method, different ways of interviewing and group interviews (Groffmann & Michel, 1982). These mainly qualitative procedures are used to record and collect subjective senses of cognition and intension (Schreier, 2006). Depending on the collection procedure, there exist different analysis procedures (e.g. content analysis, coding) (Schreier , 2006). In addition, an isolated measurement of the closely connected cognitive abilities is problematic.

Tests to measure the cognitive abilities during babyhood and pre-school age particularly includ an important motor component especially in infancy, and mental tests have an enormous motor component (Thelen, 2000b). The methodological point of criticism is the derivation of conclusions on the control and functional processes from psychometric collected descriptive data (Aslin & Fiser, 2005). Furthermore, despite all efforts to create objectivity, some psychometric procedures included subjective components when measuring creativity (Solso, 2005).

Briefly, there still exists a major distance among the different approaches to measure cognitive development as well as it has already been recommended to combining correlative and experimental methods (Birney & Sternberg, 2006). Today in intelligence research, the combination of quantitative and qualitative methods (Jensen, 2006) and a comparison of data collected on a behavioral level and collected by visual approaches are in demand today.

2.3 State of Research

Presenting an overview about the state of research regarding to motor and cognitive development, is very important. Therefore, we have attempted to show simple meta-analysis in order to clarify the current situation of the research directions in both national and international levels.

The meta-analysis basically does not comprise a very limited set of procedures and prerequisites for its application. However, it provides great flexibility with respect to the type of data that can be analyzed and how it can be presented (Schulze, 2007a). In addition, it provides the opportunity to view the whole picture of the research idea, and helps us see the similarities and differences among the methods and the results of many related studies (Rosenthal & DiMatteo, 2001).

2.3.1 Research resources

In order to collect the related data, the major research strategies for a systematic literature search based on Cooper (1994) and Wilson & McKenzie (1998) summarized as the follows:

- Reference Databases
- Footnote Chasing
- Citation Searches
- Consultation
- Browsing

In addition, the criteria of selection were; firstly, the content criteria including key words, study design and sample. Second, the form criteria including language of publication, date of publication and art of publication. In Table 2 the selection criteria are presented in details.

Tab. 2: The selection criteria of the related research

Content criteria	
Key words	- Motor Development, Motor Abilities, Motor Skills, Motor Function, Physical Activities, Motor Activities, Physical Education, Motor Tests. - Cognitive Development, Cognitive Abilities, Academic Achievement, Cognitive Tests, Educational Measurement, Reasoning, Mathematical Ability, Educational Counseling, Childhood. - The relationship among motor and cognitive development - A cross-cultural studies (especially between Egypt and Germany)
Study design	- Cross sectional studies - Correlative study
Sample	- Children in primary school age
Form criteria	
Language of publication	English, Deutsch
Date of publication	After 2000
Art of publication	Open publication

2.3.2 List of Publication

In this part, the related publications that are conducted in the last decade (2000-2012) in the area of motor and cognitive abilities will be presented. About 28 publications (15 in English, 13 in German) are presented in Table (3) and arranged by the year of publishing from the oldest to the newest. In case, we were found more than one study in the same year, the publications were arranged by the first letter of the author's name.

Tab. 3: The list of related publication in the area of motor and cognitive development

N	Publication Title
1	Alwasif, N. (2001). Körperliche Aktivität, Fitness und Gesundheit im interkulturellen Vergleich. Eine empirische untersuchung an Ägyptischen und Deutschen Studierenden, Universität Karlsruhe.
2	Dwyer, T., Sallis, J. F., Blizzard, L., Lazarus, R. & Dean, K. (2001). Relation of academic performance to physical activity and fitness in children. Pediatric Exercise Science, 13 (3), 225-237.
3	Ahnert, J., Bös, K. & Schneider, W. (2003). Motorische und kognitive Entwicklung im Vorschul- und Schulalter: Befunde der Münchner Längsschnittstudie LOGIK. Zeitschrift für Entwicklungs-psychologie und Pädagogische Psychologie., 35 (4), 185-199.
4	Hassan, O. (2003). Evaluation Sportartspezifischer Konditioneller Fähigkeiten bei Talenten. Ein Vergleich zwischen Deutschen und Ägyptischen Kunstturn-Talenten im Alter von 10-12 Jahren, Universität Konstanz.
5	Stachelhaus, A. (2003). Auswirkungen wahrnehmungs- und bewegungsorientierter Förderung auf die Graphomotorik von Schulanfängern – Eine Längsschnittuntersuchung. Unpublished Inaugural-Dissertation, Westfälische Wilhelms-Universität, Münster.
6	Bonifacci, P. (2004). Children with low motor ability have lower visual-motor integration ability but unaffected perceptual skills. Human Movement Science, 23 (2), 157-168.
7	Lau, P.-W. C., Yu, C. W., Lee, A., So, R.-C. H. & Sung, R.-Y. T. (2004). The Relationship Among Physical Fitness, Physical Education, Conduct and Academic Performance of Chinese Primary School Children. International Journal of Physical Education, 41 (1), 17-26.
8	Piek, J. P., Dyck, M. J., Nieman, A., Anderson, M., Hay, D., Smith, L. M., et al. (2004). The relationship between motor coordination, executive functioning and attention in school aged children. Archives of Clinical Neuropsychology, 19, 1063-1076.
9	Ahnert, J. (2005). Motorische Entwicklung vom Vorschul- bis ins frühe Erwachsenenalter – Einflussfaktoren und Prognostizierbarkeit. Unpublished Inaugural-Dissertation, Julius-Maximilians-Universität, Würzburg.
10	Hillman, C. H., Castelli, D. M. & Buck, S. M. (2005). Aerobic fitness and neurocognitive function in healthy preadolescent children. Journal of the American College of Sports Medicine 37 (11), 1967-1974.
11	Stachelhaus, A. & Strauß, B. (2005). Die Förderung graphomotorischer Fertigkeiten von Erstklässlern durch psychomotorische Übungen im Sportunterricht. Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie, 37, 194-204.
12	Voelcker-Rehage, C. (2005). Der Zusammenhang zwischen motorischer und kognitiver Entwicklung im frühen Kindesalter - Ein Teilergebnis der MODALIS-Studie. Deutsche Zeitschrift für Sportmedizin, 56 (10), 358-363.
13	Nourbakhsh, P. (2006). Perceptual-Motor Abilities and their Relationships with Academic Performance of Fifth grade Pupils in Comparison with Oseretsky Scale. Kinesiology, 38 (1), 40-48.
14	Livesey, D., Keen, J., Rouse, J. & White, F. (2006). The relationship between measures of executive function, motor performance and externalizing behavior in 5- and 6- year-old children. Human Movement Science, 25, 50-64.
15	Piek, J., Baynam, G., Barrett, N. (2006). The relationship between fine and gross motor ability, self-perceptions and self-worth in children and adolescents. School of Psychology, Curtin University of Technology, G.P.O. Box U1987, Perth 6845, WA, Australia. Available online 25 January 2006
16	Ahnert, J., & Schneider, W. (2007). Entwicklung und Stabilität motorischer Fähigkeiten vom Vorschul- bis ins frühe Erwachsenenalter. Befunde der Münchner Längsschnittstudie LOGIK.
17	Castelli, DM., Hillman, C. H., Buck, S. M. & Erwin, H. E. (2007). Physical Fitness and Academic Achievement in Third- and Fifth-Grade Students. Journal of Sport & Exercise Psychology, 29, 239-252.

18	Elbatrawy, A. (2008). Förderung der motorischen Fähigkeiten bei Kindern mit geistiger Behinderung durch Freizeitaktivitäten. Eine Studie an Schulen in Ägypten unter Ausnutzung von Erkenntnissen in Deutschland. Universität Karlsruhe.
19	Fleig, P. (2008). Der Zusammenhang zwischen körperlicher Aktivität und kognitiver Entwicklung. Sportunterricht, 57 (1), 11-16.
20	Piek, JP, Dawson, L, Smith, LM, Gasson, N. (2008). The role of early fine and gross motor development on later motor and cognitive ability, Journal of Human Movement Science, (5), 668-681.
21	Marei, M. (2009). Optimierung der Steuerung des Fitnesstrainings bei Kindern unter Ausnutzung einer vielseitigen, kindgemäßen und ökonomischen sportmotorischen Leistungsdiagnostik, Universität Karlsruhe.
22	Pieper, M. (2010). Motorische Entwicklungsförderung im frühen Schulkindalter. Inaugural-dissertation, ruprecht-Karls-Universität Heidelberg.
23	Lämmle, L., Tittelbach, S., Oberger, J., Worth, A., Bös, K. (2010). A Two-level model of motor Performance Ability. Journal of Exercise Science & Fitness, 8, 1, 41-49.
24	Kastner, J., Lipsius, M., Hecking, M., Petermann, F., Petermann, U., Mayer, H., Springer , S. (2011). Kognitive Leistungsprofile motorisch- und sprachentwicklungsverzo¨gerter Vorschulkinder.
25	Paul D. L., & Bradly, J. (2011). Measuring Children's Physical Activities And Sedentary Behaviors. Journal of Exercise Science & Fitness, 9, 1, 15-23.
26	Sheikh, M., Safania, A., Afshari, J. (2011). Effect of selected motor skills on motor development of both genders aged 5 and 6 years old. Procedia Social and Behavioral Sciences 15 (2011) 1723–1725.
27	Kretschmer, J., Saunders, J., Bressan, L., Erhon, J., Wirzing D. (2012). The Motor Ability of 8 and 9 Years Old Primary School Children in Germany, Australia and South Africa- Across-culture Study.
28	Aibar, A., Bois, J., Generelo, E., Casterad, J., Paillard, T. (2012). A cross-cultural study of adolescents' physical activity levels in France and Spain. European Journal of Sport Science.

2.3.3 Discussion

The presented publications cover six major areas, namely physical fitness, physical activities, MPA, motor development, cognitive development and academic performance based on the findings of 28 publications. These related publications were identified by searching the Google scholar of article, Science Direct, PubMed - indexed for Medline and publications by local German universities. Actually, the interest of the researcher has increased in the six areas identified; however, much more work still needs to be done especially in Egyptian environment to improve the level of MPA by children and the impact of this development on their motor and cognitive achievement.

The goals of these studies were to evaluate the current situation and testing the relations among the selected major areas. In addition, the prediction for the effect of strength and weaknesses in the achievement level by one factor on the others. The participations in research samples were between 33 and 7961 children the majority of them were selected from the public primary and secondary schools in different countries (Australia, Egypt, France, Germany, Iran, Italy, Spain and USA). The tests in general were implemented by the typical developed children. The children with developmental coordination disorder (DCD) were assessed in the publications (6, 8, 15 and 24) and the children with mental dysfunction in (18).

The data collection methods included both cross-sectional and longitudinal studies. By the motor development the most used tests to assess the motor abilities and skills were namely McCarron Assessment of Neuromuscular Development (MAND), Test of Gross Motor

Development (TGMD), Sport Motor Test for Children (AST 6-11), Motor Test for pre-school age (MOT 4-6), Physical Coordination Test (Körper-Koordinationtest (KTK) für kinder von 5 bis 14 Jahren), Graphomotor Test Battery (GTB), and Osertsky Scale. For the cognitive development the most used tests to assess the cognitive abilities were Wechsler Intelligence Scale for Children-Version IV (WISC-IV), Wechsler Intelligence Scale for Children-Version III (WISC-III), Kaufmann Brief Intelligence Test, and Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III).

The results show that the motor development depends on gender (Ahnert & Schneider, 2007), which seems a major variable in understanding differences in motor abilities as girl's achievement remains lower than boys (Kretschmer et al., 2012). The stability increasing in the level of achievement can be considered as a function of growing age, which depends on the importance of developing motor abilities in both kindergarten and primary school (Ahnert, Bös & Schneider, 2003). In addition, the effect of PE curriculum and the social-cultural factors should be considered in discussing some differences in the characteristic of motor abilities by children located in different cities around the world (Kretschmer et al., 2012).

The results indicate a positive relationship between physical activity and cognition or academic achievement in school-age children is positively recognized (Dwyer et al., 2001; Sebley & Entnier, 2003). In addition, the physical and motor activity may activate identical process of the CNS (Voelcher, 2005), therefore the aspect of physical fitness may be globally related to academic achievement such as mathematics and reading achievement (Castelli et al., 2007), and the results also suggest that both cognitive and motor skills can be compromised (Davies et al., 2010).

The majority of related comparative studies between Germany and Egypt have been concentrated on studying the physical activities and health (Alwasif, 2001), and evaluating the conditional abilities by the talented of children from 10-12 years old (Hassan, 2003) on the development of MPA of Egyptian children with mental disability during free time activities (Elbatrawy, 2008). The studies that focused on the level of MPA by typical developmental in primary school-aged children have been rarely implemented in the Egyptian environment. In addition, in these studies the educational impact in developing the MPA is missed in the discussion of the results of. Whereas, most findings have been discussed with regard to maximizing the school performance and the implications for the educational policies as well as its potential in children's general health.

Therefore, this work intends to contribute to the clarification of the question concerning the characteristics different among selected Egyptian and German children in the level of motor and cognitive abilities with a focusing on the primary school- aged, and whether they are able to cope with the demands placed on them, or whether there were gender differences in performance in coping with the requirements. These overarching issues are therefore an investigation due, dealing with the cognitive and motor differences in achievement by German and Egyptian children aged 6-8 years old.

3. Methods

3.1. Study Sample

Total (N = 384) children aged 6-8 years were tested during the test implementation in public primary schools in both Egypt (Assiut city) and Germany in (Magdeburg city) as well in public primary schools in both Egypt (N = 187) and Germany (N = 197). The characteristic description of Egyptian and German sample is shown in Table 4.

Tab. 4: Distribution of study sample

		Number of Assiut children			Number of Magdeburg children		
		Boys	**Girls**	**Total**	**Boys**	**Girls**	**Total**
Age	**6**	31	33	64	26	30	56
	7	26	28	54	46	37	83
	8	36	33	69	29	29	58
Total		93	94	187	101	96	197

Table 4 shows the characteristics of the distribution for both the study samples. By Assiut sample, there were 34.2 % children aged 6, 28.9 % children aged 7, and 36.9 % children aged 8 of the total sample. According to gender Assiut boys were 49.7 % of the total admitted while girls were 50.3 %. On the other hand, in Magdeburg sample, there were 28.4 % children aged 6, 42.2 % children aged 7, and 29.4% children aged 8. According to gender, in Magdeburg sample boys were 51.3 % while girls were 48.7 %. The results show nearly equal percentages between boys and girls for both samples while by gender factor the number of children at 7 years old was the highest by Magdeburg children and the worst by their Assiut peers. For 6 and 8 years old the number of samples was nearly equal.

3.2 Study design

According to the nature of the study, the cross-sectional design was used (Field, 2009). The children's MPA are tested using German motor test while the cognitive abilities are tested using cognitive ability test illustrated in details in this chapter.

3.2.1 Data Collection

3.2.1.1 German Motor Test (GMT) (6-18)

3.2.1.1.1 Test description

The German motor test GMT 6-18 (Bös, 2009) is used to assess motor abilities including endurance, strength, speed, coordination, and agility which together indicate about the general MPA. The realization of these abilities is achieved through structured motor skills like running, jumping, and balancing. Sport-specific skills such as playing ball for instance, swimming, and turning are excluded in this testing. In addition, this test is targeted towards the efforts in schools and clubs of the children from the age of 6-18 years.

3.2.1.1.2 Test execution

The German motor test should be executable in schools and clubs in an economic and simple way for children and adolescents in the age range of 6-18 years. The test is designed from guidance of teachers as well as exercise instructors, and can be implemented with the support of a helping staff. The implementation of singular test tasks is simple and requires a slight use of instruments.

For a time-based and optically corresponding evaluation, an evaluation CD along with evaluation software will be available. The test team, which consists of one skilled person and five test helpers, who can be instructed students, can test a group up to 28 children in 90 min. The test tasks are objective, reliable and valid. There are norm values for boys and girls and the age groups from (6-18 years). The German Motor Test norms have been used in the comparison between Assiut and Magdeburg children in order to clarify the differences between both samples in comparison to the lower and upper interval of German norms.

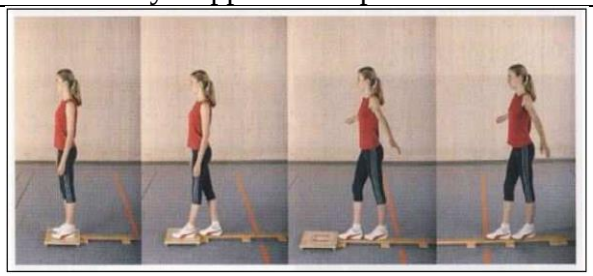
3.2.1.1.3 Test items

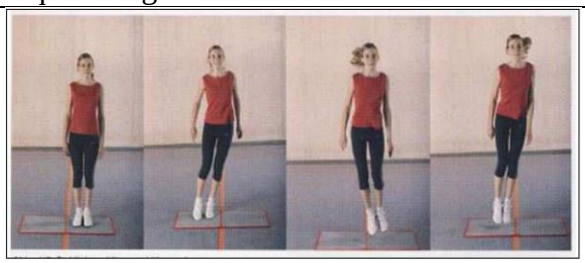
This motor test includes 8 items to measure five MPA (speed, coordination, power, endurance and agility). The answering of diagnostic question about MPA can be approached in different complex ways. Bös (2009) mentioned that the easiest way of testing motor abilities is the application of single test tasks. These uncover a specific aspect of MPA. The coordination ability for instance can be tested by balance with the tasks balancing backwards or the testing of the strength endurance through sit-ups, while the more complex form of testing is the use of test formats. Here several test tasks are implemented, which measure the different branches of MPA. It found that the second way is more powerful in testing the MPA by different test tasks that cover several diminutions from this ability, which can be observed by power ability and tested by sit-ups, push-ups and long jump. In addition, the coordination ability it can be tested by backwards balance and jumping sideways.

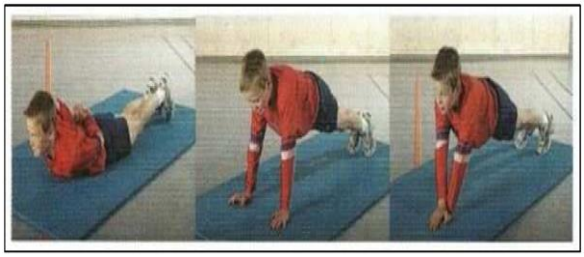
The demand should be realized by the use of simple structured tasks, which basically measure the relative isolated fields of ability. In Table 5 we have shown the German motor test items in details which include the description of the implementation processes of this test items. Furthermore, the test execution procedures, the way of data collection and the measurement value for each test items.

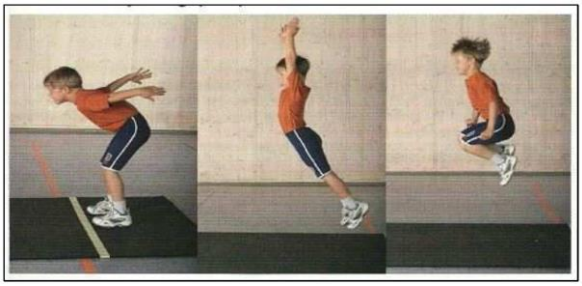
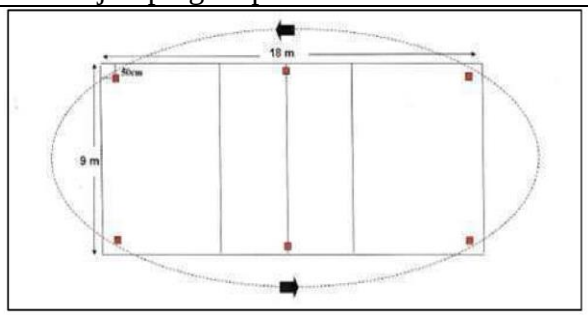
In addition, some important considerations related with each test belong to the quality of test administration in order to prevent the accuracy, especially with younger children. Test tasks should measure diagnostic traits as well as limit practice effects as much as possible with short and simple to adjust the concentration and not to compromise at all. On the homepage of the GMT, there is a multimedia accompaniment to the individual tasks, which can be used for the test team as a guide (Schlenker, Seidel & Bös, 2010).

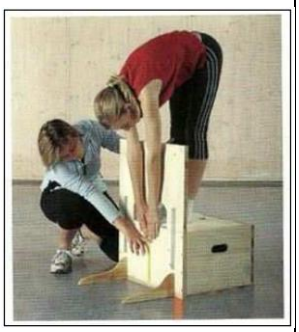
Tab. 5: Description of the German motor test items:

Test Items	Test Description	Test Material	Reference
20 m-sprint	This test item provides a measure of speed ability. The child must cross a path of 20 meters in the shortest time possible for two attempts. The child remains behind the starting line. An external starter gives the acoustic signal. Once the goal line is reached, the time is stopped. The running time is recorded in seconds with 1/10 intervals. Measurement value is the best. The ground line of a handball field serves as the starting line and the goal line is the middle line. Start and Goal are marked with two marking cones/caps. In case there is no handball field marked, the two lines are marked with tape with the distance of 20 m. Behind the goal line, there must be enough discharge. In small sport facilities, the sprint must be crossed diagonally. ***Note:*** The exactitude of the hand stopping was examined successfully in a study. The external starter watches the start. When there is a mistake, the run must be immediately stopped and repeated. 	Stopwatch, hand ball field, tape, marking cone/cap	KATS-K (Bös et al., 2001; Fetz & Kornexl, 1978)
Balancing backward	 The test item balancing backward provides a measure of coordination ability. In two valid attempts, the child must balance backwards over three beams (6 cm, 4, 5 cm and 3 cm). The test begins on the start board. The number of steps till floor contact is counted. An attempt forward and backwards is executed. The first planting of the foot is not yet valued. Only when the second foot leaves the starting position and touches the beam the steps begin to count. The number of steps are counted till one foot touches the floor or eight points are reached. If the path	3 balancing beams of 6cm, 4.5cm and 3cm breadth. All beams are 5cm high and 300 cm long. First starting board with a 40 cm length, 40 cm breadth and 4cm height.	MoMo-Testmanual (Bös et al, 2004); KTK (Kiphard & Schilling, 1970)

	is crossed with less than eight steps, then eight points are to be tabulated. The sum of the attempts was used. ***Note:*** The practice should be implemented with sport shoes. A peaceful environment should be maintained, because the task requires high concentration.		
Jumping sideways	 This test item provides a measure of coordination ability under time pressure while jumping with both legs simultaneously as fast as possible within 15 s. The child has to jump side to side over the middle line of a box with dimensions (100 × 50 cm) which is divided into two parts (50 × 50 cm) for (15) in tow attempt. Between the attempts, a recovery time of at least a minute is required. A mat with 50 to 100 cm size and with a marked middle line is advisable with a double-sided tape that is slip proof. Alternatively, the field can be glued down with the measure of the carpet mats on the hall floor. The mean of the two attempts is used. ***Note:*** The exercise should be implemented with sport shoes.	Stop clock, slip proof mat (50 times 100cm) with a middle line, double sided tape to secure the mat.	MoMo-Testmanual (Bös et al., 2004; KTK (Kiphard & Schilling, 1970)
Push-ups	This test item checks strength endurance of the upper extremities. The subject should perform as many push-ups as possible within 40 s. In the starting position, the subject lays on his belly with his hand touching his buttocks. Afterwards, he has his hands behind his back, sets them next to the shoulders and presses off from the ground until his arms are stretched out and his body is far above the ground. Next, a hand is released from the ground and touches the other hand. During this process, only hands and feet have contact with the ground. The torso and legs are stretched. A crossed position is to be avoided. Afterwards, the arms are bent until the body is again belly flat in the original position. Before a new push up is executed, the subject touches his	Gym mat, stop watch.	MoMo-Testmanual (Bös et al., 2004)

	hands behind his back. A correctly executed push-up is counted within the time span of 40 s. That means, it is counted every time the hand touch behind the back. The test task is demonstrated before the exercise is carried out. Afterwards, the subject absolves the attempt. Measurement value is the number of push-ups in 40 s. The necessary criteria are as follows: 1) Only hands and feet touch the ground. 2) The hand is struck off in upper position. 3) The back is given a "high-five". 4) Legs and upper body must leave the floor at the same time.  ***Note***: The test task is executed on a thin gym mat also it must be well demonstrated.		
Sit-ups	This test item serves to check the strength endurance. The child must do as many sit ups as possible within a 40 s timeframe. During the execution, the feet of the subject are fixed and the legs are bent in an 80° angle. The fingertips are held on the temples while the thumb is placed on the earlobe. The hand position must remain constant during the testing. The subject must direct the upper body and touch his knees with both elbows. As he lies his upper body down, both of his shoulder blades must touch the mat. A walk through is necessary. All correctly performed sit-ups during the 40 s are counted. The measurement values the number of sit-ups in 40 s. This test is performed on a gym mat.  ***Note:*** The strain on the spine is unproblematic with healthy subjects.	Gym mat, stop watch.	KATS-K (Bös et al., 2001)

