

**THE EFFECT OF AN ADAPTED SWIMMING PROGRAM ON THE PERFORMANCE
OF AN INDIVIDUAL WITH KYPHOSIS – SCOLIOSIS.**

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The purpose of this action research study was to examine the effect of an adapted swimming program in terms of improving the performance and behaviour of an individual with kyphosis-scoliosis, with the use of an individualised education approach. The sample consisted of an adult woman with kyphosis-scoliosis. The pre-swimming phase included a holistic evaluation of the abilities of the individual in terms of swimming performance, measurement of the behaviour according to the Rutter Scale and physical – health variables. Next, the subject followed an adapted swimming program based on the Halliwick Method. The duration of the swimming program was 6 months at a frequency of two times per week, for 60 minutes. Each session included additional muscle strength and body posture exercises outside water. At the end of the swimming program the initial measurements were repeated. The results of the study revealed the beneficial effect of the swimming lessons in terms of improving the swimming abilities and the behaviour of the individual. In the light of the findings, useful conclusions were drawn regarding the structure of the swimming program.

Swimming, an excellent medium for enhancing strength, stamina and fitness for health, ranks high among the physical education activities that can be most successfully taught to those who are disabled (Kokaridas, 2004; Short, 1990). Swimming can be applied to the widest range of disabilities (Christie, 1985). A well-planned swimming program contributes to organic and motor development, and its most important benefit is the stimulation of development growth (Walker & Baker, 1983). The success of swimming is due in large part to the buoyancy of the water, which provides support to the body, and enables people with disabilities to perform a wider range of movements than they could do otherwise, especially in the case of individuals with a high degree of spinal column deviations whose physical range of movement and ability is often limited (Lepore, Gayle, & Stevens, 1998). Swimming is recognized as probably the best way of maintaining or improving the motor fitness of physically disabled individuals, and in consequence, of individuals with kyphosis- scoliosis.

One of the main methods of teaching swimming to those who are disabled is the Halliwick Method (Association of Swimming Therapy, 1992). This unique method, which combines the

therapeutic effects of hydrotherapy with the advantages of the recreational methods of teaching swimming, has the distinction not only of denying the use of all artificial aids, but also having been devised especially for use with disabled individuals (Price, 1980).

According to Shephard, the main problems of the disabled swimmers relate to balance in the primary axes of the body (Shephard, 1990). The Halliwick Method is the only method that uses known scientific principles of hydrostatics, hydrodynamics and body mechanics in order to: teach the swimmer how to maintain a safe breathing position; how to regain such a position from any other position; and making swimmers familiar with all conceivable body rotations and learning how to initiate, control and arrest such rotation at will (Association of Swimming Therapy, 1992). The end-product is a secure swimmer whose confidence is based upon sound knowledge of water and the ability to control her own movements in water.

The activities selected for the swimmer are parts of the Halliwick Method's Ten Stages and Four Phases program, which shows the development of each individual during the whole process (Table 1).

Table 1. The Ten-Points and Four Phases of the Halliwick Method	
<i>The ten points</i>	<i>The four phases</i>
Mental adjustment Disengagement	Mental Adjustment
Vertical rotation Lateral rotation Combined rotation	Balance Restoration
Upthrust Balance with stillness Turbulent gliding	Movement Inhibition
Elementary propulsion Basic stroke	Movement Facilitation

The Halliwick Method is considered as the most successful and promising method for all ages for those who are disabled (Association of Swimming Therapy, 1992; Price, 1980), and it has enjoyed a great success as evidenced by the Association of Swimming Therapy (1992) since its creation in 1949. Today, it is practised with thousands of swimming clubs and schools throughout the world.

However, as stated by Csapo (1985, p.127): *it is necessary to individualise the teaching approach and the need to adapt the Halliwick Method and to adjust the expectations.* The great success of the method and the importance of swimming for the disabled individuals, gave the motivation to test the ideas of adaptations (Kokaridas, Aggelopoulou – Sakadami & Walters, 2000) in an attempt to promote the effectiveness of the method.