Standing long jump	 The test serves to check the speed strength while jumping (jumping strength). In two valid attempts the child must jump as far as possible with one jump. The jumping takes places with both legs and the landing with both feet. Upon landing, the hand of the child may not reach backwards. The distance from the jumping line is measured up till the heels of the foot furthest back upon landing. The recording of the measurement takes place in centimeters. The measurement value is the best attempt from both jumps. ***Note:*** The test is performed on a facility floor a jumping carpet/mat.	Measurement tape, crape tape	MoMo-Testmanual (Bös, 2004; Fetz & Kornexl, 1978)
Six-min-run	 The test serves to measure the aerobic endurance while running. The child should run around a volleyball field as many times as possible within 6 min. The endurance run takes place in groups of up to 10 subjects. In 6 min, running and walking are allowed. During the run, every minute that has passed is announced. After the period of 6 min, every subject remains at the place where they stopped and sits down on the floor. In order to give the children the impression of a running rhythm, the testing staff gives the running speed in the first two rounds. Because of the investigated normal times, a running tempo of 24 s is recommended for children aged 6-8 years old and a tempo of 20 s is recommended for children aged 9-12 years. With adolescents there are larger gender-specific differences, so that average	Stop watch, starting numbers, prepared t-shirts and numbers, six marking tools (caps, cones etc.)	MoMo-Testmanual (Bös, 2004; Fetz & Kornexl, 1978)

	round time for 14-year-old girls is around 19 s and it is 14 s for boys of the same age. The measurement value for every child is the path in meters crossed in 6 min. The paths are calculated by the number of rounds (1 round = 54 m) plus the path of the last round that was started. The path calculated exactly 1. ***Note:*** The path follows around the demarcation line of the volleyball field (9 - 18 m). On the corner edges of the field (transferred 50 cm inwards) as well as and on the sides longwise are marked by caps/cones. A run has the length of 54 m. In addition, for the test implementation at least two test givers are necessary. The test can be executed with groups of up to 14 subjects.		
Flexibility (forward bending)	This test item provides the measure of agility. The child stands on a long bench or on a prepared crate of wood. He bends his upper body slowly forward and his hands are parallel. Meanwhile, across a centimeter scale, if possible followed downwards. The legs are parallel and stretched out. The maximal reachable stretch position is to be held for 2 s. The scale value is to read off from the deepest point that the fingertips touch. The child has two attempts. Between the first and second attempt, the subject should recover shortly. The reached scale value (per attempt) was noted. It was to be noticed that when the scale is under the "sole level" it is positive and over negative. The zero point is the sole level. The measurement value is the best value in relation to sole level.  ***Note:*** The exercise is executed without sport shoes. It should be noted that the test task should be implemented slowly.	A wooden crate with a centimeter scale. Alternatively, a board with a centimeter scale can be secured on a long bench.	MoMo-Testmanual (Bös et al., 2004; Fetz Kornexl, 1978).

3.2.1.2 Cognitive Abilities Test & CAT (1-3)

3.2.1.2.1 Test Description:

The cognitive abilities test CAT 1-3 (Heller & Geisler, 1983) has been used to assess cognitive abilities of primary school years from 1 to 3 classes includes test items for the language understanding, relationships recognizing, deductive thinking and computational thinking. These cognitive abilities together indicate the cognitive learning abilities that reflect the intercultural learning of the children in the first three years of the school and the requirements of the learning sciences in primary schools. This test is sub-divided in four parts that test four cognitive abilities. The measurement value is 15 points for each test part in sum of 60 questions (Table 6).

Tab. 6: Cognitive abilities test items:

Test parts	**Test tasks**	**Value in points**
Suptest 1	Language Understanding	15
Suptest 2	Relations Recognizing	15
Suptest 3	Deductive Thinking	15
Suptest 4	Computational Thinking	15
Sum of parts	**Sum of Cognitive Abilities**	**60**

3.2.1.2.2 Test execution

This test should be executable in schools for children in the first three years in primary schools. The test is designed based on guidance from the teachers and test instructors. The implementation of the test should be executed in a group sitting inside the classroom. In terms of routine, up to 25 children were tested in 60 min.

The execution process starts with the distribution of the test material consisting of a copy form the test sheet for every child in the classroom. Later, the school teacher introduces the test staff leader. In order to explain the way of answering the test questions, the staff leader describes to children the way of choosing the right answer. For the children about 5 min relax time should be considered between the subtests while about 15 minutes relax time between the second and the third subtest can considered by children at the first school year.

Before each subtest the staff leader should explain carefully the example illustrated on the test sheet and assure that the students understand it very well. The cognitive abilities test norms do not used in the comparison between children of Assiut and Magdeburg because it is not standardized in the Egyptian environment. The original data for both samples is used in the statistical analysis.

3.2.1.2.3 Test items

This cognitive abilities test includes four items to measure four cognitive performance abilities. Table 6 shows the details of the descriptions of these test items in details and clarify the test execution, along with, some consideration related with each test item.

Language Understanding

The language understanding is the ability to deal with linguistic concepts, with vocabulary, comprehension and play verbal role. It is developed long before a child can speak. It comes from the connection of a verbal sound image and an object, the children sees simultaneously. This symbolization of objects serves as a prerequisite to that, the actual language development (Schröder, 2009). All the items are named by the tester. Briefly, in this test part the children provide recognition of the objects ore actions based on visual attempt (Heller & Geisler, 1983). For example, **"crosses under the rodent."**

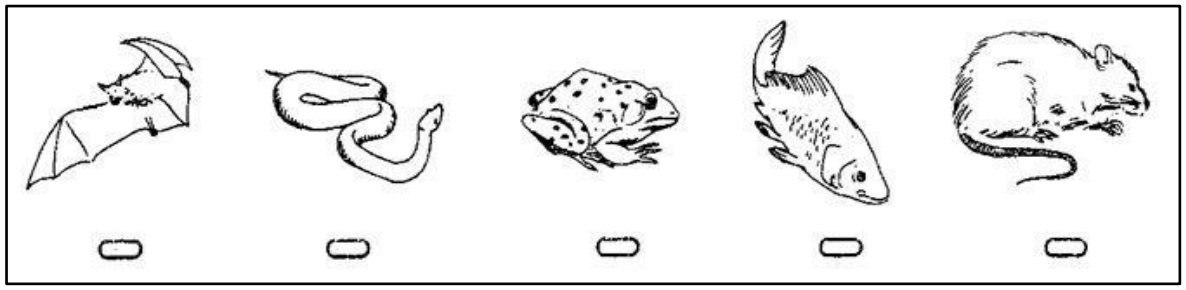


Fig. 6: Subtest (1) Language Understanding (Heller & Geisler, 1983, p.7).

Relations Recognizing

The second test section deals with the recognition of relationships. In this connection it is a matter of recognize different objects by the sizes, quantities and locations can recognize different objects. It must be made of the existing images for relationships between spatial and temporal components to be produced (Heller & Geisler, 1983). The recognition of the relationships among different objects requires logical operations such as groupings or classifications. Briefly, the child has to perceive multiple features of an object perceived differentiate those features concentrate on it, and from the relationship between the individual objects (Montada, 2002). Verbal instruction is formulated for the second subtest, for example **"crosses under the picture that shows a medium sized ball."**

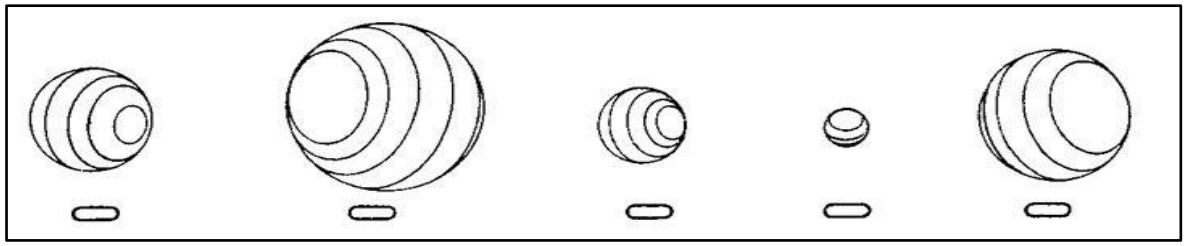


Fig. 7: Subtest (2) Relations Recognizing (Heller & Geisler, 1983, p.7).

Deductive Thinking

The deductive thinking is the ability to identify certain logical rules and principles and to apply them appropriately. The children should find out under what aspect, four of the five pictured templates are the same and what the objects thus do not fit with the others (Heller & Geisler, 1983). This ability, classified under logical thinking, transfer known information to unknown situations and thus new knowledge can be reached. The inductive reasoning goes from the specific information to education. The deductive thinking goes, however from the general knowledge to the specific knowledge (Lohaus, Vierhaus & Mass, 2010). This cognitive ability is used among other things as a basis for complex motor learning (Ahnert, Bös & Schneider, 2003). Briefly, in this test part the child must recognize under which aspect four from five belong photos. The child has to choose the photo which is not related with the others. For example **"Crosses under the picture that not one of the other suits."**

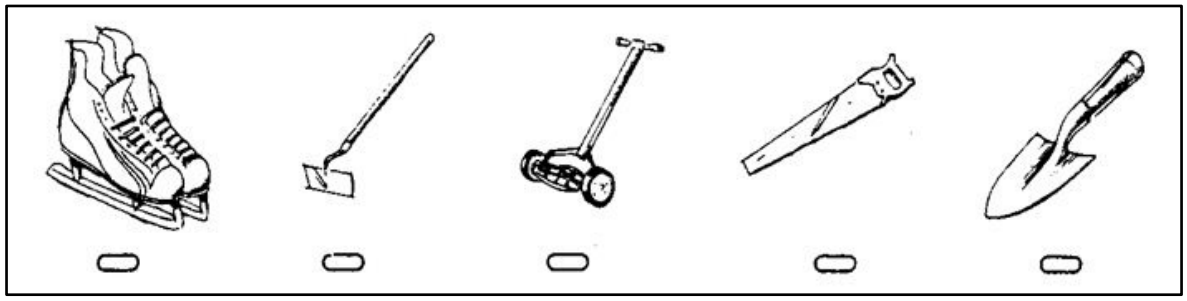


Fig. 8: Subtest (3) Deductive Thinking (Heller & Geisler, 1983, p.7).

Computational Thinking

At the last subtest, mathematical thinking of the children will be reviewed. It is the ability to perform simple arithmetic operations of addition, subtraction, multiplication, and division correctly. There are mainly dealing with the numbers and the idea of various quantities in the foreground (Heller & Geisler, 1983). Computational knowledge collects a child's cognitive development very early. Numbers, sizes and ratios are also nearly indistinguishable. From 4 years, the toddler learns to be aware of the phenomenon of cardinality deal, so the counting to ten is no longer a problem. In addition, for children in preschool years a child is able to understand arithmetic and solve simple addition and subtraction problems. More the parents and adults support a child, faster is the development of their skills and better learning to deal with it (Berk, 2011).

Moreover, in preschool the acquired knowledge improved and clarified through specifically mathematics instruction. They learn not only the representing numbers but also counting and calculating with the numbers. It is particularly important that the children counting, because it makes it more easily to handle the more complex and abstract mathematical calculations (Berk, 2011). Briefly, this test part detects the child’s extended ability of accounting. The wording of this task is like, “In this series, you can see pictures of some cakes. Check out the cake that stands alone at it. "**Finds a more cake that combined with this would result in a whole pie.**"

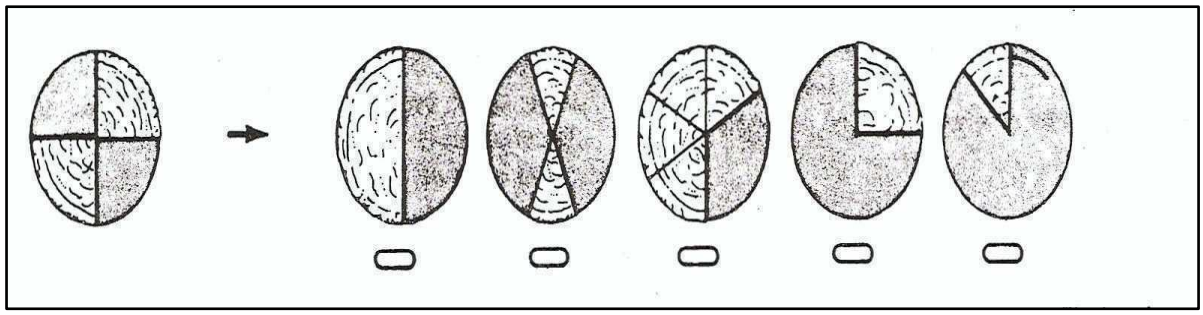


Fig. 9: Subtest (4) Computational Thinking (Heller & Geisler, 1983, p.7).

3.3 The Research procedures

The researcher takes into account, that the related considerations for the across-culture studies especially those mentioned from the perspective of Pohl (1995) about the diversity of the related test items and the changing of test leaders is one of the main problems during procedures of this kind of comparative studies. In this case the researcher selected the German motor test with high validity rang. In addition, he tried to control the test administration for both samples as much as possible by illustrating the test conditions by the same way and the similar work plan for both samples which reflects the accuracy of the collected data. The research procedures were divided in two stages; the first was the preparation procedures that aimed to create the most appropriate environment by the coordination with all responsible persons involved in the second stage which aimed to organize and implement accurately the test procedures.

3.3.1 Preparation procedures

The preparation processes were seemly equal for both motor and cognitive test in management steps which were done by schools administrations. A special preparation was done by the test staff according to the different nature for each test.

3.3.1.1 Preparation procedures for the motor test

The preparation processes for motor test administration was very difficult, because the process was administrated in primary schools in two different countries (Egypt and Germany) as well as by different sport facilities and different climate. In addition, between total different backgrounds about sport culture and the benefit of evaluating the children's MPA which clearly impacts their children health and academic achievement especially in this age.

The preparation steps of PE teachers for the test implementation with in the schools were the follows:

1) A meeting between the test leader and the school's managers and PE teachers to explain the nature of the study and the benefit of the test implementation for evaluating the level of MPAs.
2) Sending letters (by school's administrations) for the children parents to accept the participation in the data collection process.
3) Preparing a classes sheets with the student numbers, names and date of birth.
4) Planning the implementation time table according to the school schedule.
5) A meeting between the test leader, the test assistant and PE teachers to describe the test items, test procedures and test equipment's.
6) Preparing the individual test sheet for every child with his name, gender and date of birth.

3.3.1.2 Preparation procedures for the cognitive test

The preparation processes for the cognitive abilities test administration was very hard, especially for the Egyptian sample. Additionally, the same procedures in the motor test considered an additional preparation procedure. For the German test staff preparation meetings were organized to train the staff members of the test administration. For Egypt, the test instructions translation process and reviewing it from German language to Arabic language was conducted before the preparation meeting which was also organized to train the test staff on the test administration and test considerations. An explanation and describing process about the test items, test execution and expected required time was discussed with the school teachers.

3.3.2 Implementation procedures

The implementation procedures will be discussed in two parts, because the nature of each test is different especially in the place of implementation and the number of available children to test as well as the giddiness processes from the test staff.

3.3.2.1 Motor test implementation

The motor test implementation by Egyptian sample was in the school year (2010/2011) while the German sample, it was imposed in school year (2009/2010) and (2010/2011). In both, Assiut and Magdeburg, the German motor test was administered in a group setting during regular school classes. Motor test and body mass index (BMI) was conducted in sessions each lasting for about 90 min. While five assistants were participating in the test administration, about 20 children were assessed every session. The test process was supervised inside the school gymnasiums by the PE teachers and administrated by the assistant staff of our research group utilizing the special test equipment's.

3.3.2.2 Cognitive test implementation

The cognitive abilities test for Assiut and Magdeburg samples was implemented at the same period where the motor test was implemented but at different days according to the school schedule. This test was administered in a group setting during regular school classes. By special test constructions it was also conducted in sessions each lasting for about 90 min about 25 children were assessed in every session. The test process was supervised inside the school classes by the class responsible teachers and administrated by the assistant staff of our research group. The implementation process for both motor and cognitive abilities tests were conducted in public primary schools in both the city of Assiut and the city of Magdeburg. The demographic distribution of the schools in both cities was considered.

3.4 Statistical Analysis

The statistical analysis was done using SPSS software for windows in version (19.0). In addition, the descriptive statistic includes mean and standard division scores of the achievement level in motor and cognitive ability as well as body composition that had been analyzed and presented by age and gender for both samples.

According to the normal distribution of the collected data the analysis of variance (ANOVA) has been used to define the significant value for all variables. ANOVA is a general method of analyzing data from designed experiments, whose objective is to compare two or more group means (Bös, Hänsel & Schott, 2000). Well-designed experiments are usually optimal with respect to meeting study objectives. ANOVA designs can be more or less complex. The designs can be very simple, as in the case of the t-test procedure which only compares two means. Other designs can be quite complex, when we compare more than two means are compared and sometimes depending on computers for their solution and analysis (Bolton & Bon, 2009).

In order to examine the relationships among body composition and the motor abilities of the individual items, the performance results were correlated with the available anthropometric data by using of Spearman correlation.

In addition, the correlation between motor and cognitive abilities has been tested using Kendall's tau test of correlation. In the two rankings are presented, at least one ordinal scaled data series, as this is criteria for an exact assignment of rank. In the present case we had two series of data to be compared, and the results of (GMT 6-18) are represented as a metric scaled set of data. Second, the results of (CAT 1-3) are presented as ordinal scaled data. This test is necessary, because of the different kinds of scale.

The reliability of the cognitive abilities test for children of Assiut has been done using Alpha test and the value was (α = .79). The computation of alpha is based on the reliability of a test relative to other tests with the same number of items, and measuring the same construct of interest (Hatcher, 1994).

4. Results

4.1 Presentation of the comparison in body composition

The body composition for each child in both the samples was calculated by assessing the relationship among body height, body weight and age with the help of the special German motor test software. In this part, the descriptive statistic and the ANOVA among age, gender and city for both samples is presented. The results value is presented for body height in meter, body weight in kilogram and BMI in numeral.

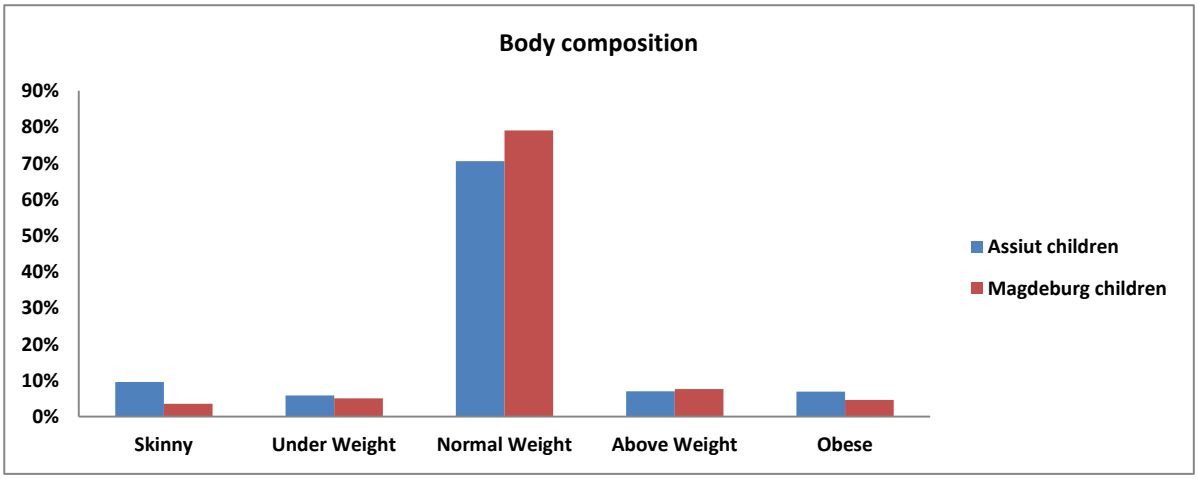


Fig. 10: Distribution of body composition for Assiut and Magdeburg children

Tab. 7: Distribution of Assiut and Magdeburg children by body composition:

Body Type	Assiut children		Magdeburg children	
	N.(187)	Percent	N.(197)	Percent
Skinny	18	9.6 %	7	3.6 %
Underweight	11	5.9 %	10	5.1 %
Normal Weight	132	70.6 %	156	79.1 %
Overweight	13	7.0 %	15	7.6 %
Obese	13	6.9 %	9	4.6 %

Table 7 and **Fig. 10** show the distribution of body composition for Assiut and Magdeburg children. For Assiut sample about 8.5 % from the children with normal body weight were less than Magdeburg children. In both the samples the percent of overweight children was nearly equal. The prevalence of obese children in Assiut sample was higher than Magdeburg sample with 2.3%. The number of skinny children in Assiut sample was also higher than Magdeburg sample with 6 %.

4.1.1 Presentation of the comparison in body height

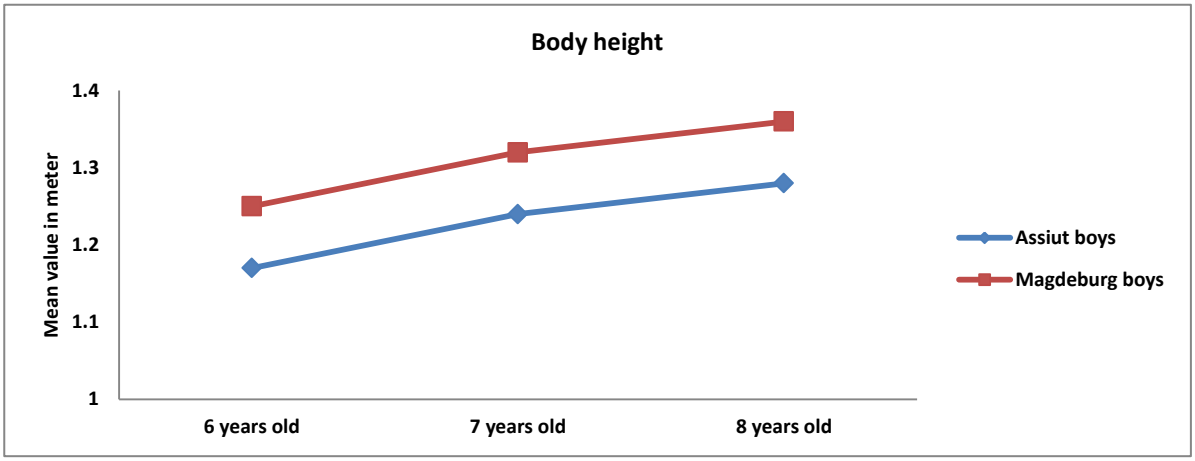


Fig . 11: Comparison among boys of Assiut and Magdeburg in body height

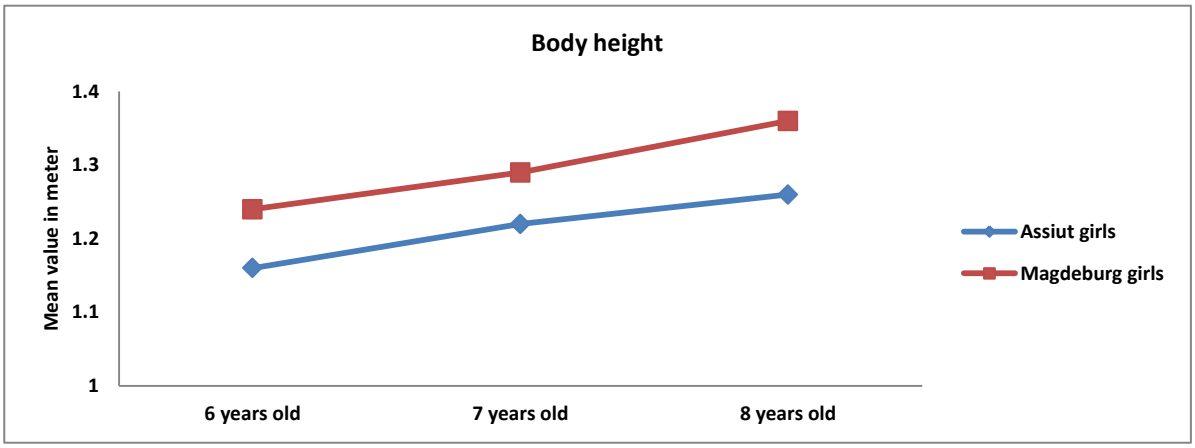


Fig. 12: Comparison among girls of Assiut and Magdeburg in body height

Tab. 8: Descriptive statistic of body height among children of Assiut and Magdeburg

	Gender	Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Body height	boys	93	1.23	.07	101	1.31	.07	194	1.27	.08
	girls	94	1.22	.07	96	1.30	.07	190	1.26	.08
	sum	187	1.22	.07	197	1.30	.07	380	1.26	.08

Tab. 9: Descriptive statistic of body height for children of Assiut and Magdeburg by age and gender

	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Body height	6	boys	31	1.17	.04	26	1.25	.06	57	1.21	.06
		girls	33	1.16	.04	30	1.24	.06	63	1.20	.06
		sum	64	1.17	.04	56	1.25	.06	120	1.20	.06
	7	boys	26	1.24	.06	46	1.32	.05	72	1.29	.07
		girls	28	1.22	.06	37	1.29	.05	65	1.26	.06
		sum	54	1.23	.06	83	1.31	.05	137	1.28	.07
	8	boys	36	1.28	.06	29	1.36	.07	65	1.32	.07
		girls	33	1.27	.06	29	1.36	.06	62	1.31	.07
		sum	69	1.27	.06	58	1.32	.07	127	1.31	.07

Tab. 10: Analysis of variance among children of Assiut and Magdeburg in body height

Variables	QS	df	QM	F	P	η^2
Age	.732	2	.366	103.64	.000	.358
City	.589	1	.589	166.78	.000	.310
Gender	.013	1	.013	3.78	.053	.010
Age * City	.001	2	.000	.123	.884	.001
Age * Gender	.004	2	.002	.611	.543	.003
City * Gender	.000	1	.000	.089	.765	.000
Age * City * Gender	.002	2	.001	.293	.746	.002

Table 10 shows that the children of Magdeburg were taller than their Assiut peers. A significant effect was observed for both age ($F = 103.64$; $P = .000$; $\eta^2 = .358$) and city ($F = 166.78$; $P = .000$; $\eta^2 = .310$). While for the other variables there were no significant differences between both the samples.

4.1.2 Presentation of the comparison in body weight

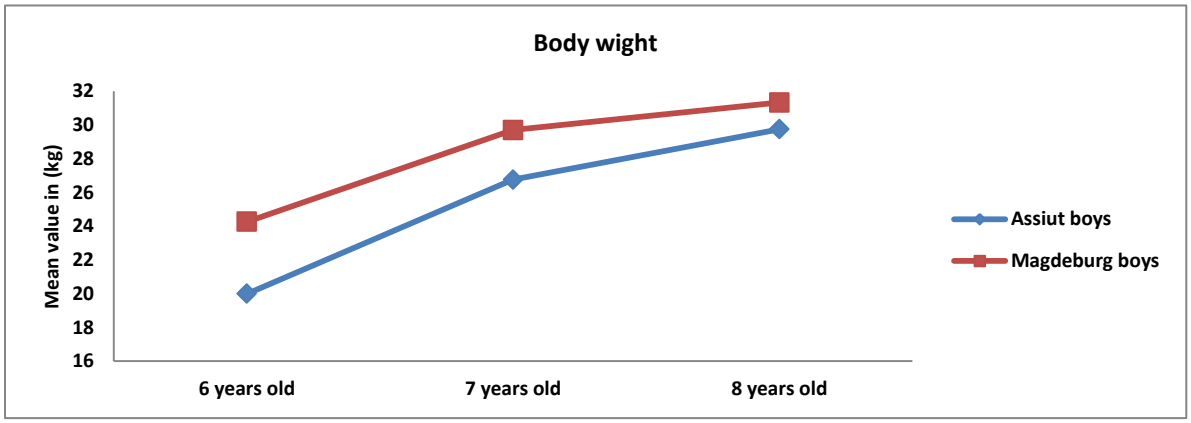


Fig. 13: Comparison among boys of Assiut and Magdeburg by body weight

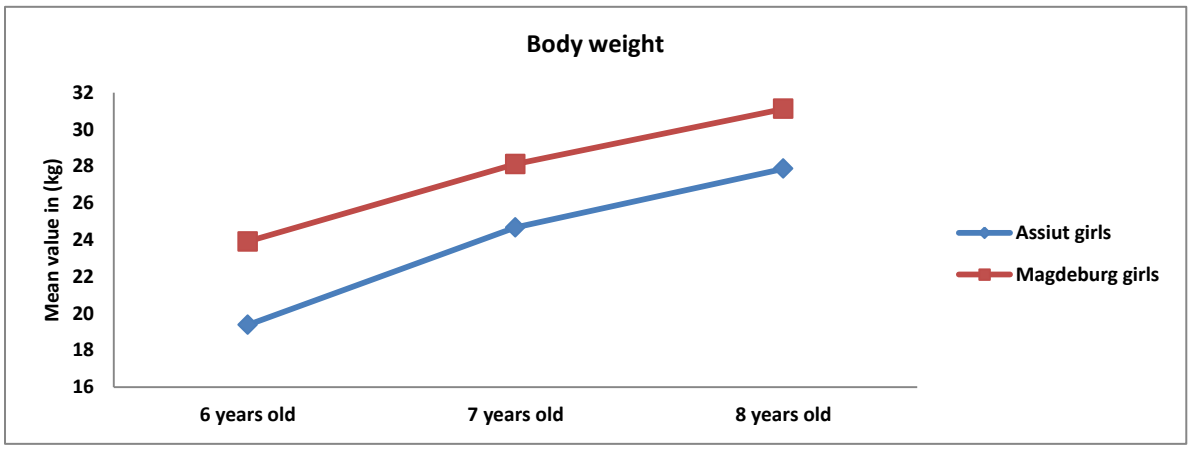


Fig. 14: Comparison among girls of Assiut and Magdeburg by body weight

Tab. 11: Descriptive statistic of body weight among children of Assiut and Magdeburg

	Gender	Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Body weight	**boys**	93	25.66	7.10	101	28.89	6.52	194	27.34	6.98
	girls	94	23.94	6.60	96	27.71	6.46	190	25.84	6.78
	sum	187	24.79	6.89	197	28.32	6.50	384	26.60	6.91

Tab. 12: Descriptive statistic of body weight among children of Assiut and Magdeburg by age and gender

	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Body weight	6	boys	31	19.98	3.64	26	23.72	4.81	57	22.14	4.81
		girls	33	19.37	4.67	30	23.91	4.01	63	21.53	4.90
		sum	64	19.67	4.18	56	24.28	4.38	120	21.82	4.84
	7	boys	26	26.76	5.03	46	29.71	6.15	72	28.65	5.91
		girls	28	24.67	5.04	37	28.12	5.50	65	29.39	5.54
		sum	54	25.68	5.10	83	29.00	5.89	137	29.94	5.80
	8	boys	36	29.75	7.52	29	31.34	6.84	65	30.46	7.21
		girls	33	27.87	6.73	29	31.12	7.65	62	29.39	7.30
		sum	69	28.85	7.16	58	31.23	7.19	127	29.94	7.24

Tab. 13: Analysis of variance among children of Assiut and Magdeburg in body weight

Variables	QS	df	QM	F	P	η^2
Age	4063.17	2	2031.58	59.77	.000	.243
City	1093.84	1	1093.84	32.18	.000	.080
Gender	134.37	1	134.37	3.95	.048	.011
Age * City	77.16	2	38.58	1.13	.322	.006
Age * Gender	21.196	2	10.59	.312	.732	.002
City * Gender	9.868	1	9.86	.290	.590	.001
Age * City * Gender	13.691	2	6.84	.210	.818	.001

Table 13 shows that the children of Magdeburg were heavier than their Assiut peers. Significant differences were clearly noted for both age ($F = 59.77$; $P = .000$; $\eta^2 = .243$) and city ($F = 32.18$; $P = .000$; $\eta^2 = .080$). For gender varliable there were low significant differences observed ($F = 3.95$; $P = .048$; $\eta^2 = .011$). For other variables no significant differences were found between both samples.

4.1.3 Presentation of the comparison in BMI

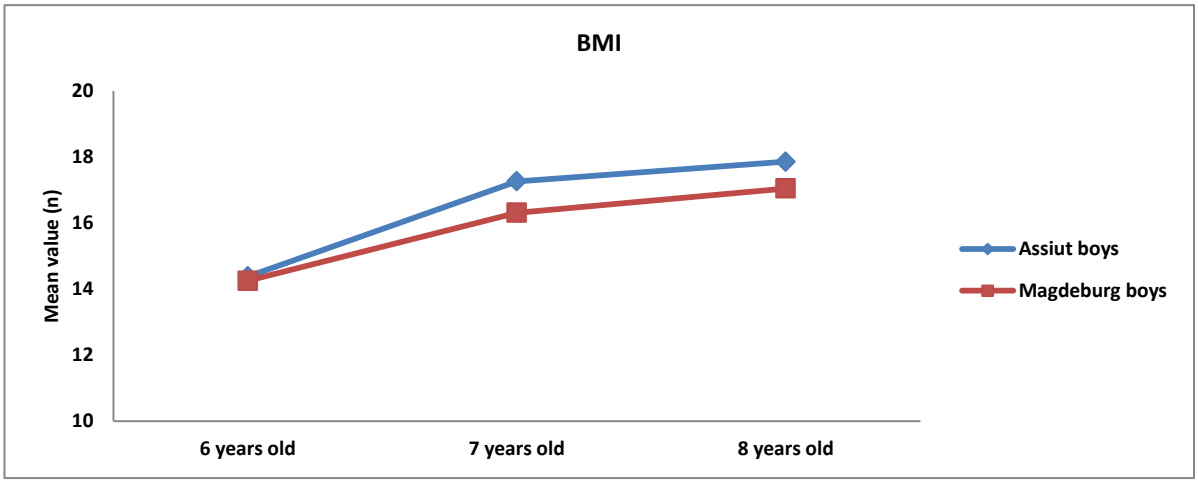


Fig. 15: Comparison among boys of Assiut and Magdeburg in BMI

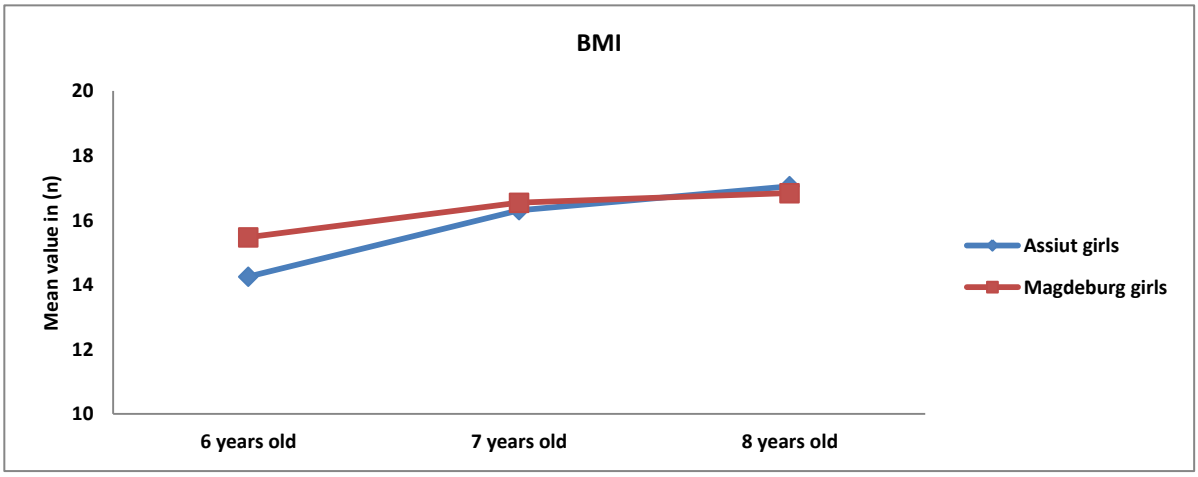


Fig. 16: Comparison among girls of Assiut and Magdeburg in BMI

Tab. 14: Descriptive statistic of BMI among children of Assiut and Magdeburg

	Gender	Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
BMI	boys	93	16.53	3.20	101	16.54	2.42	194	16.54	2.81
	girls	94	15.85	3.11	96	16.20	2.35	190	16.03	2.75
	sum	187	16.19	3.16	197	16.38	2.38	384	16.29	2.79

Tab. 15: Descriptive statistic of BMI among children of Assiut and Magdeburg by age and gender

	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
BMI	6	boys	31	14.38	2.26	26	15.55	1.94	57	14.91	2.18
		girls	33	14.25	2.86	30	15.40	1.74	63	14.79	2.45
		sum	64	14.31	2.57	56	15.47	1.80	120	14.85	2.30
	7	boys	26	17.26	2.47	46	16.92	2.64	72	17.04	2.57
		girls	28	16.31	2.56	37	16.54	2.15	65	16.44	2.32
		sum	54	16.77	2.54	83	16.75	2.43	137	16.76	2.46
	8	boys	36	17.86	3.44	29	16.84	2.24	65	17.41	2.99
		girls	33	17.05	3.17	29	16.84	3.04	62	16.84	3.05
		sum	69	17.48	3.31	58	16.72	2.60	127	17.13	3.02

Tab. 16: Analysis of variance among children of Assiut and Magdeburg in BMI

Variables	QS	df	QM	F	P	η^2
Age	340.82	2	170.41	24.99	.000	.118
City	1.359	1	1.35	.199	.656	.001
Gender	18.43	1	18.43	2.704	.101	.007
Age * City	56.43	2	28.21	4.139	.017	.022
Age * Gender	4.38	2	2.19	.322	.725	.002
City * Gender	3.26	1	3.26	.479	.489	.001
Age * City * Gender	1.75	2	.877	.129	.879	.001

Table 16 shows no significant differences among children of Assiut and Magdeburg by city (F = 199; P = .656; η^2 = .001), while there were significant differences between both samples by age (F = 24.99; P = .000; η^2 = .118) and by (age*city) (F = 4.139; P = .017; η^2 = .022). For other variables there were no significant differences observed between both samples.

4.2 Presentation of the Comparison among Children of Assiut and Magdeburg in MPA

In this part of the study the differences between children of Assiut and Magdeburg will be presented for each ability (speed, coordination, strength, endurance and agility) tested by the motor test items in order to clarify the descriptive statistic between both the samples by age and gender groups. The ANOVA among different variables and the relationship among the test items and body composition will be also presented.

4.2.1. Presentation of the Comparison in Speed Ability

This motor ability was tested by 20-m-sprint test. The results showed significant differences in the level of MPA between both the samples with different level of correlations with body height, body weight and BMI. The general level of achievement in speed ability has been shown for both the samples in second value, as well as the ANOVA.

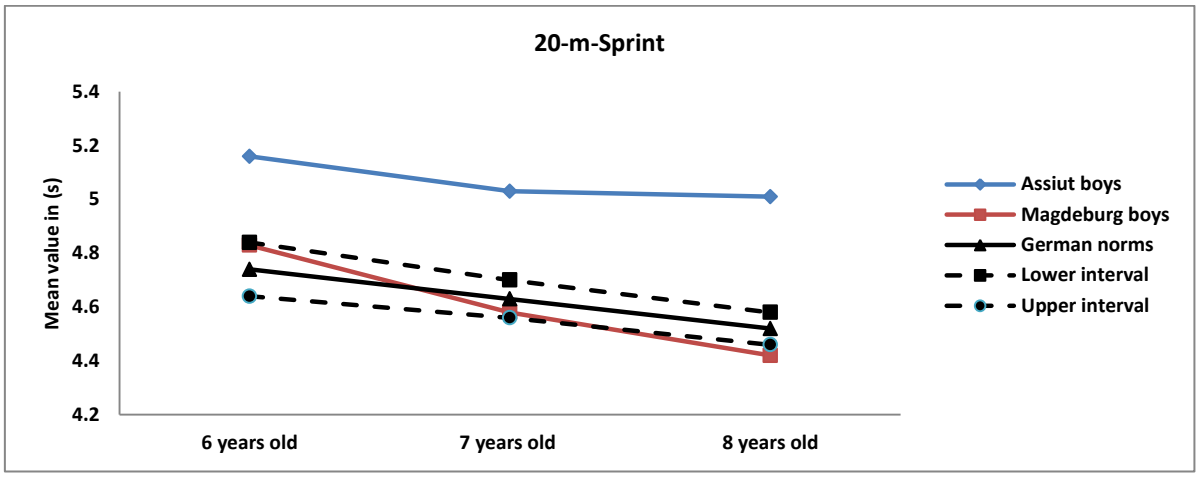


Fig. 17: Comparison among boys of Assiut and Magdeburg in 20-m-sprint

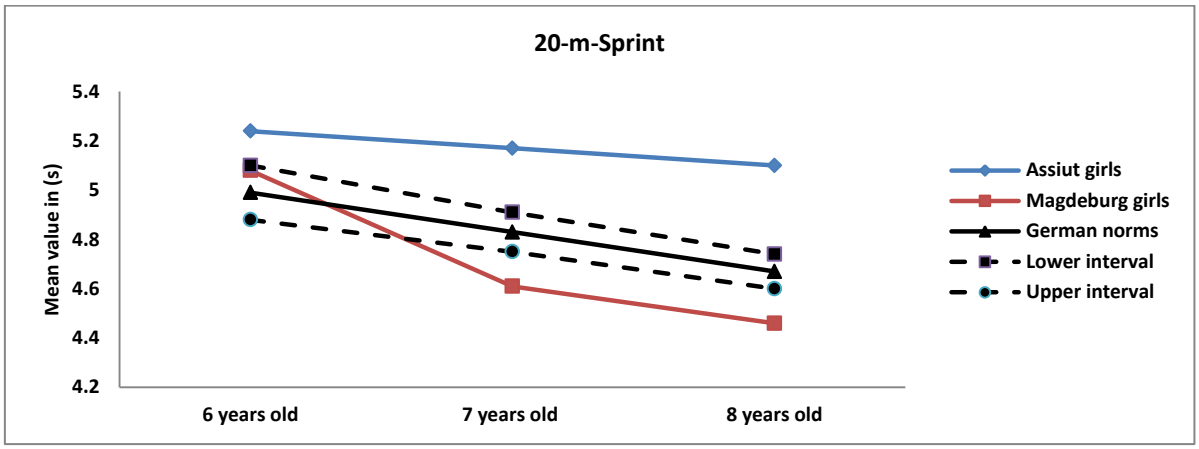


Fig. 18: Comparison among girls of Assiut and Magdeburg in 20-m-sprint

Tab. 17: Descriptive statistic of 20-m-sprint among children of Assiut and Magdeburg

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
20-m-Sprint	boys	93	5.15	0.35	101	4.60	0.46	194	4.86	0.50
	girls	94	5.20	0.26	96	4.71	0.44	190	4.98	0.45
	sum	187	5.20	0.31	197	4.65	0.45	384	4.92	0.48

Tab. 18: Descriptive statistic of 20-m-sprint among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
20-m-Sprint	6	boys	31	5.16	0.24	26	4.83	0.50	57	5.01	0.41
		girls	33	5.24	0.25	30	5.08	0.37	63	5.16	0.32
		sum	64	5.20	0.24	56	4.96	0.45	120	5.09	0.37
	7	boys	26	5.13	0.27	46	4.58	0.39	72	4.85	0.50
		girls	28	5.17	0.26	37	4.61	0.37	65	4.94	0.50
		sum	54	5.35	0.26	83	4.60	0.38	137	4.89	0.50
	8	boys	36	5.01	0.43	29	4.42	0.46	65	4.74	0.53
		girls	33	5.10	0.26	29	4.46	0.33	62	4.85	0.47
		sum	69	5.10	0.36	58	4.44	0.40	127	4.80	0.50

Tab. 19: Analysis of variance among children of Assiut and Magdeburg in 20-m-sprint

Variables	QS	df	QM	F	P	η^2
Age	6.01	2	3	23.21	.000	.111
City	28.80	1	28.80	222.21	.000	.374
Gender	1.020	1	1.02	7.87	.005	.021
Age * City	4.449	2	2.22	17.16	.000	.084
Age * Gender	0.259	2	.130	1	.369	.005
City * Gender	.004	1	.004	.028	.868	.000
Age * City * Gender	.392	2	.196	1.513	.222	.008

Table 19 shows that the achievement of the children of Magdeburg is better than Assiut peers with significant differences by age (F = 23.22; P = .000; η^2 = .111), city (F = 222.21; P = .000; η^2 = .374), gender (F = 7.87; P = .005; η^2 = .021) and for (age * city) between both (F = 17.16; P = .000; η^2 = .084). The presented results indicate that the achievement of the children differ significantly among boys and girls as well as among the children of Assiut and Magdeburg city.

4.2.1.1 Presentation of the correlation among speed ability and body composition

Tab. 20: Correlation among children of Assiut and Magdeburg in 20-m-Sprint and body composition using Spearman test

Test items	City		Body height	Body weight	BMI
20-m-Sprint (s)	Assiut children	r	0.108	0,068	0,038
		p	0.142	0,356	0,605
	Magdeburg children	r	**0.294** **	**0,149** *	0,037
		p	0.000	0.003	0.601

**. Correlation is significant P < 0.01 level.
*. Correlation is significant P < 0.05 level.

Table 20 shows that the children of Magdeburg had a high and middle significant correlation in body height (P = .000) and body weight (P = .003). However, for Assiut children the correlation among this test with body height body weight and BMI was not significant. Namely, among children of Magdeburg, the taller ran faster than their shorter peers.