The purpose of Kokaridas et al., (2000) study was to intervene in the process of the Halliwick Method, in order to improve the Method or some of its aspects for a sample of 14 individuals with Down's syndrome (aged 6-21 years), using both an individualised educational setting approach and a differentiation of the elements of the Halliwick Method. In the light of the findings of this study, further recommendations for the improvement of Halliwick Method procedures were

made, common factors that affected the performance of each individual were identified and their relation with performance was explored.

However, reviewing the literature it seems that there are no other studies concerning swimming for people with disabilities except the study of Kokaridas et al., (2000). The possibilities of working through a case study, and the possibilities of developing an individualized educational approach to teach swimming to an individual with spinal column deviations according to the Halliwick Method, led to the present action research. That is, the teacher was also the researcher, working on an individual basis in a swimming pool with the view to bringing improvements in the swimming abilities and the behaviour of the individual.

In summary, the purpose of this action research study was to examine the effect of an adapted swimming program in terms of improving the performance and behaviour of an individual with kyphosis-scoliosis, with the use of an individualised education approach.

Method

The sample consisted of an adult woman (31 yrs of age) with kyphosis-scoliosis. The pre-swimming phase included three data collection points for the individual:

Swimming performance as it was evaluated according to the Red Test of the Halliwick Method for beginners (Table 2).

Measurement of behaviour according to the Rutter Scale.

Body posture in terms of the degree of kyphosis – scoliosis and other physical – health variables.

Table 2. The Red Test of the Halliwick Method

Enter the water unaided from a sitting position to an instructor

Blow a plastic disk (with support from behind if necessary) for a distance of 10 metres.

Perform kangaroo jumps for a distance of 10 metres.

Perform a forward recovery with a minimum of aid.

Following the pre-swimming evaluations an adapted swimming program was structured based on the ten points and four phases of the Halliwick Method. The duration of the swimming program was 6 months at a frequency of two times per week, for 60 minutes.

The swimming program was formulated on a specific instructional time-frame in a periodical system (Harre, 1989) which included the three interrelated components of the process of an Individualized Educational Program (IEP), structured in a system of cycles: a) macro-cycles (annual goals); b) middle-term cycles (short-term instructional objectives, STIO), with a duration of 4 weeks; and c) micro-cycles (present levels of educational performance, PLEP; the structure of everyday training).

In every lesson, each of the swimming activities was scored on a scale of 0-5 points, based on the different amounts of support for each swimming activity as described by the Halliwick Method instructions (Kokaridas, 2003; Association of Swimming Therapy, 1992). Each activity received:

0 points in case the individual practiced a swimming activity but she was not able to perform it.

1 point in case the subject performed the activity with maximum support provided by the swimming teacher.

2 points for each activity performed with reducing support provided by the swimming teacher.

3 points for each activity performed with minimum support provided by the swimming teacher.

4 points for each activity performed without support provided by the swimming teacher.

5 points in case the participant performed the activity unaided and showed that she was mentally adjusted to the exercise.

The ten stages of the Halliwick Method represented different middle-term cycles (short-term instructional objectives) grouped in six months. Each middle-term cycle was equal to 8 micro-cycles (lessons). The difficulty level in each of the middle-term cycles (months) for each individual practising on the swimming program was augmented gradually from month to month by reducing the level of support of the activities or by selecting more difficult exercises.

The end of an eight micro-cycle (lesson) represented the end of a middle-term cycle (end of a stage(s) of the Halliwick Method). Thus, the new micro-cycle (lesson) included activities from the next stage(s) of the Halliwick Method. In this way, it was expected that during the study the individual following the swimming program would cover the activities of all of the 10 stages of the Halliwick Method. The interaction between the 10 stages of the Halliwick Method in six months, led to the annual goal (macro-cycle), the end-product of a secure swimmer (Association of Swimming Therapy, 1992).

Additional muscle strength and body posture exercises outside water were also included at the beginning of each lesson, in order to prepare the participant for the swimming activities and to teach her how to maintain a proper body posture in various positions (e.g. stretching exercises in the sitting or standing position).

At the end of the swimming program the initial measurements were repeated.