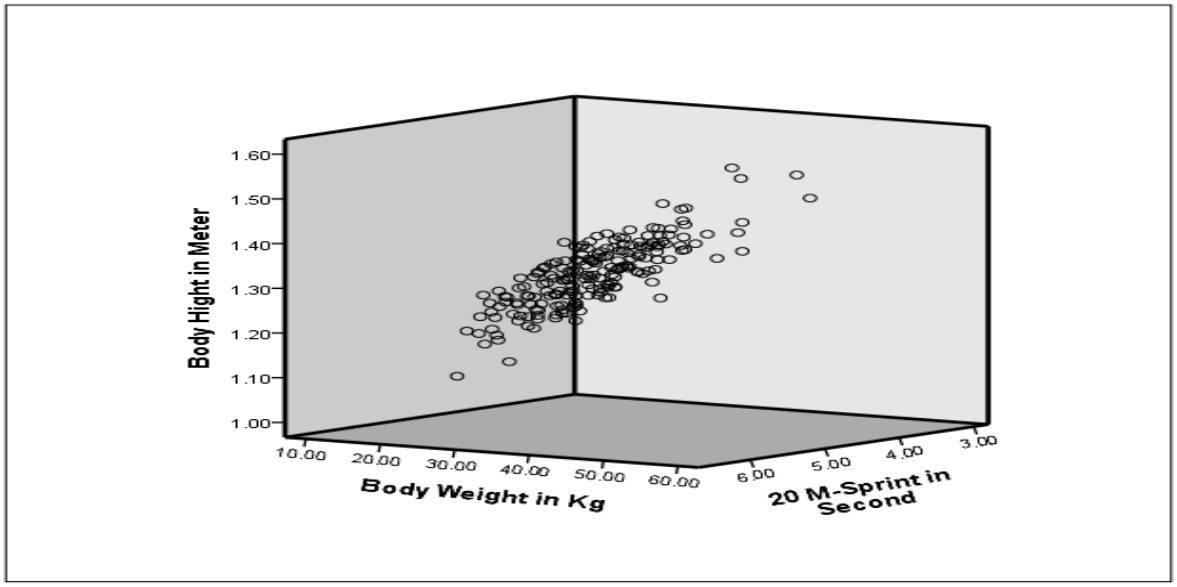


Fig. 19: Correlation among 20-m-sprint and body composition by children of Magdeburg

4.2.2 Presentation of the Comparison in Coordination Ability

This motor ability was tested by the test items which include backwards balance and jumping sideways. The results will present for each test item. The presented value will be in points. The analysis of variance among both samples will present as well as the relationship between each item and body composition will present as well.

4.2.2.1 Presentation of the comparison in balancing backward

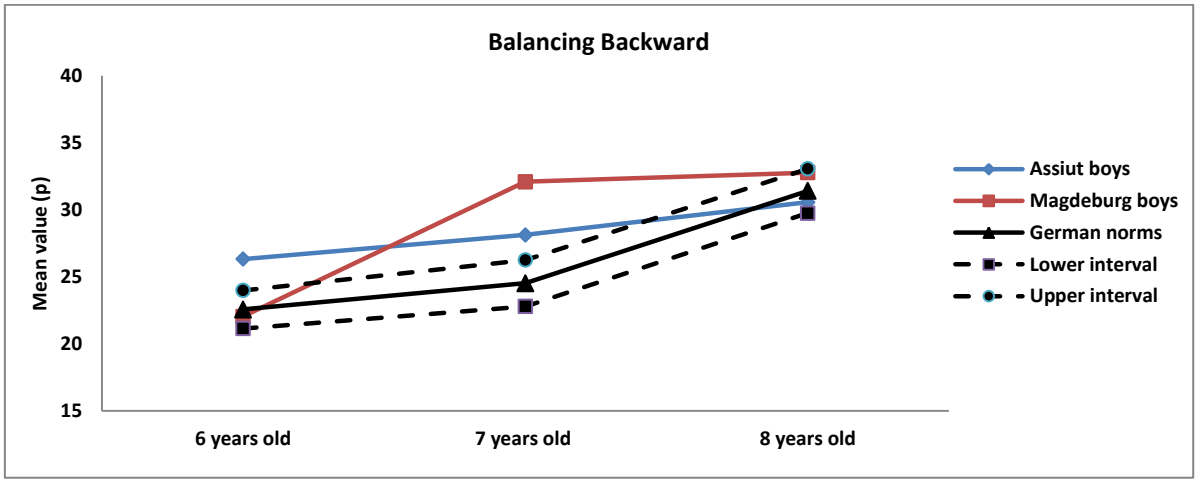


Fig . 20: Comparison among boys of Assiut and Magdeburg in balancing backward

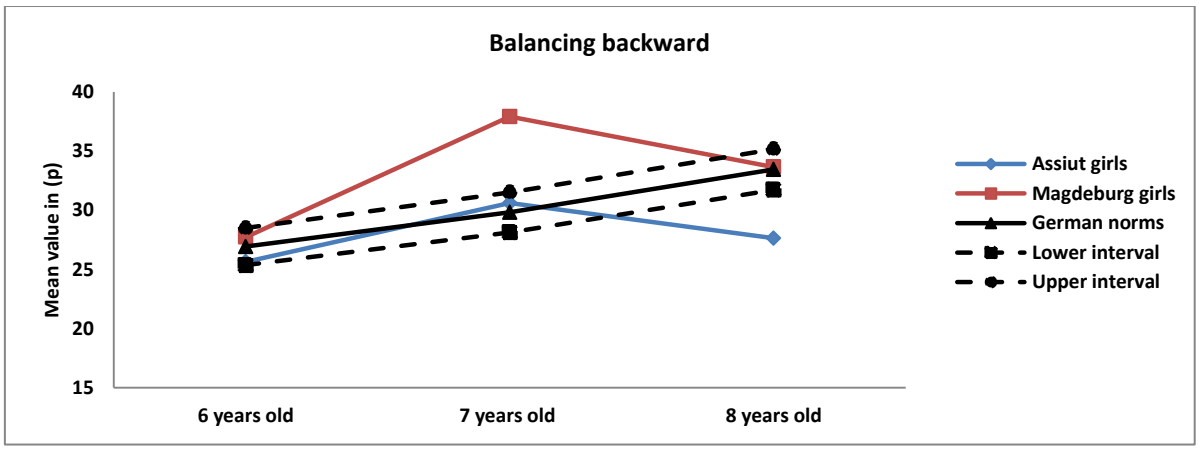


Fig. 21: Comparison among children of Assiut and Magdeburg in balancing backward

Tab. 21: Descriptive statistic of balancing backward among children of Assiut and Magdeburg

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Balancing backward	boys	93	28.46	11.82	101	30.02	11.68	194	29.27	11.75
	girls	94	27.82	12.33	96	33.45	10.72	190	30.66	11.86
	sum	187	28.14	12.05	197	31.69	11.33	384	29.96	11.81

Tab. 22: Descriptive statistic of balancing backward among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Balancing backward	6	boys	31	26.32	12.50	26	22.04	11.91	57	24.37	12.32
		girls	33	25.64	14.67	30	27.73	9.78	63	26.63	12.53
		sum	64	25.97	13.56	56	25.09	11.10	120	25.56	12.43
	7	boys	26	28.12	9.41	46	32.80	11.04	72	31.11	10.66
		girls	28	30.61	10.44	37	37.92	8.58	65	34.77	10.03
		sum	54	29.41	9.94	83	35.08	10.29	137	32.85	10.49
	8	boys	36	30.56	12.71	29	32.76	9.23	65	31.54	11.26
		girls	33	27.64	11.09	29	33.66	11.61	62	30.45	11.65
		sum	69	29.16	11.97	58	33.21	10.40	127	31.01	11.42

Tab. 23: Analysis of variance among children of Assiut and Magdeburg in balancing backward

Variables	QS	df	QM	F	P	η^2
Age	3354.54	2	1677.27	13.28	.000	.067
City	846.31	1	846.31	6.70	.010	.018
Gender	291.92	1	291.92	2.31	.129	.006
Age * City	829.41	2	414.70	3.28	.039	.017
Age * Gender	394.10	2	197.05	1.56	.211	.008
City * Gender	427.59	1	427.59	3.38	.067	.009
Age * City * Gender	56.796	2	28.39	.225	.799	.001

Table 23 show a significant differences among children of Assiut and Magdeburg by age ($F = 13.28$; $P = .000$; $\eta^2 = .067$), city ($F = 6.70$; $P = .010$; $\eta^2 = .018$) and (age * city) ($F = 3.28$; $P = .039$; $\eta^2 = .017$) while for other variables there were no significant differences noted between both the samples.

4.2.2.2 Presentation of the comparison in jumping sideways

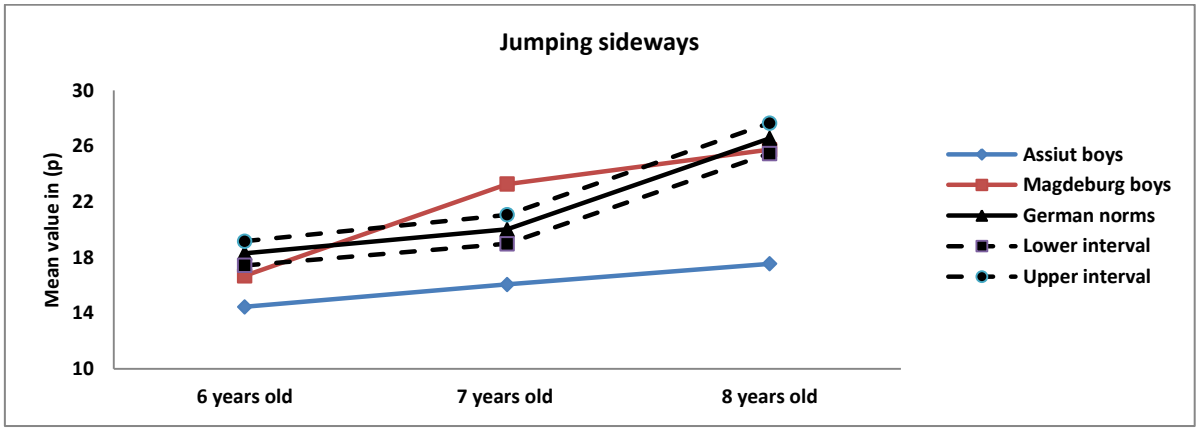


Fig. 22: Comparison among boys of Assiut and Magdeburg in jumping sideways

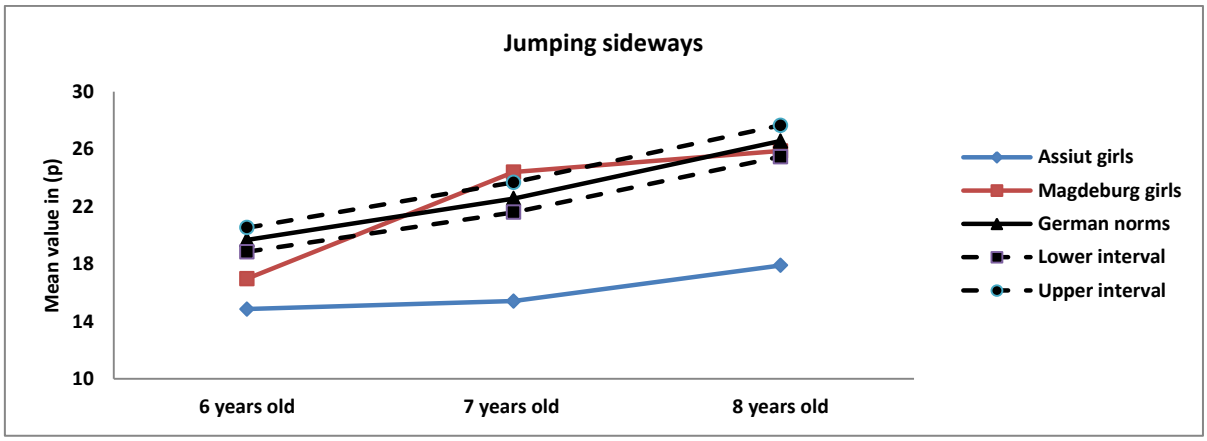


Fig. 23: Comparison among girls of Assiut and Magdeburg in jumping sideways

Tab. 24: Descriptive statistic of jumping sideways among children of Assiut and Magdeburg

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Jumping sideways	boys	93	17.78	4.60	101	22.29	7.25	194	20.13	6.51
	girls	94	17.50	5.33	96	22.53	7.63	190	20.04	7.04
	sum	187	17.64	4.97	197	22.41	7.42	384	20.09	6.77

Tab. 25: Descriptive statistic of jumping sideways among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Jumping sideways	6	boys	31	14.46	3.87	26	16.69	5.91	57	18.20	5.05
		girls	33	18.86	4.87	30	16.98	6.01	63	17.96	5.48
		sum	64	19.15	4.39	56	16.84	5.91	120	18.07	5.20
	7	boys	26	16.07	3.69	46	23.28	6.17	72	20.68	6.41
		girls	28	15.42	5.02	37	24.40	7.14	65	20.53	7.71
		sum	54	15.74	4.40	83	23.78	6.61	137	20.61	7.03
	8	boys	36	17.56	5.32	29	25.75	7.22	65	21.22	7.42
		girls	33	17.90	5.62	29	25.88	6.73	62	21.64	7.31
		sum	69	17.73	5.43	58	25.82	6.92	127	21.42	7.34

Tab. 26: Analysis of variance among children of Assiut and Magdeburg in jumping sideways

Variables	QS	df	QM	F	P	η^2
Age	1253.70	2	626.85	24.93	.000	.118
City	3811.67	1	3811.67	151.60	.000	.290
Gender	204.87	1	204.87	8.14	.005	.020
Age * City	269.68	2	134.84	5.36	.005	.028
Age * Gender	65.10	2	32.55	1.29	.275	.007
City * Gender	72.45	1	72.45	2.88	.090	.008
Age * City * Gender	47.37	2	23.68	.942	.391	.005

Table 26 shows a significant differences among children of Assiut and Magdeburg by age ($F = 24.93$; $P = .000$; $\eta^2 = .118$), city ($F = 151.60$; $P = .000$; $\eta^2 = .290$). While for other variables no significant differences were observed between both the samples.

4.2.2.3 Presentation of the correlation among coordination ability and body composition

Tab. 27: Correlation among coordination ability and body composition

Motot ability	Test items	City		Body height	Body weight	BMI
Coordination	balancing backward	Assiut children	r	.107	.100	.070
			p	.145	.172	.341
		Magdeburg children	r	.133	.130	.092
			p	.062	.068	.200
	jumping sideways	Assiut children	r	**.156***	**.173***	.130
			p	.021	.018	.077
		Magdeburg children	r	**.254****	**.185***	.056
			p	.000	.009	.433

**. Correlation is significant at P < 0.01 level.
*. Correlation is significant at P < 0.05 level.

Table 27 shows that, in the children of Assiut and Magdeburg, the correlation among the balancing backward test and body height, body weight and BMI was no significant. However, in both the samples the correlation among the achievement in jumping sideways test and body height and body weight was significant. For children of Magdeburg, significant correlation was observed among this test and body height (P = .000) and body weight (P = .009). A low significant correlation was found by Assiut children in the achievement of this test and body height (P = .021) and weight (p = .018). For both the samples there is no significant correlation was found with the BMI.

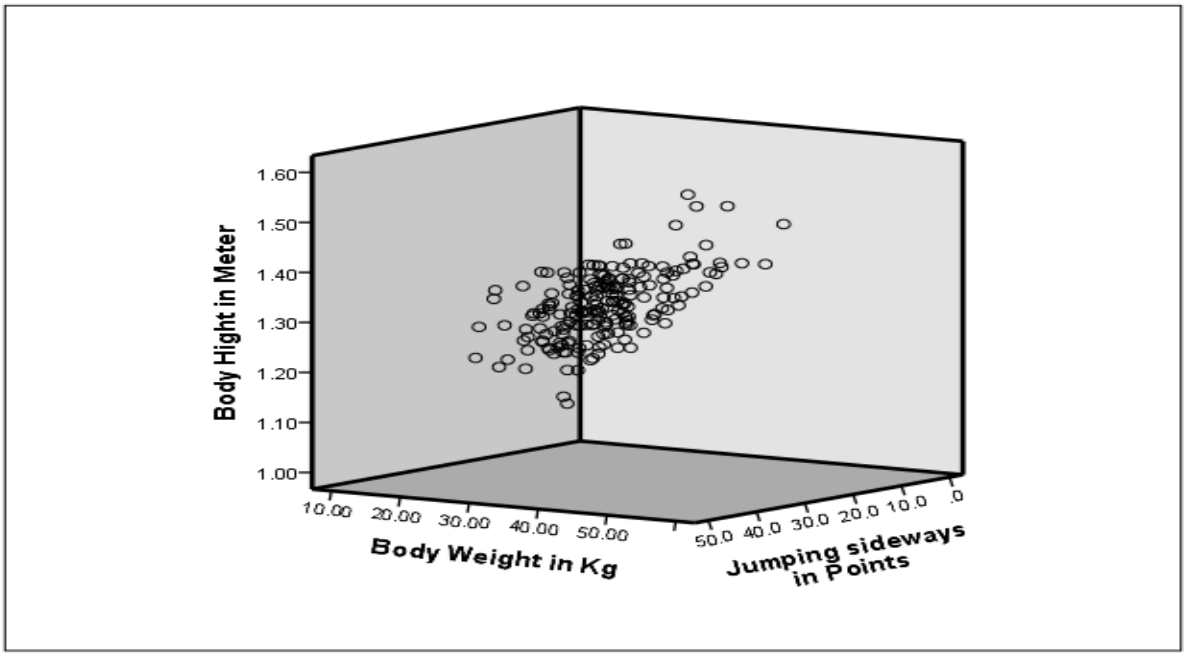


Fig. 24: Correlation among body composition and jumping sideways by children of Magdeburg

4.2.3 Presentation of the Comparison in Strength Ability

This motor ability was tested by three test items that included (push-ups, sit-ups and standing long jump). The descriptive statistic presents the numbers of both push-ups and sit-ups while standing long jump is presented in meter. The ANOVA between both the samples is presented as well. In addition, the relationship among the achievement in each test item and body composition is shown.

4.2.3.1 Presentation of the comparison in push-ups

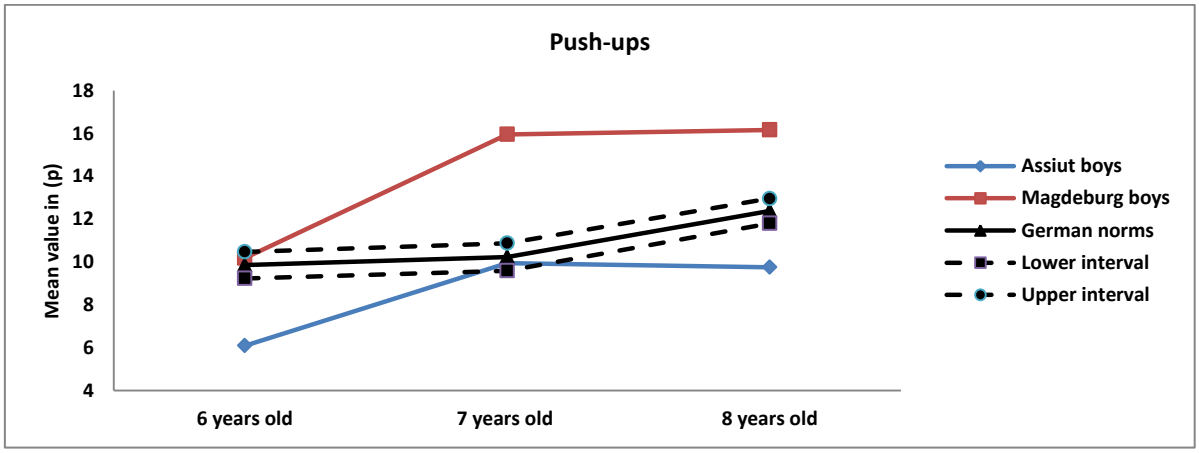


Fig. 25: Comparison among boys of Assiut and Magdeburg in push-ups

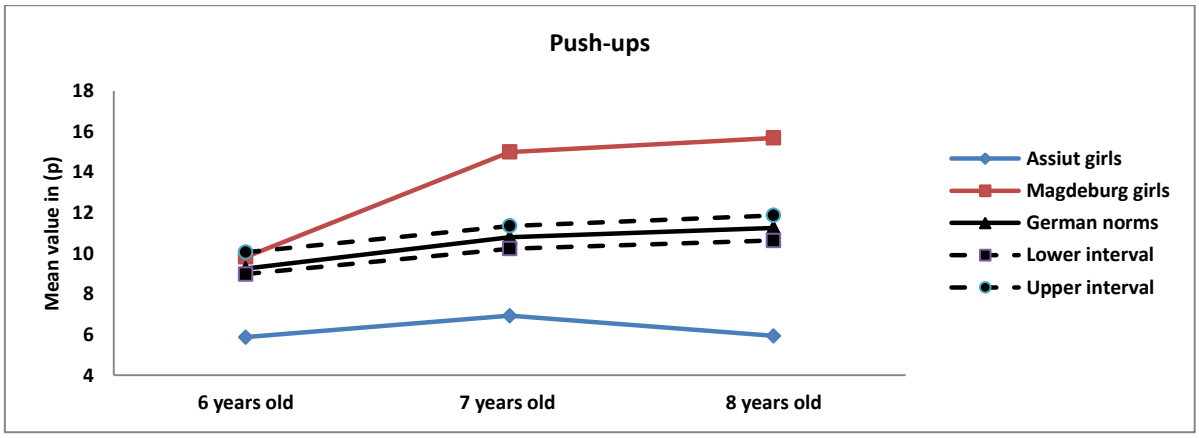


Fig. 26: Comparison among girls of Assiut and Magdeburg in push-ups

Tab. 28: Descriptive statistic of push-ups among children of Assiut and Magdeburg

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Push-ups	boys	93	8.60	7.66	101	14.53	7.66	194	11.69	6.67
	girls	93	6.21	6.18	96	13.59	6.18	190	9.94	5.92
	sum	187	7.40	6.98	197	14.08	6.98	384	10.82	6.36

Tab. 29: Descriptive statistic of push-ups among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Push-ups	6	boys	31	6.10	1.81	26	10.19	6.68	57	7.96	5.09
		girls	33	5.88	1.55	30	9.83	4.70	63	7.76	3.94
		sum	64	5.98	1.67	56	10	5.65	120	7.86	4.50
	7	boys	26	9.96	2.44	46	15.96	7.56	72	13.79	6.84
		girls	28	6.93	2.53	37	15	5.61	65	11.52	6.05
		sum	54	8.39	2.90	83	15.53	6.74	137	12.72	6.55
	8	boys	36	9.76	3.76	29	16.17	7.34	65	12.62	6.45
		girls	33	5.94	2.09	29	15.69	6.64	62	10.50	6.82
		sum	69	7.93	3.61	58	15.93	6.94	127	11.59	6.69

Tab. 30: Analysis of variance among children of Assiut and Magdeburg in push- ups

Variables	QS	df	QM	F	P	η^2
Age	875.95	2	437.97	13.08	.000	.066
City	1995.36	1	1995.36	59.62	.000	.138
Gender	1.028	1	1.028	0.03	.861	.000
Age * City	2204.37	2	1102.18	32.93	.000	.150
Age * Gender	3.12	2	1.56	0.047	.954	.000
City * Gender	15.67	1	15.67	0.468	.494	.000
Age * City * Gender	15.78	2	7.89	0.236	.790	.001

Table 30 shows significant difference among the children of Assiut and Magdeburg by age ($F = 13.08$; $P = .000$; $\eta^2 = .066$), city ($F = 59.62$; $P = .000$; $\eta^2 = .138$) and (age * city) ($F = 32.93$; $P = .000$; $\eta^2 = .150$). For other variables there were no significant differences observed between both the samples.

4.2.3.2 Presentation of the comparison in sit-ups

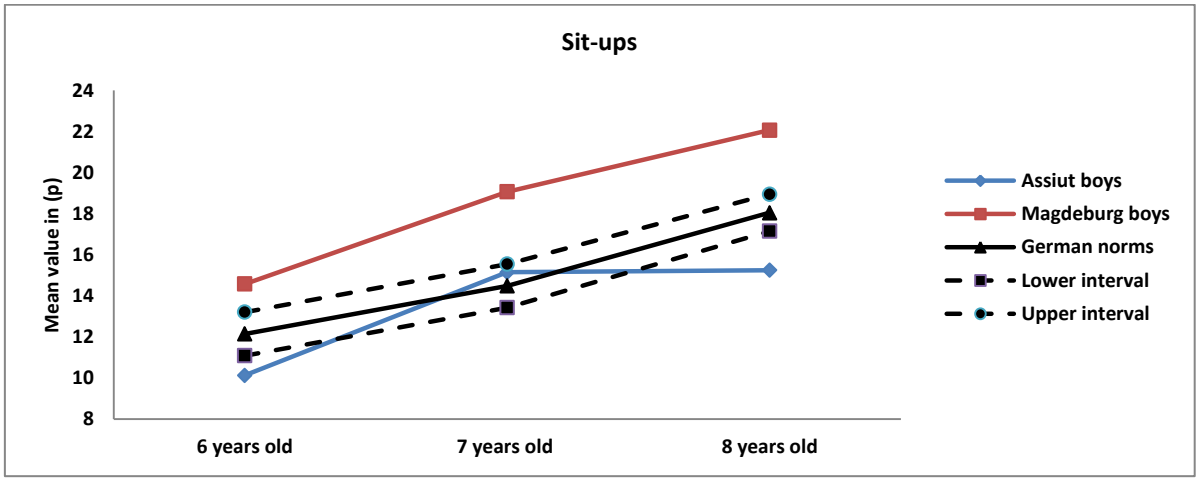


Fig. 27: Comparison among boys of Assiut and Magdeburg in sit-ups

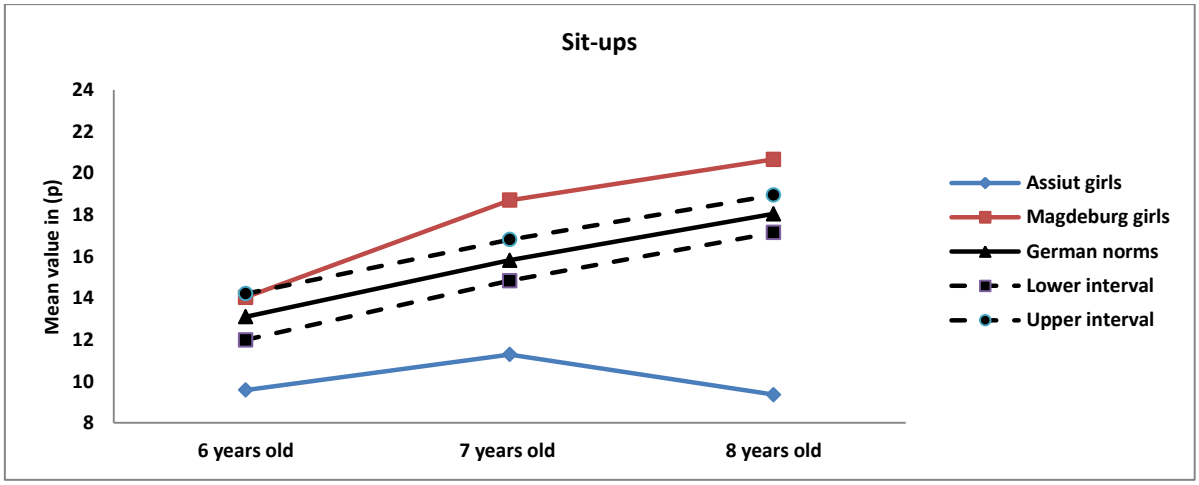


Fig. 28: Comparison among girls of Assiut and Magdeburg in sit-ups

Tab. 31: Descriptive statistic of sit-ups among children of Assiut and Magdeburg

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Sit-ups	boys	93	13.52	4.19	101	18.77	7.45	194	16.25	6.63
	girls	94	10.01	3.10	96	17.83	6.66	190	13.96	6.51
	sum	187	11.75	4.07	197	18.31	7.07	384	15.12	6.67

Tab. 32: Descriptive statistic of sit-ups among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Sit-ups	6	boys	31	10.13	2.95	26	14.58	6.26	57	12.16	5.21
		girls	33	9.58	2.15	30	14.03	5.90	63	11.70	4.87
		sum	64	9.84	2.56	56	14.29	6.02	120	11.90	5.02
	7	boys	26	15.15	3.20	46	19.07	6.64	72	17.65	5.93
		girls	28	11.29	2.99	37	18.70	6.11	65	15.51	6.20
		sum	54	13.15	3.63	83	18.90	6.37	137	16.64	6.13
	8	boys	36	15.25	4.01	29	22.07	8.03	65	18.29	6.97
		girls	33	9.36	3.71	29	20.66	6.48	62	14.65	7.66
		sum	69	12.43	4.85	58	21.36	7.27	127	16.51	7.52

Tab. 33: Analysis of variance among children of Assiut and Magdeburg in sit-ups

Variables	QS	df	QM	F	P	η^2
Age	1582.97	2	791.48	28.80	.000	.134
City	3825.44	1	3825.44	139.19	.000	.272
Gender	414.88	1	414.88	15.09	.000	.039
Age * City	352.45	2	176.22	6.41	.002	.033
Age * Gender	147.22	2	73.61	2.67	.070	.014
City * Gender	166.01	1	166.01	6.04	.014	.016
Age * City * Gender	83.87	2	41.93	1.52	.219	.008

Table 33 shows a significant difference among children of Assiut and Magdeburg by age ($F = 28.80$; $P = .000$; $\eta^2 = .134$), city ($F = 139.19$; $P = .000$; $\eta^2 = .272$), gender ($F = 15.09$; $P = .000$; $\eta^2 = .039$), (age * city) ($F = 6.41$; $P = .002$; $\eta^2 = .033$) and (city * gender) ($F = 6.04$; $P = .014$; $\eta^2 = .016$). For other variables there were no significant differences observed between both the samples.

4.2.3.3 Presentation of the comparison in standing long jump

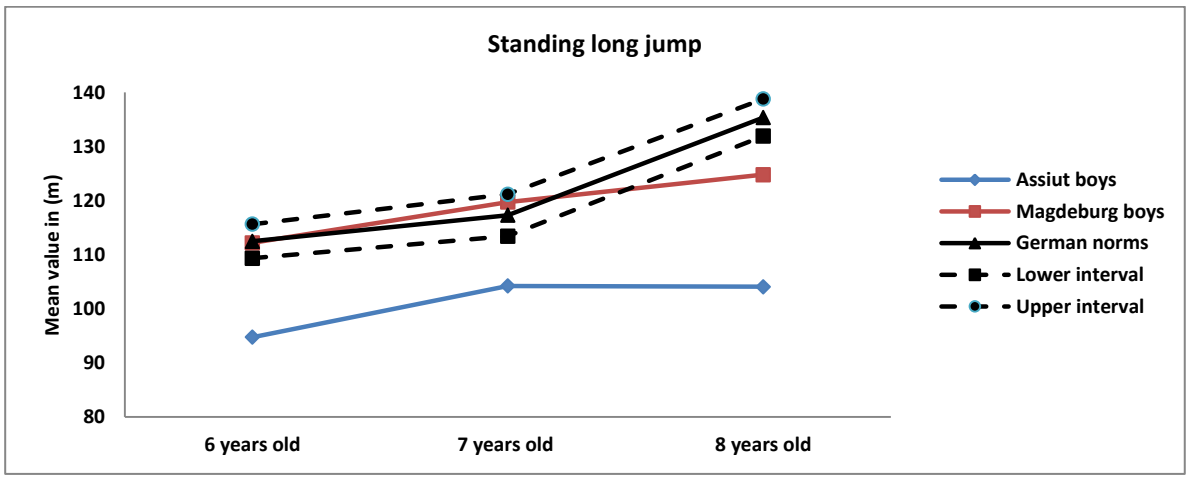


Fig. 29: Comparison among boys of Assiut and Magdeburg in standing long jump

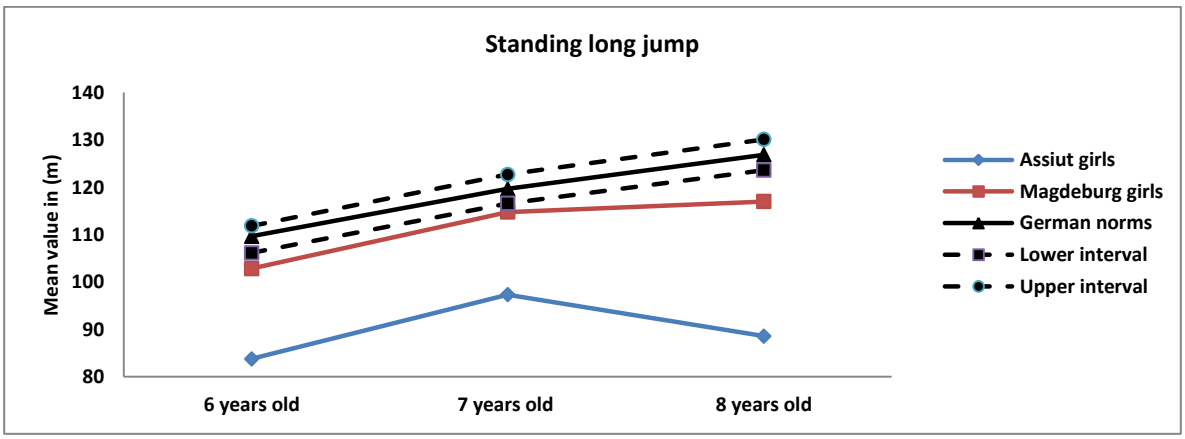


Fig. 30: Comparison among girls of Assiut and Magdeburg in standing long jump

Tab. 34: Descriptive statistic of standing long jump among children of Assiut and Magdeburg

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Standing long jump	boys	93	101	17.80	101	119.24	21.61	194	110.50	21.83
	girls	94	89.51	16.11	96	111.97	17.80	190	100.86	20.34
	sum	187	95.22	17.88	197	115.70	20.13	384	105.73	21.62

Tab. 35: Descriptive statistic of standing long jump among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Standing long jump	6	boys	31	94.74	18.61	26	112.19	17.07	57	102.70	19.81
		girls	33	83.78	12.54	30	102.83	14.92	63	92.85	16.65
		sum	64	89.09	16.59	56	107.17	16.49	120	97.53	18.80
	7	boys	26	104.23	15.64	46	119.73	22.47	72	114.13	21.50
		girls	28	97.35	15.49	37	114.78	17.66	65	107.27	18.77
		sum	54	100.66	15.80	83	117.53	20.50	137	110.88	20.47
	8	boys	36	104.08	17.57	29	124.79	22.76	65	113.32	22.43
		girls	33	88.57	17.49	29	117.86	17.54	62	102.27	22.78
		sum	69	96.66	19.08	58	121.32	20.44	127	107.92	23.18

Tab. 36: Analysis of variance among children of Assiut and Magdeburg in standing long jump

Variables	QS	df	QM	F	P	η^2
Age	9034.26	2	4517.13	14.06	.000	.070
City	37109.4	1	37109.4	115.52	.000	.237
Gender	7750.97	1	7750.97	24.13	.000	.061
Age * City	1282.87	2	641.43	1.99	.137	.011
Age * Gender	504.48	2	252.24	.785	.457	.004
City * Gender	380.29	1	380.29	1.18	.277	.003
Age * City * Gender	243.09	2	121.54	.378	.685	.002

Table 36 shows a significant difference among the children of Assiut and Magdeburg by age ($F = 14.06$; $P = .000$; $\eta^2 = .070$), city ($F = 115.52$; $P = .000$; $\eta^2 = .237$) and gender ($F = 24.13$; $P = .000$; $\eta^2 = .061$). For other variables there were no significant differences observed between both the samples.

4.2.3.4 Correlation among strength ability and body composition

Tab. 37: Correlation among strength ability and body composition using Spearman test

Motot Ability	Test items	City		Body Height	Body Weight	BMI
Strength	push-ups	Assiut children	r	**.247****	**.280****	**.247****
			p	.000	.000	.000
		Magdeburg children	r	.190*	.118	.036
			p	.007	.100	.615
	sit-ups	Assiut children	r	**.332****	**.330****	**.265****
			p	.000	.000	.000
		Magdeburg children	r	.226**	.052	.132
			p	.001	.471	.065
	standing long jump	Assiut children	r	.138	**.191***	**.188***
			p	.060	.009	.010
		Magdeburg children	r	**.210***	.051	.090
			p	.003	.479	.207

**. Correlation is significant at P < 0.01 level.
*. Correlation is significant at P < 0.05 level.

Table 37 shows that the correlation was ranked among the achievement in push-ups with body height (P = .000), body weight (P = .000) and BMI (P = .000) by children of Assiut. In their Magdeburg peers, the correlation was ranked by body height (P = .007) with no significant correlation with body weight and BMI. In addition, the correlation was also significantly found among the achievements in sit-ups test with body height, body weight and BMI (P = .000) by Assiut children. In their Magdeburg peers the correlation was noted with body height (P = .001). No significant correlation was observed among this test with body weight and BMI. Once more in standing long jumps test the correlation was observed between body weight and the achievement level by children of Assiut (P = .009), and, in Magdeburg peers a significant correlation was found between this test with body height (P = .003).

4.2.4 Presentation of the Comparison in Endurance Ability

This motor ability was tested with the 6-min-run test. The descriptive statistic is presented in meter. The ANOVA between both the samples is presented as well. In addition, the relationship between the achievement in this test item and body composition is also shown.

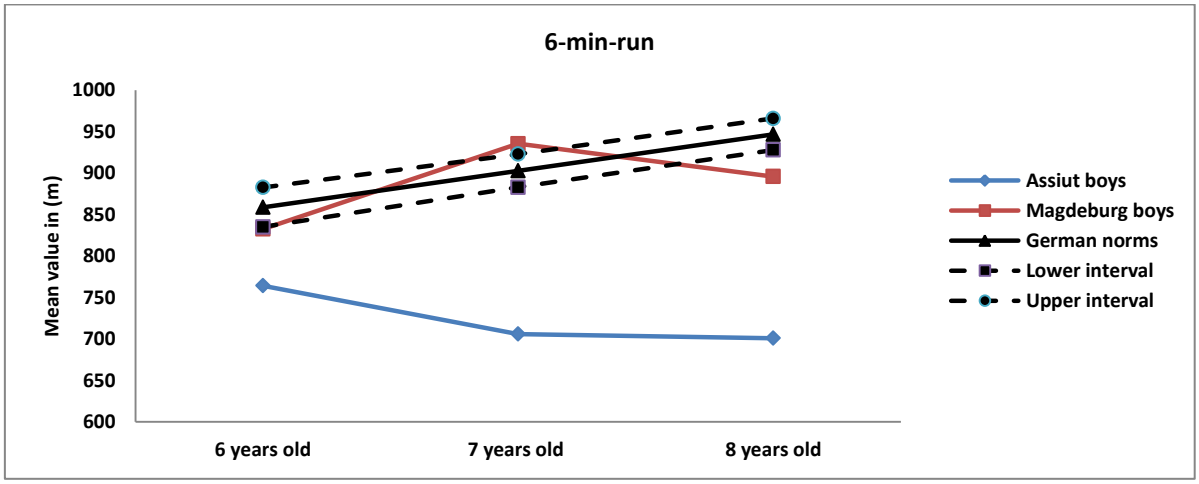


Fig. 31: Comparison among boys of Assiut and Magdeburg in 6 min-run

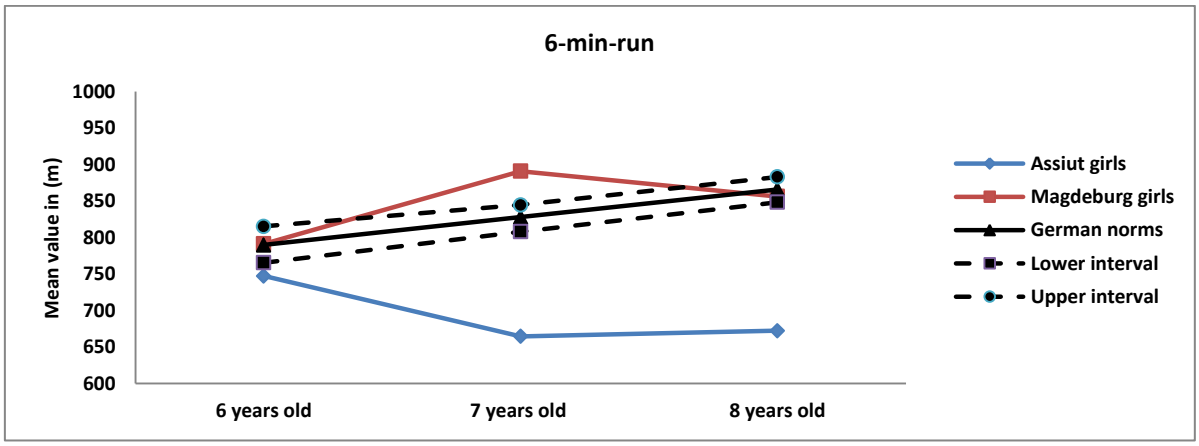


Fig. 32: Comparison among girls of Assiut and Magdeburg in 6 min-run

Tab. 38: Descriptive statistic of 6-min-run among children of Assiut and Magdeburg

Test Item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
6-min-run	boys	93	723.69	94.59	101	897.72	158.91	194	814.29	157.94
	girls	94	696.36	98.44	96	849.43	125.26	190	773.70	136.17
	sum	187	709.95	97.25	197	874.19	145.17	384	794.21	148.77

Tab. 39 : Descriptive statistic of 6-min-run among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
6-min-run	6	boys	31	764.22	100.95	26	832.57	165.82	57	795.40	137.53
		girls	33	747.42	87.45	30	791.43	133.05	63	768.38	112.77
		sum	64	755.56	93.85	56	810.53	149.20	120	781.21	125.34
	7	boys	26	705.96	77.04	46	935.58	153.74	72	852.66	171.48
		girls	28	664.60	73.59	37	891	97.63	65	793.47	142.86
		sum	54	684.51	77.42	83	915.71	132.86	137	824.58	160.74
	8	boys	36	701.61	91.39	29	896.06	146.11	65	788.36	152.96
		girls	33	672.24	108.51	29	856.41	129.27	62	758.38	149.76
		sum	69	687.56	100.29	58	876.24	138.19	127	773.73	151.56

Tab. 40: Analysis of variance among children of Assiut and Magdeburg in 6-min-run

Variables	QS	df	QM	F	P	η^2
Age	23675.25	2	11837.62	.849	.429	.005
City	2333386.12	1	2333386.12	167.32	.000	.310
Gender	117943.27	1	117943.27	8.45	.004	.022
Age * City	498416.08	2	249208.04	17.87	.000	.088
Age * Gender	3111.76	2	1555.88	.112	.894	.001
City * Gender	3729.62	1	3729.62	.267	.605	.001
Age * City * Gender	1779.97	2	889.98	.064	.938	.000

Table 40 shows significant difference among the children of Assiut and Magdeburg by city (F = 167.32; P = .000; η^2 = .310), gender (F = 8.45; P = .004; η^2 = .02) and (age * city) there is also a significant difference (F = 17.87; P = .000; η^2 = .088). For other variables there were no significant differences were observed between both the samples.

4.2.4.1 Correlation among endurance ability and body composition

Tab. 41: Correlation between 6-min-run and anthropometric data according to Spearman test

Motot Ability	Test item	City		Body height	Body weight	BMI
Endurance	6-min-run	Assiut children	r	.193*	.264**	.241**
			p	.005	.000	.000
		Magdeburg children	r	.119	.049	-.029
			p	.096	.496	.687

**. Correlation is significant at P < 0.01 level.
*. Correlation is significant at P < 0.05 leve.

Table 41 shows that the correlation is significantly noted by children of Assiut among this test and body height (P= .005), body weight (P= .000) and BMI (P= .000). However, there were no significant differences observed by children of Magdeburg.

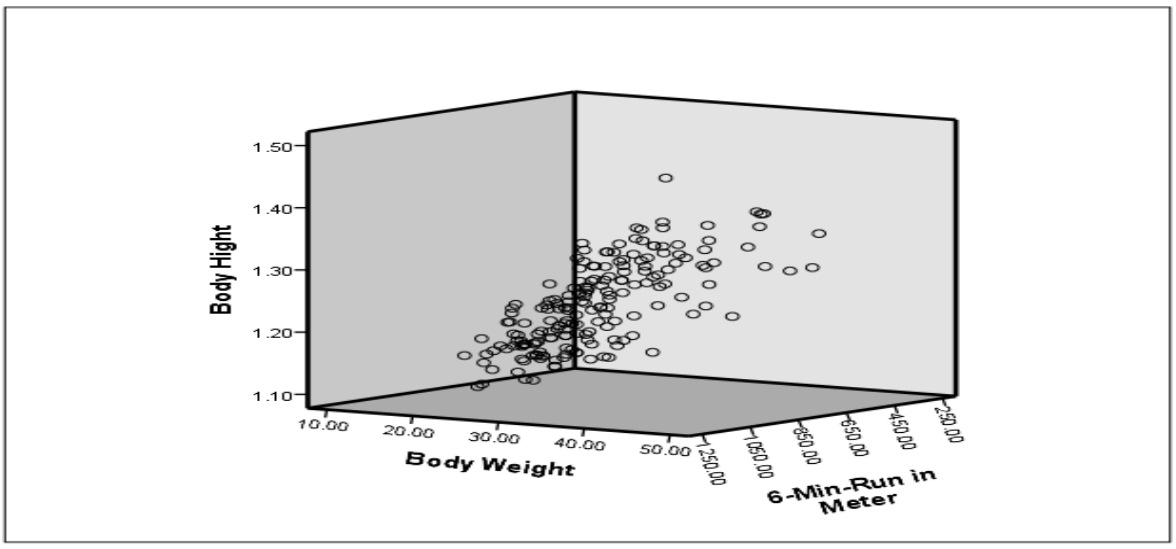


Fig. 33: Correlation among body height, body weight and 6-min-run by children of Assiut

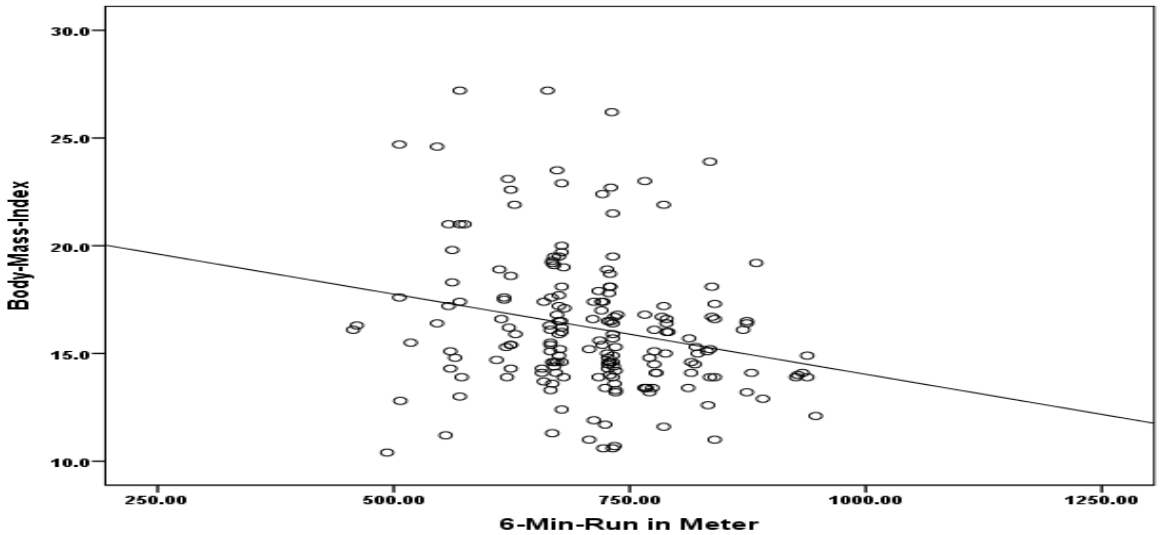


Fig. 34: Correlation among body mass index and 6-min-run by children of Assiut

4.2.5 Presentation of the Comparison in Flexibility (forward bending)

This motor ability was tested with the test item forward bending. The descriptive statistic is presented in centimeter. The ANOVA between both the samples is presented as well. In addition, the relationship among the achievement in this test item and body composition is also shown.

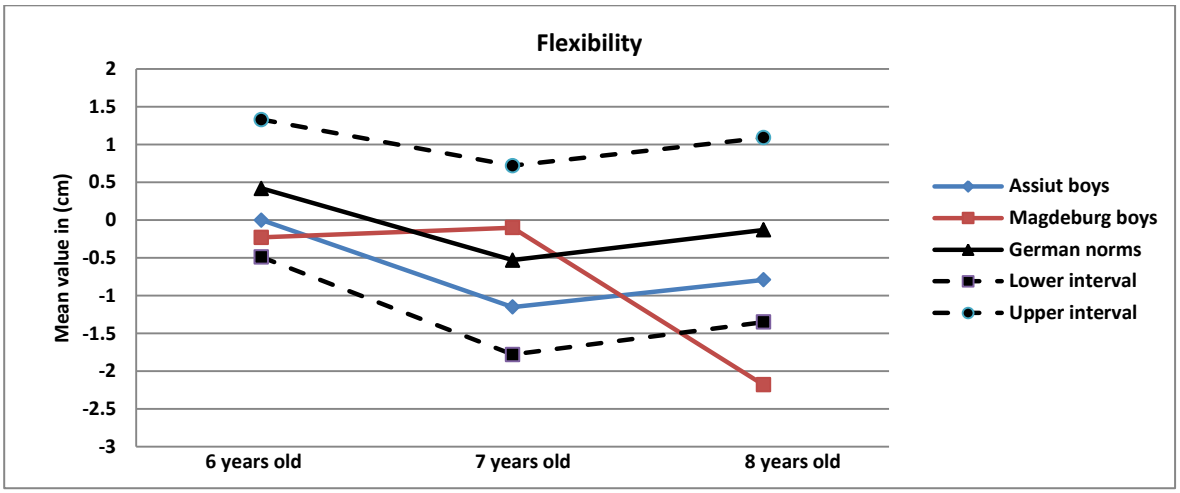


Fig. 35: Comparison among boys of Assiut and Magdeburg in flexibility

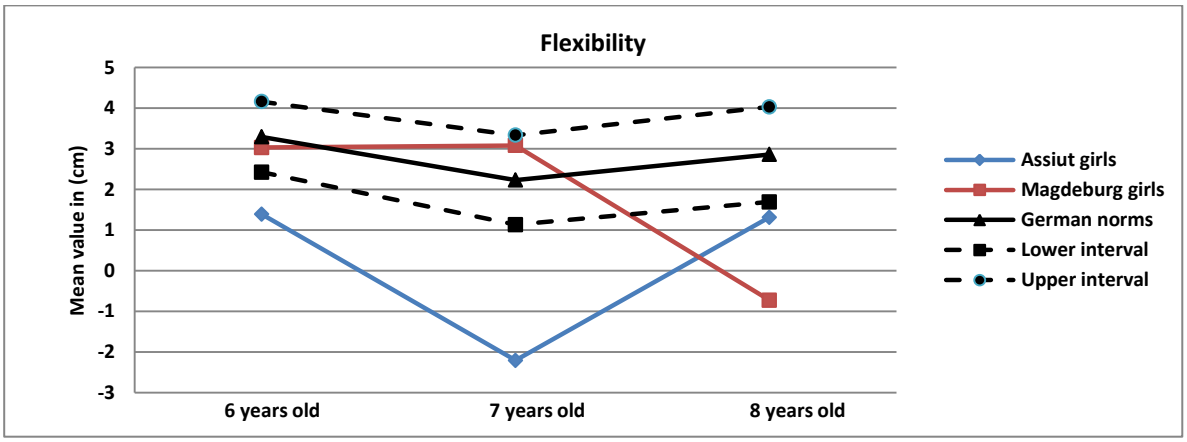


Fig. 36: Comparison among girls of Assiut and Magdeburg in flexibility by girls

Tab. 42: Descriptive statistic of flexibility among children of Assiut and Magdeburg in flexibility

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Flexibility (forward bending)	boys	93	-.62	3.94	101	-.73	5.92	194	-.68	5.05
	girls	94	.29	3.78	96	1.91	5.45	190	1.11	4.76
	sum	187	-.16	3.88	197	.55	5.84	384	.20	4.99

Tab. 43: Descriptive statistic of flexibility among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Flexebility (forward bending)	6	boys	31	.00	3.66	26	-.23	5.78	57	-.10	4.70
		girls	33	1.39	2.96	30	3.03	4.38	63	2.17	3.77
		sum	64	.71	3.36	56	1.51	5.29	120	1.08	4.37
	7	boys	26	-1.15	3.57	46	6.07	5.30	72	-.79	4.43
		girls	28	-2.21	3.71	37	5.54	5.48	65	1.31	3.65
		sum	54	-1.70	3.65	83	6.02	5.40	137	.21	4.18
	8	boys	36	-.79	4.43	29	-2.18	5.74	65	-1.41	5.07
		girls	33	1.31	3.65	29	-.73	5.59	62	.35	4.73
		sum	69	.21	4.18	58	-1.46	5.67	127	-.55	4.97

Tab. 44: Analysis of variance among children of Assiut and Magdeburg by age and gender

Variables	QS	df	QM	F	P	η^2
Age	173.67	2	86.83	3.82	.023	.020
City	47.96	1	47.96	2.11	.147	.006
Gender	278.75	1	278.75	12.26	.001	.032
Age * City	383.09	2	191.54	8.42	.000	.043
Age * Gender	25.18	2	12.59	.55	.575	.003
City * Gender	78.02	1	78.02	3.43	.065	.009
Age * City * Gender	96	2	48	2.11	.122	.011

Table 44 shows a significant differences among children of Assiut and Magdeburg by gender ($F = 8.45$; $P = .004$; $\eta^2 = .020$) with a better achievement for girls. In addition, (age * city) is also significant ($F = 8.42$; $P = .000$; $\eta^2 = .043$). For the other variables there were no significant differences observed among both samples.

4.2.5.1 Correlation among flexibility (forward bending) and body composition

Tab. 45: Correlation among flexibility (forward bending) and body composition

Test item	City		Body height	Body weight	BMI
Flexibility (forward bending)	Assiut children	r	**-,221****	**-,156***	-,097
		p	,002	,013	,188
	Magdeburg children	r	-,122	,007	,123
		p	,116	,920	,084

**. Correlation is significant at P < 0.01 level.
*. Correlation is significant at P < 0.05 level.

Table 45 shows a significant correlation in Assiut sample among this test item and body height (P= .002) and a low correlation of the test and body height. In body weight there is a middle significant difference (P= .013), in the sample of Magdeburg there are no significant differences. In addition, thete is no correlation of this test and BMI for both samples.

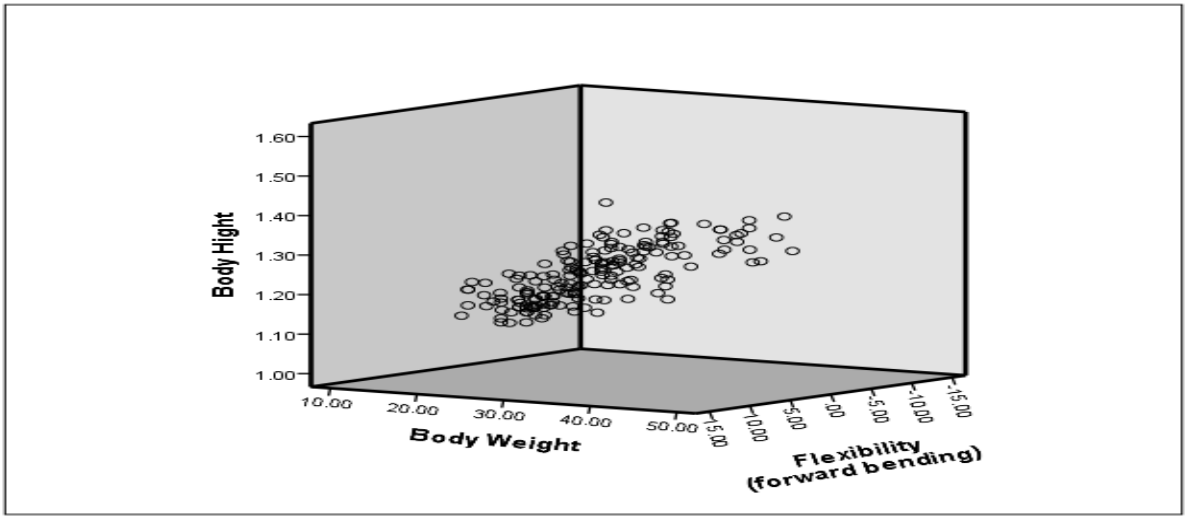


Fig. 37: Correlation among body height, body weight and flexibility by children of Assiut

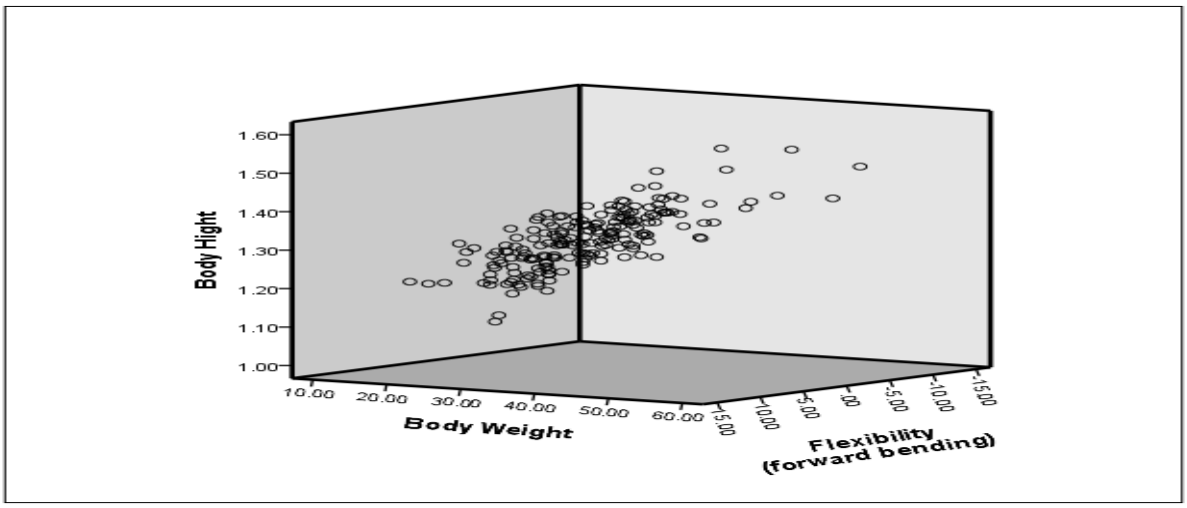


Fig. 38: Correlation among body height, body weight and flexibility by children of Magdeburg

4.3 Interpretation and discussion of the results of MPA

In this section, the results of (MPAs) are explained and discussed. Actually, there are many aspects can be considered during this section. Among them is the relationship between the body composition and the achievement level in the MPA.

The superiority in the level of MPA for children of Magdeburg over their Assiut peers comes from the effect of **body composition**. The results show that the children of Magdeburg were taller and heavier than their Assiut peers; therefore in our study we could confirm the positive effect of genetic factor in the achievement level of MPA for children of Magdeburg is illustrated in the following part of discussion by each motor ability.

For **speed ability** the positive achievement for children of Magdeburg is interpreted by the correlation among the achievement in this motor ability with body height ($r = 0.294$; $P = .000$) and body weight ($r = 0.149$; $P = .003$). The children in Magdeburg were taller and heavier over their Assiut peers with clearly significant differences. In addition, we observe that there is a positive achievement for the children of Magdeburg having 8 years, while the achievement was equivalent for children of Assiut having age between 6 and 7 years. Considering the gender factor, the results show that Assiut and Magdeburg boys have better performance than girls with no significant differences. While when we take into account the German norms, the result show both Assuit girls and boys have lower achievement than the German norms, while, girls and boys of Magdeburg have better achievement than the German norms.

It has been known that, the civilization affects this positive secular trend and reflects the developmental trajectories for children to be taller, heavier, and more mature at an earlier age over than children in another country**.** The increase in the growth, maturation and physical performance levels have been demonstrated in most developed countries and nations (Gallahue & Ozmun, 2006). Thus, clarify this superiority in the achievement in speed ability for children of Magdeburg over than Assiut peers by these civilization level, which is better in Germany than those in Egypt.

In addition, the superiority in the achievement level for children of Magdeburg over their Assiut peers is also related to the developmental level of muscle strength and the central nerves system. The development of strength makes the children more powerful and faster. Moreover, the development in the central nerves system increase the movement's coordination and has a positive effect on the achievement by speed ability (Frey, 1995).

For **coordination ability** includes two dimensions. First dimension is the whole body coordination that demonstrated in balancing backward test shows convergence between both samples with low significant differences by city ($F = 6.70$; $P = .010$). Therefore, the achievement in this ability for children of Assiut was not much declined compared to their Magdeburg peers. Thus, this convergence in the achieviement could referes to the content of the Egyptian PE curriculum which includes a lot of opportunities for game practice developed in general as the coordinative ability using different kind of equipment during sport classes.

Second, the coordination in fast performing under time pressure which was demonstrated in jumping sideways also included agility test (Bös, 1987), and refers to the superiority in the achievment level of the children of Magdeburg with slightly significant differences by city (F = 151.60; P = .000). The children of Magdeburg were nearly equal in the achievement level as compared to the German norms. While the achievement of Assuit children was significantly lower than that of Magdeburg children.

Considering the age factor, a strong relationship was observed between coordination ability and age growing. It found markedly significant differences in balancing backward (P = .000) and jumping sideways (P = .000) for children of Magdeburg. On the contrary, the results for children of Assiut show no relationship among this ability and age growth with different levels of achievement because of age groups.

The primary school age is considered as the most important period in which the performance level of children in coordination abilitiy develops. This development not only increases the learning ability for the motor skills but also affect the maturation of the CNS and increase cognitive abilities in the positive coordination of development (Bös, 2003). In addition, the coordination ability is a training ability which by appropriate training programs could well developed especially in the primary schools age where the PE is an obligatory for children of age 6 years onward (Roth et al., 1994).

The PE conditions in primary school age should include coordinative abilities to be very well trained and should be recommended to extend the motor repertoire by a variety of motor training. Sport basic techniques can be learned by a lot of training. The variables should be designed by the learning processes through appropriate repeated practice in priority in content of the physical and motor development (Meinel, 1998). For gender factor the equality in the performance level has been found for the both samples with no significant differences between boys and girls. These results reflect no preference in the achievement level for boys and girls by coordination ability.

For **strength ability** based on our observations and previous results, the superiority in the achievement level for children of Magdeburg in comparison to their Assiut peers is expected. Previous studies have indicated that the achievement level in strength ability demonstrates the most influential factor in the general level of MPA by German children with (0.97) value (Lämmle et al., 2010). Whereas, the unexpected result were that the achievement of Magdeburg children in all test items which provide the measure of strength were much better comparing to their Assiut peers.

Regarding to the city, the achievement in push-ups test is nearly double the value with positive significant differences for children of Magdeburg (F = 59.62; P = .000). Whereas, by sit-ups test the achievement for children of Magdeburg was more than that of their Assuit peers with strongly significant differences between both the cities (F = 139.19; P = .000). In addition, by standing long jump the differences were also significant by city (F = 115.52; P = .000) with positive achievement for children of Magdeburg. The overall achievement by children of Assiut was lower than that of German norms. On the other hand, the

achievement in push-ups and sit-ups of the children of Magdeburg was more than the German norms while in case of standing long jumps the achievement was equal.

Considering the age factor the achievement level by both samples had a clearly slow developmental rate with 8 yeard old especially by Assiut children, because it is well known that the developmental rate during primary school is low (Bös, 2003). Strength ability basically is mixed among genetics and training programs clarifying the superiority of children of Magdeburg than their Assiut peers. The training programs can positively affect the developmental level for the children in primary schools age which cause the increasing in the achievement level for children of Magdeburg.

Regarding to gender factor the equality in the achievement level is clearly found among children of Magdeburg except in standing long jumps where the differents among boys and girls were in favor of the boys. Therefore, the developmental trajectories of girls and boys are nearly identical, but boys have slightly more favorable genetic conditions over girls (Scheid, 1994b). On the other hand, in children of Assiut there are significant differences between boys and girls in all test items which provide the measurement of strength ability with positive achievement for boys. The poorly trained muscle in the torso, shoulder and hip basically could cause these differences.

These results show a clear effect of the constraints that meet the children in Egypt for appropriate participation in the PE and sport. These constraints include cultural traditions, especially social attitudes, lack of legislation, as well as, restricted range of opportunities to improve the MPA in the content of PE curriculum. This content is predominantly oriented for males and inadequately qualified and uniformed teachers. All of these reasons are no guarantee of equality among boys and girls in participation in PE and sport. Moreover, it could also create a motor poverty among girls (Hardman, 2009).

For **endurance ability** the differences between both the samples in the achievement of (6-min-run) were positive for children of Magdeburg over their Assiut peers with highly significant difference ($F = 167.32$; $P = .000$). The decline in body composition by children of Assiut is lower than their Magdeburg peers and has a negative effect on the achievement level by endurance ability. By children of Assiut the smaller and heavier children ran less than other mates. Considering the German norms, the achievement level by children of Assiut was lower while for children of Magdeburg was nearly equal for boys and girls.

Regarding to age factor, the differences are significant for both the samples ($F = 17.87$; $P = .000$). The best achievement level was demonstrated by 6 years old for children of Assiut and by 7 years for the children of Magdeburg. The children having 8 years in both the samples achieved lower than the youngest mates. These result reflect the reduction in the development of endurance ability with growing age. Considering the gender factor, there were low significant differences between boys and girls by both the samples ($F = 8.45$; $P = .004$). Therefore, the differences in endurance ability based on gender are not highly significant.

This results reflect the impairment in the achievement level of endurance ability with growing age by children of Assiut and Magdeburg. This impairment by children of Magdeburg reflects the lowest loadings of endurance ability in the level of MPA (0.36) which previously pointed out (Lämmle et al., 2010). Whereas by children of Assiut, this reduction reflects problem in the duration of practicing the physical and motor activities as well as in health problem in children. In addition, it is considered as most the weaknesses in the PE curriculum in Egypt, which does not include appropriate physical and motor activities to develop the endurance ability at this age.

In most studies that analyze and investigate the health status of children and adolescents, the measures of MPA were often integrated (Kretschmer et al., 2007; Fu, Nie & Tong, 2004; Bös, 2003). Therefore, for both cities an expected health problems can affect the children public health regarding to the level of developing the MPA. Actually, at the beginning of school age the development of the muscles starts. The muscles become stronger, faster and achieved in more body parts. Therefore, improvement can be made in conditions for good endurance from the sixth to tenth year approximately.

The results of routine screening are show a continuous increase in oxygen uptake in these years of life. In the next stage of life, the late school age, it was reduced and mature oxygen uptake was demonstrated where there were gender differences. A large performance increades was recorded in boys from the seventh to the tenth year, then the output stagnated during the late school-aged child and the onset of puberty for almost 4 years. In girls endurance performance was noted until the age of 11 and continuously thereafter. Thus, for them especially in the early school age mature and determined high endurance growth rates was demonstrated (Martin, 1988).

4.4 Presentation of the Comparison in Cognitive Abilities

In this part of the study the differences among children of Assiut and Magdeburg in their cognitive abilities are presented. The descriptive statistic and the ANOVA between both the samples for each cognitive ability including language understanding, relations recognizing, deductive thinking and computational thinking has been presented.

4.4.1 Presentation of the comparison in language understanding

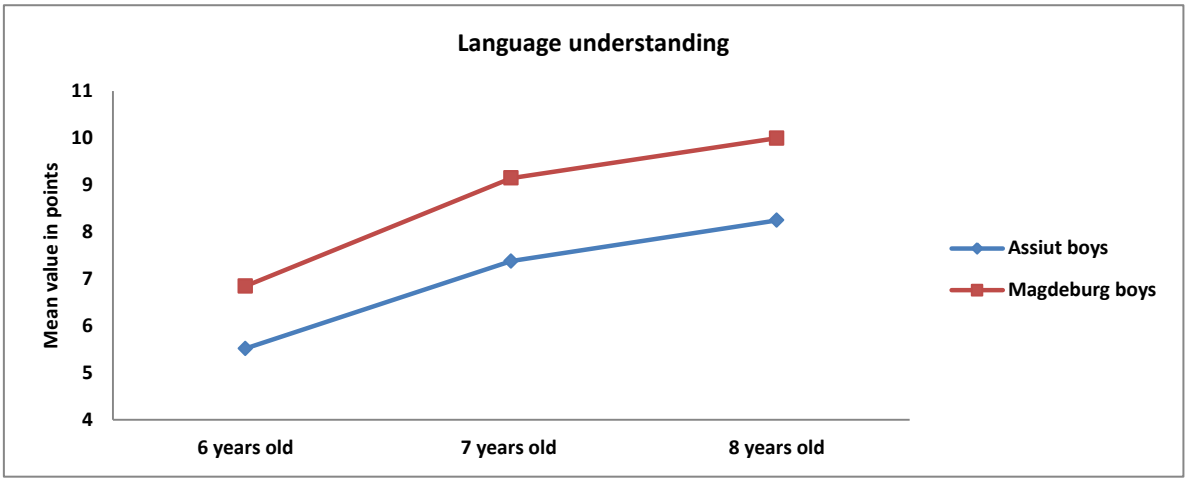


Fig. 39: Comparison among boys of Assiut and Magdeburg in language understanding

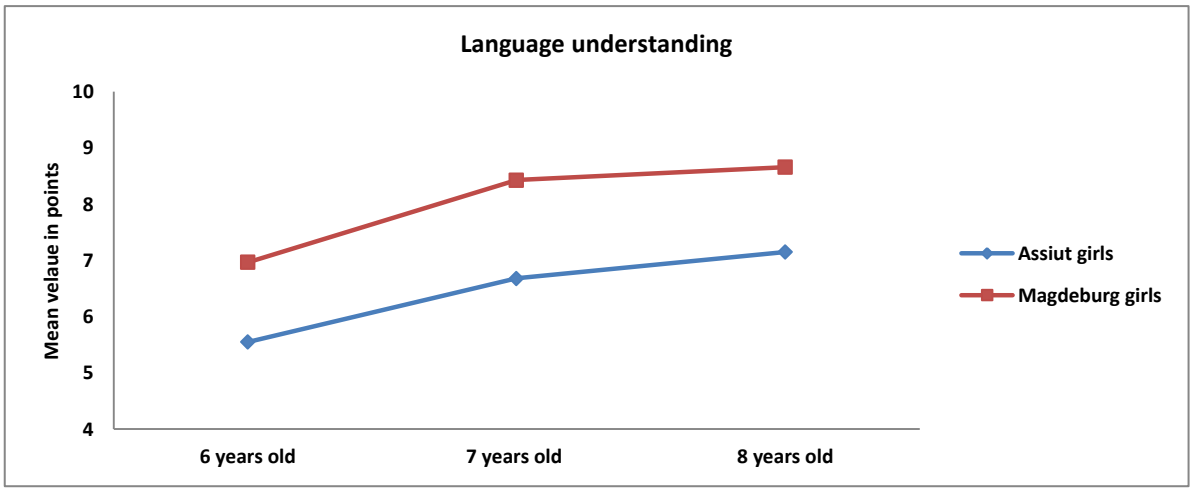


Fig. 40: Comparison among girls of Assiut and Magdeburg in language understanding

Tab. 46: Descriptive statistic of language understanding among children of Assiut and Magdeburg

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
language understanding	boys	93	7.38	1.70	101	8.80	3.24	194	8.12	2.71
	girls	94	6.74	1.86	96	8.04	2.87	190	7.40	2.50
	sum	187	7.06	1.80	197	8.43	3.08	384	7.76	2.63

Tab. 47: Descriptive statistic of language understanding among children of Assiut and Magdeburg by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
language understanding	6	boys	31	5.52	1.71	26	6.85	2.73	57	7.21	2.24
		girls	33	5.55	1.64	30	6.97	3.23	63	6.22	2.60
		sum	64	6.50	1.93	56	6.91	2.98	120	6.69	2.47
	7	boys	26	7.38	1.65	46	9.15	3.27	72	8.51	2.91
		girls	28	6.68	1.88	37	8.43	2.77	65	8.11	2.44
		sum	54	7.54	1.76	83	8.83	3.06	137	8.32	2.69
	8	boys	36	8.25	1.77	29	10	2.91	65	8.48	2.71
		girls	33	7.15	1.39	29	8.66	2.34	62	7.85	2.03
		sum	69	7.20	1.59	58	9.33	2.71	127	8.17	2.41

Tab. 48: Analysis of variance among children of Assiut and Magdeburg in language understanding

Variables	QS	df	QM	F	P	η^2
Age	182	2	91	15.72	.000	.078
City	147.38	1	147.38	25.46	.000	.064
Gender	35.99	1	35.99	6.21	.013	.016
Age * City	46.93	2	23.46	4.05	.018	.021
Age * Gender	8.47	2	4.23	.732	.481	.004
City * Gender	.074	1	.074	.013	9.10	.000
Age * City * Gender	52.86	2	26.43	4.56	.011	.024

Table 48 shows significant differences among the children of Assiut and Magdeburg by age ($F = 15.72$; $P = .000$; $\eta^2 = .078$) and city ($F = 25.46$; $P = .000$; $\eta^2 = .064$), as well as, low significant differnces by gender between both the samples ($F = 6.21$; $P = .013$; $\eta^2 = .016$). For other variables no significant differences was observed between both samples.

4.4.2 Presentation of the Comparison in Relations Recognizing

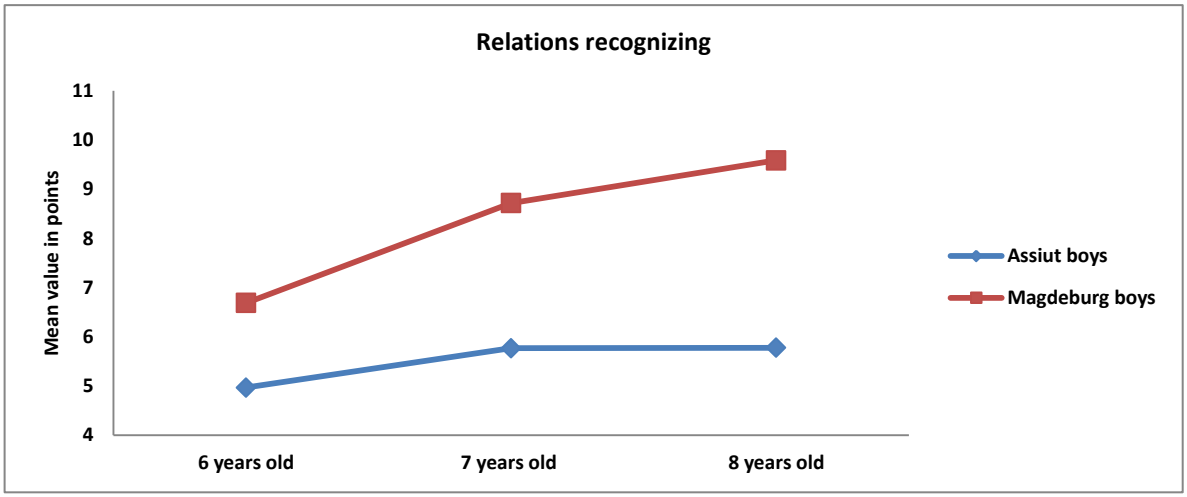


Fig. 41: Comparison among boys of Assiut and Magdeburg in relations recognizing

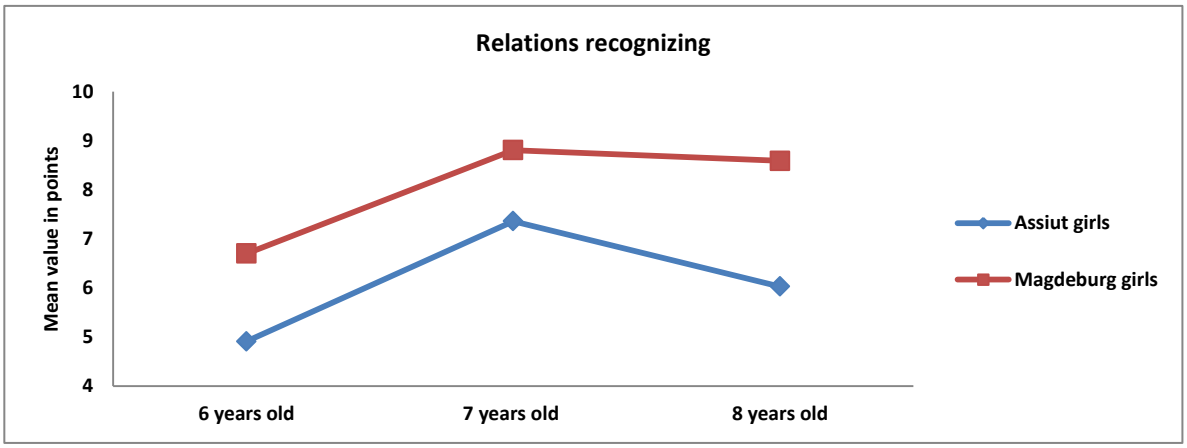


Fig: 42: Comparison among girls of Assiut and Magdeburg in relations recognizing

Tab. 49: Descriptive statistic among children of Assiut and Magdeburg in relations recognizing

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Relation recognizing	boys	93	5.51	2.78	101	8.45	3.55	194	7.04	3.52
	girls	94	6.03	2.86	96	8.08	3.12	190	7.07	3.15
	sum	187	5.77	2.82	197	8.27	3.34	384	7.05	3.34

Tab. 50: Descriptive statistic among children of Assiut and Magdeburg in relations recognizing by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Relation recognizing	6	boys	31	4.97	3.45	26	6.69	3.03	57	5.75	3.35
		girls	33	4.91	2.33	30	6.70	3.25	63	5.76	2.92
		sum	64	4.94	2.91	56	6.70	3.12	120	5.76	3.12
	7	boys	26	5.77	2.51	46	8.72	3.72	72	7.65	3.61
		girls	28	7.36	3.38	37	8.81	3.01	65	8.18	3.23
		sum	54	6.59	3.07	83	8.76	3.40	137	7.91	3.43
	8	boys	36	5.78	2.26	29	9.59	3.21	65	7.48	3.31
		girls	33	6.03	2.41	29	8.59	2.71	62	7.23	2.84
		sum	69	5.90	2.32	58	9.09	2.99	127	7.35	3.08

Tab. 51: Analysis of variance among children of Assiut and Magdeburg in relations recognizing

Variables	QS	df	QM	F	P	η^2
Age	254.60	2	127.30	14.13	.000	.071
City	530.68	1	530.68	58.91	.000	.137
Gender	2.02	1	2.02	.225	.635	.001
Age * City	32.82	2	16.41	1.82	.163	.010
Age * Gender	25.06	2	12.53	1.39	.250	.007
City * Gender	18.69	1	18.69	2.07	.151	.006
Age * City * Gender	10.79	2	5.39	.599	.550	.003

Table 51 shows significant difference among the children of Assiut and Magdeburg by city ($F = 58.91$; $P = .000$; $\eta^2 = .137$) with positive achievement for children of Magdeburg, and by age ($F = 14.13$; $P = .000$; $\eta^2 = .071$). For other variables no significant differences was observed between both samples.

4.4.3 Presentation of the Comparison in Deductive Thinking

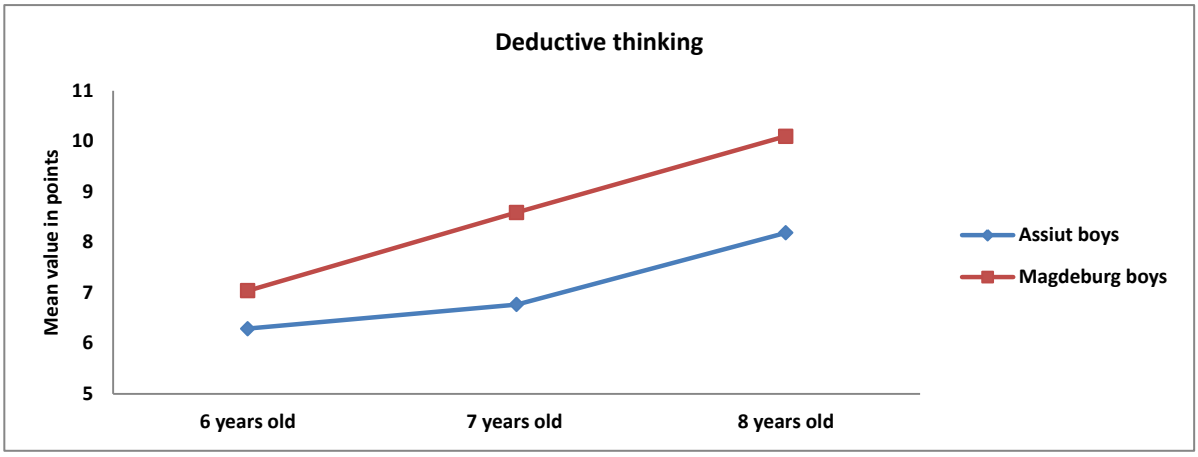


Fig. 43: Comparison among boys of Assiut and Magdeburg in deductive thinking

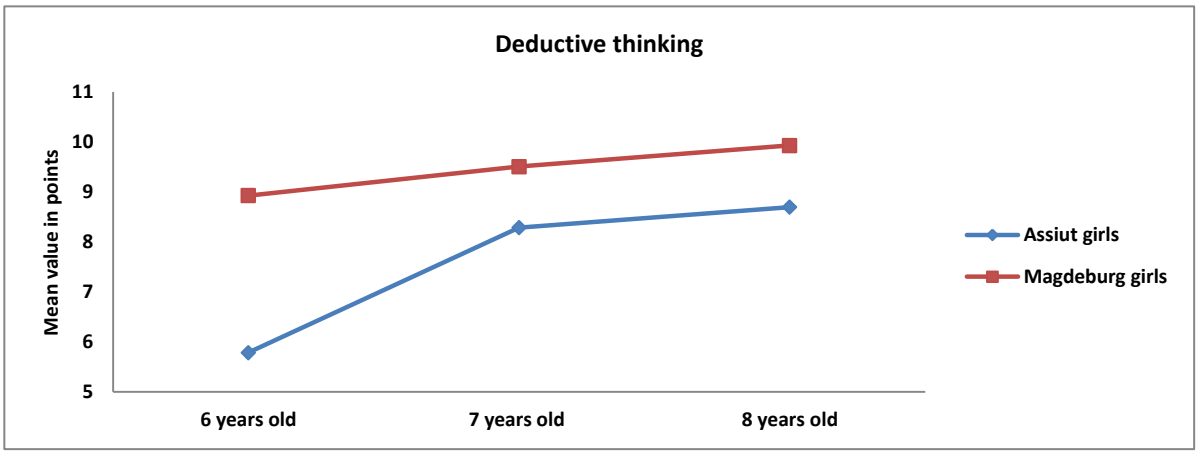


Fig. 44: Comparison among girls of Assiut and Magdeburg in deductive thinking

Tab. 52: Descriptive statistic among children of Assiut and Magdeburg in deductive thinking

Test Item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Deductive thinking	boys	93	7.16	3.56	101	8.62	3.14	194	7.92	3.42
	girls	94	7.55	3.68	96	9.46	2.89	190	8.52	3.43
	sum	187	7.36	3.62	197	9.03	3.04	384	8.22	3.43

Tab. 53: Descriptive statistic among children of Assiut and Magdeburg in deductive thinking by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Deductive thinking	6	boys	31	6.29	4.38	26	7.04	2.37	57	6.63	3.59
		girls	33	5.79	3.68	30	8.93	3.10	63	7.29	3.74
		sum	64	6.03	4.01	56	8.05	2.92	120	6.98	3.67
	7	boys	26	6.77	3.14	46	8.59	3.40	72	7.93	3.40
		girls	28	8.29	4.28	37	9.51	3.15	65	8.98	3.70
		sum	54	7.56	3.82	83	9	3.30	137	8.43	3.57
	8	boys	36	8.19	2.83	29	10.10	2.65	65	9.05	2.89
		girls	33	8.70	2.28	29	9.93	2.25	62	9.27	2.33
		sum	69	8.43	2.58	58	10.02	2.43	127	9.16	2.62

Tab. 54: Analysis of variance among children of Assiut and Magdeburg in deductive thinking

Variables	QS	df	QM	F	P	η^2
Age	302.94	2	151.47	14.67	.000	.073
City	264.47	1	264.47	25.61	.000	.064
Gender	45.14	1	45.14	4.37	.037	.012
Age * City	3.29	2	1.64	.159	.853	.001
Age * Gender	17.85	2	8.93	.865	.422	.005
City * Gender	3.33	1	3.33	.323	.570	.001
Age * City * Gender	46.64	2	23.32	2.25	.106	.012

Table 54 shows a significant difference among the Assiut and Magdeburg children by age ($F = 14.67$; $P = .000$; $\eta^2 = .073$), city ($F = 25.61$; $P = .000$; $\eta^2 = .064$) as well as a low significant difference by gender ($F = 4.37$; $P = .037$; $\eta^2 = .012$). For other variables no significant differences was observed between both the samples.

4.4.4 Presentation of the Comparison in Computational Thinking

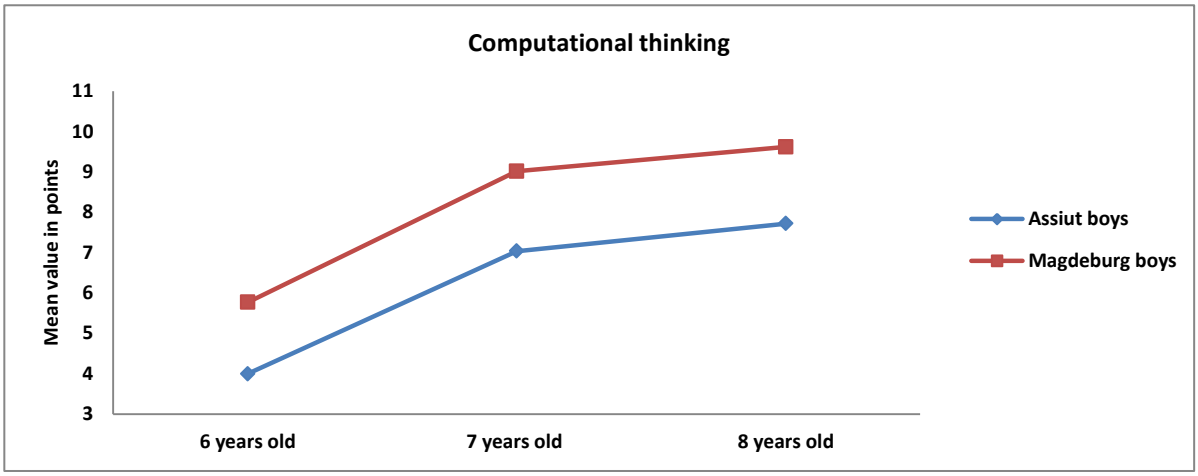


Fig. 45: Comparison among boys of Assiut and Magdeburg in computational thinking

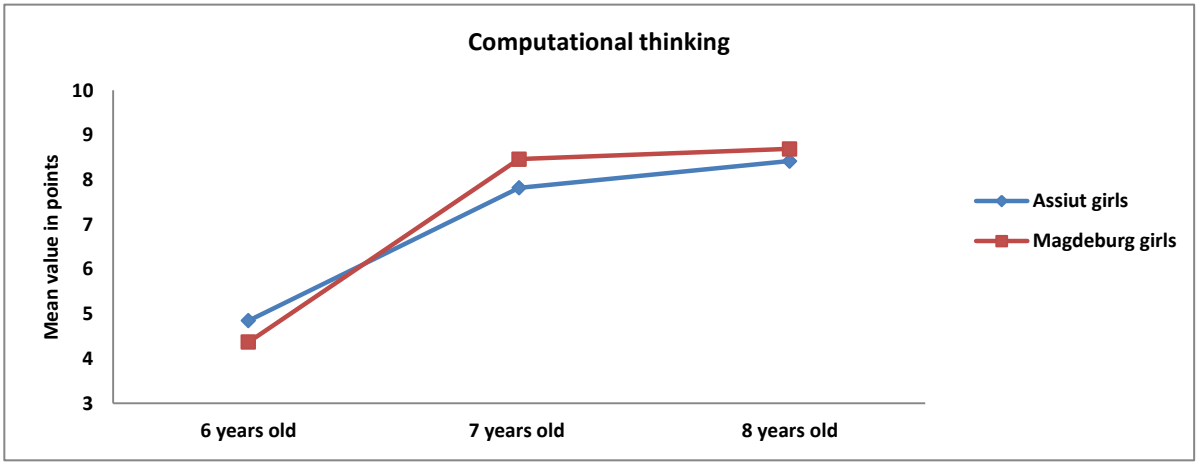


Fig. 46: Comparison among girls of Assiut and Magdeburg in computational thinking

Tab. 55: Descriptive statistic among children of Assiut and Magdeburg in computational thinking

Test item		Assiut children			Magdeburg children			Both samples		
		N	M	SD	N	M	SD	N	M	SD
Computational thinking	boys	93	6.29	2.72	101	8.36	3.52	194	7.37	3.32
	girls	94	7.69	2.57	96	7.25	4.02	190	7.47	3.38
	sum	187	6.99	2.73	197	7.82	3.80	384	7.42	3.35

Tab. 56: Descriptive statistic among children of Assiut and Magdeburg in computational thinking by age and gender

Test item	Age		Assiut children			Magdeburg children			Both samples		
			N	M	SD	N	M	SD	N	M	SD
Computational thinking	6	boys	31	4	0.96	26	5.77	2.50	57	4.81	2.02
		girls	33	4.85	2.72	30	4.37	3.92	63	5.67	3.55
		sum	64	5.47	2.50	56	5.02	3.38	120	5.26	2.94
	7	boys	26	7.04	2.76	46	9.02	3.00	72	8.31	3.05
		girls	28	7.82	2.22	37	8.46	3.46	65	8.18	2.98
		sum	54	7.44	2.50	83	8.77	3.20	137	8.25	3.01
	8	boys	36	7.72	2.48	29	9.62	3.95	65	8.57	3.33
		girls	33	8.42	2.52	29	8.69	3.24	62	8.55	2.86
		sum	69	8.25	2.50	58	9.16	3.61	127	8.56	3.10

Tab. 57: Analysis of variance among children of Assiut and Magdeburg in computational thinking

Variables	QS	df	QM	F	P	η^2
Age	798.71	2	399.35	46.66	.000	.201
City	43.15	1	43	5.04	.025	.013
Gender	5.37	1	5.37	.628	.428	.002
Age * City	49.94	2	24.97	2.91	.055	.015
Age * Gender	11.43	2	5.71	.668	.513	.004
City * Gender	135.98	1	135.98	15.89	.000	.041
Age * City * Gender	39.15	2	19.57	2.28	.103	.012

Table 57 shows a significant differences among the children of Assiut and Magdeburg by age ($F = 46.66$; $P = .000$; $\eta^2 = .201$), city ($F = 5.04$; $P = .025$; $\eta^2 = .013$) and by (city * gender) ($F = 15.89$; $P = .000$; $\eta^2 = .041$). For other variables there were no significant difference observed between both the samples.

4.5 Interpretation and Discussion of the Results of Cognitive Abilities

In this section, the results of the cognitive abilities were discussed and explained. Actually, there are many aspects can be considered during this section. Among them is the relationship between the social-cultura factors and the achievement level in the cognitive abilities.

Discussing the superiority for the children of Magdeburg over their Assiut peers is very complex, especially with two different educational system, cultural and social conditions. In addition, closely relationships among these cognitive abilities cause difficulties in the interpretation of the differences between both samples in order to understand the role of culture in the level of cognitive development for children.

For language understanding, the results showed that the achievement by Magdeburg children are better than that by their Assiut peers with observed significant differences by city ($F = 25.46$; $P = .000$). In addition, the development of this ability with growing age for both the samples was also expected with significant differences by age variable ($F = 15.72$; $P = .000$). Whereas, by gender variable the significant differences were relative low with positive achievement for boys than for girls ($F = 6.21$; $P = .013$). Moreover, the achievement level for children of Magdeburg meets the German standards.

This superiority by children of Magdeburg over their Assiut peers could be from the effect of kindergarten where the children learn a lot of language skills to equip them when the primary school begins. In Germany, the kindergarten is very important learning period for children as ehey practice different activities and learn a lot of skills especially language. In addition, the state plans to offer places for all children and to help parents financially to send their children to kindergarten. On the other hand, the number of available places in kindergarten in Assiut is not enough as well as the economical situation of a lot of parents does not allow them to send their children to kindergarten without any financial support from the Egyptian state.

In addition, from the social development aspect, the ability to socialize with peers, negotiating, making agreements and being a part of a friendship group that exist in kindergarten is very important. For the development. For children with language understanding difficulties, making and maintaining friendships can be a real challenge. It becomes particularly difficult as such children progress through primary school, when they need an increased understanding of reciprocity and awareness of motives, thoughts and feelings of others. Actually, this development for children in both the samples refers to the fact that at primary school age, a child is able to understand much of what is said, express clearly, share feelings and make his needs known. This level of proficiency in speech, language and communication is critical to the development of a child’s cognitive, social and emotional well-being.

Moreover, children starting school with speech, language and communication needs may struggle with any aspect of communication and can become withdrawn or present with challenging behavior within the primary school environment (Hart, 2004). Nevertheless, for

children with difficulty in language understanding, language skills are not proficient enough to be used as a learning tool and therefore they can fail before the task has even begun. This can be incredibly frustrating and can have a serious impact on how such children see themselves and how they are seen by their peers (Jerome, 2002).

For children with good language understanding ability at primary school the demands lead to concerns about opportunities for differentiation (Eke & Lee, 2004). Observations in primary classrooms, as part of the Cambridge University Primary Review, suggest that children seldom have the opportunity to engage in productive social interaction and that group or pair-based activity needs more careful organization in order to achieve a productive interaction and learning (Howe & Mercer, 2007). This organization is missed in the Egyptian case, because of the increas in the number of children in the classroom as well as because of the inefficience of teacher preparation system in Egypt causing difficulties in organizing the learning experiences in a good way in order to develop children in all behavior dimensions (motor, cognitive and affective) which have clear interrelationships during the primary development stages.

In addition, language behavior and emotional development occur together in children and affect each other powerfully (Cross, 2004). In the early stages of primary school, children require an appreciation of the emotions and thoughts of other people, as well as the language to output this into words. For motor development the superiority for German children over their Egyptian peers can also be interpreted by the superiority in language understanding with positive achievement for German children in this, a relationship was clearly found between motor and cognitive abilities.

This development is raised positively with growing age as well as opportunities in school and in playground for children to interact through language, which allows children to develop skills in managing their emotions and behavior appropriately. The development of language skills make the children negotiate their roles in play situations and organized activities. For older primary school children, these skills are necessary for team games and group activities within a classroom. Children with language understanding difficulties often do not have these skills and abilities, resulting at times in frustration and behavior that is seen as poor, in reaction to situations that could be easily resolved through language (Greenberg et al., 1995).

For relation recognizing, the results show that there is a superiority in the achievement of for Magdeburg children with slightly significant differences ($F = 58.91$; $P = .000$). By age variable the difference were also significant ($F = 14.13$; $P = .000$). Whereas, by gender there were no significant differences between boys and girls for both the samples. In addition, the achievement level for children of Magdeburg meets the German standards.

For thinking ability, the results showed less difference among the children of Assiut and Magdeburg. Especially, by computational thinking, which includes the ability to perform simple arithmetic operations of addition, subtraction, multiplication, and division correctly. In addition, the most clearly significant differences were found by age variable especially for

computational thinking (F = 46.66; P = .000). By gender variable there were relative low significant differences. The converge on the achievement level in computational thinking among children of Assiut and Magdeburg meets the statement of Nisbett and Norenzayan (2002) who mentioned that no clearly cultural differences were found in tasks consisting of object counting and simple mathematical problem solving. Thus, the cultural differences are selective, emerging only when the structural differences in number naming are implicated in the number acquisition task.

Miller & Paredes, (1996) asked grade school students in China and the United States to mentally add two double-digit numbers (e.g., 27+14). Some participants received the task in Arabic numerals (the number condition), whereas others (the word condition) received it in the orthography of their native language (English or Chinese names for numbers) (Miller & Paredes, 1996). In the number condition, no differences in accuracy were found, although Chinese children were faster. In the word condition, however, systematic differences in accuracy emerged, reflecting the peculiarities of English and Chinese number naming. For example, Chinese children made more errors that were indicative of inappropriate transferring of algorithms from Arabic numeral system to the Chinese name-value system. American children did not make such errors, because in this particular task number naming in English does not present such opportunities for inappropriate transferring from Arabic numerals. The previous example clarifies that in mathematical thinking the nature of numbers could cause some problem in the calculation processes.

Basically, the cognitive abilities test (CAT) used the figures in order to overcome this problem. The accounting processes were dealing with (points, lines or shapes) which guaranteed no-language difference in number naming between both the samples except in the questions that administrated by native speakers for both. In addition, meeting the achievement level for the children of Magdeburg in comparing to the German standards indicate, that the school performance in Magdeburge meet the German national condition of educational system, especially in primary school following the children level of cognitive abilities. Knowing the strengths and weaknesses of children in the cognitive abilities which are more related with academic performance leads to a maximize the academic school performance of children.

4.6 Presentation of the Correlation among Motor and Cognitive Abilities

In this part of the study the correlation analysis among the motor and cognitive abilities of children of Assiut and Magdeburg using Kendall's tau test will be presented. The results in tow tables for each sample in order to clarify the significant level of correlation will be shown.

4.6.1 Correlation among motor and cognitive abilities by Assiut children

Tab. 58: Correlation among motor and cognitive abilities by children of Assiut using Kendall's tau test

MPA	Motor test items		Cognitive abilities				Mean of correlation
			Language understanding	Relations recognizing	Deductive thinking	Computational thinking	
Speed	20-m-sprint	r	.041	.045	.068	.034	.047
		p	.578	.539	.354	.642	
Coordination	balancing backward	r	.163*	.273**	.227**	.158*	.217
		p	.026	.000	.002	.005	
	jumping sideways	r	.033	.039	.055	.051	.045
		p	.656	.600	.453	.490	
Strength	push-ups	r	.015	.112	.111	.071	.077
		p	.840	.127	.130	.333	
	sit-ups	r	.069	.103	.162**	.092	.107
		p	.351	.159	.027	.212	
	standing long jump	r	.273**	.195*	.236**	.258**	.241
		p	.000	.008	.001	.000	
Endurance	6-min-run	r	.142	.147*	.050	.035	.094
		p	.053	.044	.501	.636	
Flexibility	forward bending	r	.044	.026	.090	.082	.061
		p	.553	.721	.219	.262	
Mean of correlation		r	.102	.117	.124	.101	.111

**. Correlation is significant at P < 0.01 level.
*. Correlation is significant at P < 0.05 level.

Table 58 show low correlation value (r = .111) among motor and cognitive abilities by children of Assiut. For motor abilities the highest correlation value was demonstrated by standing long jumps while the lowest was demonstrated by 20-min-run. For cognitive abilities the highest correlation value was demonstrated by deductive thinking and the lowest demonstrated by language understanding.

4.6.2 Correlation among motor and cognitive abilities by children of Magdeburg

Tab. 59: Correlation among motor and cognitive abilities by children of Magdeburg usung Kendall's tau test

MPA	motor test items		Cognitive abilities				Mean of correlation
			Language understanding	Relations recognizing	Diductive thinking	Computational thinking	
Speed	20-m-sprint	r	.194*	.160*	.205*	.344**	.225
		p	.007	.026	.004	.000	
Coordination	balancing backward	r	.427**	.436**	.370**	.569**	.451
		p	.000	.000	.000	.000	
	jumping sideways	r	.234**	.323**	.255**	.399**	.303
		p	.000	.000	.000	.000	
Strenght	push-ups	r	.367**	.390**	.272**	.456**	.371
		p	.000	.000	.000	.000	
	sit-ups	r	.161*	.260**	.213**	.336**	.243
		p	.025	.000	.000	.000	
	standing long jump	r	.193**	.150*	.089	.257**	.172
		p	.007	.037	.218	.000	
Endurance	6-min-run	r	.278**	.236**	.250**	.370**	.291
		p	.000	.000	.000	.000	
Flexibility	forward bending	r	.218**	.133	.132	.103	.147
		p	.000	.066	.067	.135	
Mean of correlation		r	.259	.264	.223	.355	.275

**. Correlation is significant at P < 0.01 level.
*. Correlation is significant at P < 0.05 level.

Table 59 shows that middle significant correlation (r = .275) was found among motor and cognitive abilities by the children of Magdeburg. For motor abilities the highest correlation value was demonstrated by balancing backward while the lowest was demonstrated by standing long jumps. For cognitive abilities the highest correlation value was demonstrated by computational thinking and the lowest was demonstrated by deductive thinking.

4.7 Interpretation and Discussion of the Results of Correlations

The relationship among the motor and cognitive abilities for the children of Assiut was low (r = .111), while that for the children of Magdeburg was clearly found with middle significant value (r = .275). The results for the children of Magdeburg meet the growing evidence that these two domains (motor and cognitive) are fundamentally interrelated across the development (Diamond, 2000; Rosenbaum, Carlos & Gilmor, 2001). Whereas, the results for children of Assiut may be because of the nature of the motor and cognitive tests which have been standarized for the children in German enviroment.

From the behavior level, discussing the relationship among motor and cognitive development in typically developing children has only recently been investigated. For example, positive relationships have been reported among IQ and the movement speed during a sequencing task (Martin et al., 2010), motor proficiency and fluid crystallized intelligence (Davis et al., 2010), as well as motor performance and working memory (Wassenberg et al., 2005). Given the relationship among cognitive and motor skills at the behavioral level, these studies suggested that similar neural etiology (e.g., development of frontal, parietal, cerebellar, and basal ganglia structures) may underlie the development of cognitive and motor skills.

From the prospective of motor learning, discussing this relationship is important. Separating the motor ability and the skill is difficult. However, to differentiate the concepts of ability and skill, ability is considered to be, for the most part, genetically determined and largely unchanged as a result of practice and experience, whereas they consider skill as something that people chiefly develop as a result of practice. Thus, the level of skill any person is ultimately able to achieve in a particular activity depends on the level of the person's abilities that are relevant to the activity and on the quantity and quality of the person's practice experience (Schmidt & Lee, 2005). The development of MPA has a positive effect on the maturation of all behavior dimensions motor, cognitive and affective.

Thus, maturation of the CNS with growing age provides suitable learning opportunities from a rapid change in the environment of the motor behavior. Also, the intellectual ability to learn is increasingly impressed (Oerter, 1995) and a play for the acquisition of motor skills has an increasingly important role. Before complex motor learning is possible, adequate information processes and knowledge structures exist: including perception, attention, memory, analysis and deductive reasoning as well as during the first 6 years this knowledge structures are increasingly improved, reorganized and expanded.

Briefly, these results meet the statement of Ahnert (2003) who investigated the relationships among cognitive and motor performance and mentioned that while being entirely positive, it remains in the entire study period. The mutually enlightened variance percentage drops to a maximum of 10% which is very low. However, the numerous individual results may depending on the test content and the gender of the children (Ahnert, 2003).

5. Discussion

In order to answer the first question; for ***motor development*** the different in the achievement level between both the samples is positive for the children in Magdeburg comparing to the children in Assiut. The energetic-motor abilities which include speed, strength and endurance are demonstrated the most highly significant differences between the two cities. Discussing this superiority for children of Magdeburg than their Assiut peers can be given in two points; first, the effect of ***genetic factor*** in the level of motor development that is demonstrated in body composition. Second, the effect of ***social-cultural conditions*** and society that is demonstrated on the quantity and quality of motor activity available for children in both the cities to perform inside or outside the school.

The effect of the ***body composition*** in the achievement level in MPA is positive for the children of Magdeburg than their Assiut peers while, the value of BMI is nearly equal with no significant difference between both the samples. These results confirm the first hypothesis (1.1) that point to the role of the differences in body composition by children in both the samples for the achievement level in motor development. In addition, these results reduce the impact of normal BMI in the interpretation for the level of motor development. Whereas, the relationship between body height, body weight and motor abilities could be more effective in the interpretation of the superiority in the achievement level as compared to the BMI where this relationship is missed.

Particularly, when comparing different cultures with different movement-related conditions of growing up, this applies in the context of cultural differences of physical factors such as body height, body weight and typical diseases (Bös, Opper & Woll, 2002), which may influence the motor development. In addition, the physical development is a major limiting factor in motor development while at the same time a certain degree of movement for optimal physical development is essential (Ketelhut et al, 2005; Shephard, 1985). Here, the relationship between the development of active, movement apparatus, motor skills and physical fitness is determine the development of the CNS and the information-oriented coordination skills. On mental factors short-term issues; including the influence of motivation and self-concept on the motor performance were previously confirmed as well (Heim & Stucke, 2003).

The other factor that could illustrate the superiority for children of Magdeburg over their Assiut peers belongs to the ***social-cultural conditions*** which are demonstrated in the range of physical and motor activities existing in both the countries. It can be both a cause and a result of motor development curves (Bös & Scheid, 1994; Winter & Roth, 1994). The fitness-based approach defines physical activity, including through expenditure of energy. Physical activity comprises any body movement produced by the skeletal muscles that results in a substantial increase over the resting energy expenditure (Bouchard & Shephard, 1994). In addition, this definition excludes fine motor activities (Stoll et al., 2001).

A numbers of empirical studies that have been pointed out for a positive influence of increasing the physical and motor activity on the achievement level of motor development by children (Kambas et al., 2004; Ketelhut et al., 2005; Krombholz, 2005; Kunz, 1993; Rethorst, 2004; Zimmer, 1981). The physical and motor activities can be classified in different ways. There is a possible distinction between sports (tennis, horseback riding), stressed primarily by motor abilities (explosive strength training, endurance training), to motor skills (throwing, jumping) or conceptual programs (psychomotor).

By analyzing the difference between Egyptian and German PE curriculum; the primary reason stressed for raising the performance level of motor abilities is missed in Egyptian PE curriculum, especially the MPA which are energetically based such as speed, strength and endurance. For instance, the Egyptian PE curriculum does not include any strength or endurance training. Actually, physical and motor activities stimulate bone mineralization and muscle development and help retard the deposition of fat.

The vast majority of physical activity and motor programs for children have a great beneficial effect. This point interpreted the height effect strength of the significant differences between Assiut and Magdeburg sample. On the other hand, the concern on Egyptian PE curriculum by developing the motor skills and sports is more than motor abilities. This point could also interpret the convergence between both the samples with no significant differences in coordination ability. Whereas, the achievement for children of Assiut in the other motor abilities was lower than the German norms which confirm our second hypothesis (1.2) regarding the differences in motor development among children of Assiut and Magdeburg by German norms.

The environment that promotes vigorous physical and motor activity in a child does much to promote muscle development. Active children basically have less body fat in proportion to the body mass. They do not have more muscles fibers; they simply have more muscle mass per fiber and smaller fat cells. This explanation can illustrate the height level of motor achievement that exists by the energetic-conditional abilities for children of Magdeburg over their Egyptian peers. In addition, the superiority for children of Magdeburg over the German norms reflects the plurality of playgrounds (38 locations) that are offered by the city of Magdeburg. The variety of playgrounds is considered to be one of the most influential factors of the environment that offer suitable and appropriate places for physical and motor activities (Daniel, 2007).

In addition, the social-culture that includes the economic factors could also clarify this superiority for German children from the level of economic situation. The parents have the economical ability to send the children to sports clubs to participate in plenty of motor activity in a well-organized manner. Moreover, the socio-cultural factors can be considered as indications for a positive relationship between motor development, material and social factors that directly affect the possibilities and suggestions for motor activity. These include; large living area, good accessibility of play areas, sports interest of parents, movement-friendly kindergarten or school, and membership in a sports club (Breithecker, 1998; Emrich et al., 2004, Kemper, 1982; Rethorst, 2004; Scheid, 1994a, 1994b; Zimmer, 1981).

The difference in the increase in the achievement level in motor development by growing age was found by both the samples. This stability was clearly observed for both samples by body composition. For MPA the stability was found by children of Magdeburg while there was a relatively different rate of development by children of Assiut with growing age. In addition, an observed retardation was noted by children of Assiut in the achievement level in motor test which provides measurements for strength and endurance abilities. This retardation was also found by children of Magdeburg in endurance ability. These results confirm our third hypothesis (1.3) regarding the differences in the motor development between both the samples by age. In addition, there is a need for wide and longitudinal investigations in order to clarify the causes of instability in the achievement level on motor development by children of Assiut.

The differences between boys and girls in the achievement level of motor abilities were not significant by children of Magdeburg while by children of Assiut there were significant differences between boys and girls in the motor tests that provide the measurement of strength ability with positive achievement for boys. These results confirm our fourth hypothesis (1.4) regarding the differences in the motor development between both the samples by gender. These results were expected for children of Assiut is based on previous research, which indicated that the equality between boys and girls in participating PE and sports activities is missed by Middle East countries as compared to European countries.

In order to answer the second question; for ***cognitive development*** the difference in performance level between both the samples were positive for German children except in computational thinking where the difference was not significant. We will discuss this superiority of the children of Magdeburg than their Assiut peers from the effect of ***social-cultural conditions*** and society which is demonstrated by the quantity and quality of ***cognitive activities*** that the children participated either inside or outside the school to which they belonged to the effect of the educational system a part from the social-cultural conditions and society.

The results of cognitive development show that the achievement level for children of Magdeburg meets the German standards. Whereas, the achievement level for children of Assiut was under the German norms. These results confirm our first hypothesis (1.1) regarding the differences between both the samples in the achievement level according to the German norms. In addition, it refers to the outcome of academic performance in kindergarten and primary school for children of Magdeburg meeting the German standards. In addition, the convergence on the achievement level between children of Assiut and Magdeburg in computational thinking was observed.

The structure of learning experiences in the Egyptian educational system based on the short-term knowledge which is characterized as a high quantity of knowledge and less quality of learning environment as compared to the German educational system. Moreover, the huge number of children in the class room in Assiut makes it difficult to involve the majority of children in the appropriate and effective learning processes with suitable cognitive activities.

This explanation meets the theory of Vygotsky's (1978). He mentioned that we can support the children in cognitive development through right interactions. Children's learning takes place in social interaction with other competent persons in home, kindergarten or school. In addition, the practice in these institutions can be developmental for a child when the practice challenges the child to enter into new activities and appropriate new motives and competencies (Bruner, 1999; Hedegaard, 2002; Rogoff, 2003, Vygotsky, 1987). Such suggestions include a structure learning environment in we can provide a child with aid and instructions tailored to the child's current abilities. Cooperative and interactive learning exercises are important during this process along with monitoring the child's progress closely.

The stability in the developmental rate was found by both the samples for boys and girls by growing age, which confirms our second hypothesis (1.2) regarding the differences between both the samples in cognitive development by growing age. In addition, the results also have shown a reduction in the differences between both the samples by growing age, which indicates that the mathematical thinking exists in all societies, is nearly equal in this age, and is an essential aspect of everyday reasoning.

The impact of training routines could interpret the development in the significant effect strength with growing age between children of Assiut and Magdeburg in language understanding ability. Whereas, standardized training routines show short-term effects when applied during infancy, and long-term effects on cognitive development are hard to verify (Stumpf, 2000). In addition, mathematical reasoning appears early in human cognition and is widespread. It is easy to lose sight of the fact that every time we manipulate numbers, we exploit a host of cultural tools invented and modified over historical time by cultural predecessors. But just as societies have historically diverged in their use of linguistic conventions, they have also diverged in their use of mathematical concepts, procedures, and symbols.

By gender variable the results show that no significant differences exist between both the samples in the achievement level for boys and girls except by language understanding where the differences by gender were significantly low. Considering the gender variable, the achievement level of the children in Magdeburg was better than their Assiut peers. These results confirm our third hypothesis (1.3) regarding the differences between both samples in the level of cognitive development by gender.

The cognitive process runs and depends on the characteristics of the individual as well as the environmental parameters. This factor corresponds also to the physical and motor activity especially with age and gender factors and with regards to the biography of motion in the area of motor development. Regarding the socio-cultural factors, inferior material and social environment has a negative impact on cognitive development while growing up (Jensen, 2006). When different cultures and generations are compared, intercultural differences with the environment of growing up as well as differences in values and norms of different communities have to be taken into account.

In addition, cognitive activity as a factor in cognition research is partly investigated by constructs like prior knowledge, knowledge base, prior experiences, familiarity, practice, training and repetition as well as indirectly by environmental factors. For instance, the influence of knowledge depending on the life story on language (Solso, 2005), memory (Gaultney, Bjorklund & Schneider 1992), problem solving and creativity were investigated (Funke, 2006c). With respect to practice and training, there exist various studies that analyze the impact of training routines including supraliminal and controlled execution of cognitive activities on cognitive skills and abilities (Stumpf, 2000).

Actually, cognitive competence arises out of interactions with adults and other competent associates in the child's culture. Vygotskys (1987) cites as evidence that the child must learn that it is far too complicated to learn in isolation, such as speaking a language. He proposed that most tasks are learned through guidance and encouragement from the culture around the child. The child's cognitive development is thus influenced and shaped as he participates in cultural activities and observes adults engaging in those cultural activities. Moreover, extension of the cognitive processes constitutes one of the important influence factors on the development process.

However, the value of literacy is even greater than the value of mathematical ability. The majority of the variance in teachers' judgments of their pupils' intelligence is explained by literacy; mathematical performance makes a modest contribution to the prediction of teachers' judgments. Children who are poor readers, but nevertheless perform like their peers on intelligence tests, are perceived as less able by their teachers and by themselves. Finally, teachers who think that boys are better than girls in mathematics seem to influence their pupils, who at the end of the year make similar judgments (ISSBD, 2005).

As a natural sequence as well as in the realm of social and emotional development, these changes are less likely to be subsumed under the concept of development without cognitive development (Ulrich & Schröter, 2006). Actually, the social factors have been less investigated than other influence factors groups. In addition, feeling self-confident is vitally important for children in primary schools. However, there is evidence that older primary-aged children with language understanding problems perceive themselves more negatively in scholastic competence, social acceptance and behavioral conduct than children with typical language development (Jerome, 2002).

This low self-esteem is not clearly apparent in younger children (Lindsay & Dockrell, 2000). Implications of these studies suggest that with prolonged language difficulties, children's underlying self-esteem and self-worth suffers, which can have a huge impact on their future life and development. In addition, daily experience shows that the enduring changes in personality which are not only present in childhood or youth but which can be also occur throughout life indicate that development does not stop whereas many older textbooks indicate that these changes stop after adolescence.

6. Conclusion

Body composition and social cultural factors including the educational system, nutrition system and the rate of physical and motor activities are most influential factors in reducing the rate of motor development by children of Assiut as compared to children of Magdeburg.

The fundamental motor skills such as running, jumping and throwing are demonstrated as the main part of German PE curriculum in primary schools. In addition, the number of the student and the plenty of sport equipment's allow the PE teacher in Germany to include the student as much as possible in the class activities in an appropriate and effective manner. On the other hand, the Egyptian PE curriculum is more focused on developing sports skills related to sport performance such as teaching games and individual sports. Actually, reducing the physical and motor activities that provide development of MPA especially those that are energetically based such as speed, strength and endurance were clearly at a dis-advantage in the context of Egyptian PE curriculum.

Consequently, the concern with developing the MPA should be considered as the main point in the future development of PE curriculum in Egypt. In Addition, the equality and quantity issue should be put into consideration as well. The PE conditions in primary school age should meet the physical and motor needs of the children including the MPA to be well trained and should be recommended to extend the motor repertoire by a variety of motor training. Sporty basic techniques can also be learned by a lot of training variables which should be designed by the learning processes through appropriate practice in priority in content of the physical and motor development.

In addition, we believe that the longitudinal studies help more in the explanation of the developmental changes. The age basically serves as an investigation about the development as the descriptive record of the changes and not as an explanation of the current status. The change in the level of motor development does not occur because someone grows and gets older, rather it is because of these changes. The events may for some reason could be correlated with age. The reference to age can therefore only serve as a description of motor development.

Moreover, there could be many reasons for the superiority in motor development in Magdeburg children over their Assiut peers. These differences could be a reflection of the limited improvement in lifestyle and nutritional habits from one country to another. Accordingly, there is a positive relationship among the motor performance factors and home, large living area, low floor height, frequent use of sports and games equipment and easy accessibility of play areas. Also, there are other factors that could influence the growth and development process too, including illness and disease, climate and emotions. The extent to which illnesses and disease may retard growth and development depends on their duration, severity, and timing. Often, the interaction of malnutrition and illnesses in the child makes it difficult to accurately determine the specific cause of growth retardation. However, the combination of conditions puts the child at risk and greatly enhances the probability of measurable growth deficits.

Growth and development are no independent processes. Although, heredity sets the limits of growth and development, environmental factors play an important role in the extent to which these limits are reached. Factors such as nutrition, exercises, and physical and motor activity are major considerations affecting growth and development. Especially, the complexities of social-cultural factors and motor development of children have still not been illustrated in detail. In addition, the concern of the international comparison of study results where the social-culture factors are included in the investigation of MPA. In addition, the studies focus on the relationship among motor and cognitive abilities with an influence by age and gender factors in primary schools aged-children especially in those related to the academic achievement of the children in both Egypt and Germany, which should be widely implemented.

Cognitive development can be affected inefficient planning and organizing the learning experiences during the primary school stage. In addition, the huge number of children inside class room also has a vital role in losing control of learning situations from the teachers especially, the training programs and exercises that exist during the implementation of learning experiences. Therefore, this problem has two dimensions which should be considered in the future development of Egyptian primary school curriculum and school management. Consequently, the different ways in designing learning experiences should be experimentally investigated in order to select the most appropriate and suitable ways to meet the Egyptian children needs during this important age of development.

Moreover, the concern of the studies that investigate and provide the levels of motor and cognitive development should be increased. The dimensions among child development in this age are substantial. In addition, the effect of developing MPA enhances the developing of other dimensions such as the cognitive and effective area. In fact, in Egyptian environment this kind of study is rarely implemented for children development in primary school age. It gives the ability to collect sufficient and accurate data about the level of motor and cognitive achievement for children to enable the curriculum designers plan the content of teaching material and meet the children characteristic’s and needs in this important development age.

Briefly, we believe that the future research requires a careful elaboration of the development perspective for motor and cognitive fields in order to restrict the breadth of the current empirical investigations with typically development children. In the empirical work (because of economic and social reasons) there was a preference to conduct cross-sectional study without information about the developments progress, but only among the differences in age and gender groups. That is why distinctive sequence plans with a combination of cross and extensive analyses were recommended in the age, test time, and residual effects, which can be statistically divided. In addition, the conception of development, and the mentioned historical, cultural and social influences could be regarded as development relevant factors and their effects on motor ontogenesis should be investigated as well.

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