Credibility, Transferability, Dependability and Confirmability Of The Study. This case study follows an action research approach with the researcher being simultaneously the observer that participates actively during the research (McNiff, 1994). The methodology of this case study was structured by taking into account that *anyone moving away from studies based on quantitative data, is likely to have to face criticisms that the work is unreliable or invalid* (Robson, 1993, page.402).

Whilst some researchers acknowledge action research as a worthwhile activity for practitioners, they are anxious that claims for the validity of findings should not be made beyond the particular contexts in which the investigation is carried out (Hammersley, 1992). A common challenge to action research is that it is subjective and therefore unreliable, that is the solutions that it claims to generate cannot be universally tested and are therefore invalid. As an answer, Lomax (1986) makes the point that the validity of what action researchers claim is the degree to which it was useful (relevant) in guiding practice for particular teachers, and its power to inform and precipitate debate about improving practice in the wider professional community (Lomax, 1986).

According to Habermas (1972; 1979) and Whitehead (1983) validation is in part a social process, a process shared by reflective and caring individuals. In this sense, research is seen as a community effort which profits most by critical discourse (Rudduck & Hopkins, 1985). If a person presents his/her idea to others, this idea, or knowledge claim, represents a claim to educational knowledge (McNiff, 1993; 1994). If the other persons accept what she says, they validate his/her claim. Their acceptance of the idea in making sense of their own lives indicates that they are willing to adopt that idea and adapt it to their own lives (McNiff, 1994). Through interesting discussions, individuals can use the experience of other persons, in order to reflect these experiences on their current understandings of their own situations (Ainscow, 1998).

In this study, the triangulation technique suggested by Elliot and Adelman (1973; 1976), Lincoln and Guba (1985), and McNiff (1994) in order to enhance the credibility (internal validity) of a case study, was included in the methodology.

Triangulation is the use of evidence from different sources or different methods of collecting data (Lincoln & Guba, 1985). According to Elliott and Adelman (1973; 1976), triangulation in action research is commonly used to refer to the process of obtaining information on a subject from three or more independent sources. Namely, in this study those of the teacher, his pupils, and a participant observer. Who in the triangle gathers the accounts, how they are elicited, and who compares them, depends largely on the context. By comparing his/her own account with accounts from the other two standpoints, a person at one point of the triangle has an opportunity to test and perhaps revise it on the basis of more sufficient data (Elliott & Adelman, 1976). Similarly, McNiff (1994, page. 131) identifies three steps towards establishing the validity of a claim to knowledge. In the claim *I know that I have improved the process of education for the students in my care*, the implications are of i) self validation, ii) peer validation and iii) learner validation. Triangulation is potentially powerful in getting to the heart of the matter in pooling information and perceptions (Elliott & Adelman, 1973).

In this study, the triangle (three or more independent sources) from which the information of the research was obtained, included:

The teacher as a researcher, who evaluated the level of performance of the individual before the start of the swimming program, participated in each lesson and observed the performance of the subject on a one-to-one basis (individualized approach) during the whole research. The persistent observation suggested by Lincoln et al., (1985), that is, the participation of the researcher in each lesson for each individual and the persistent observation of each activity over a sufficient period of time (6 months), had as a purpose to *bring depth to the study* (Robson, 1993, page.404).

A second swimming coach as a participant observer who helped the researcher to evaluate the performance of the participant throughout the whole program.

Peer debriefing (Lincoln et al., 1985), that is, the exposing of the analysis of the study, the co-operation, and the discussion of the results on a continuous basis with the teacher responsible for the adapted physical education courses at the University of Thessaly, was another way of fostering the credibility of the study. The involvement of the two physical education teachers in terms of the evaluation of the present level of performance of each individual (individualized educational approach) and in terms of helping the scoring of each individual's performance in each lesson was crucial.

Finally, the evaluation of the swimming performance of the individual and the completion of the *Rutter scale* between the researcher and the individual were all different sources or different methods of collecting data, to enhance the credibility of the study.

In terms of transferability-corresponding to external validity or generalisability in quantitative research (Lincoln et al.,1985), this study takes into account that it is clearly inappropriate to seek to make the same kind of statistical generalization as in the case of a quantitative research, which is referred as the first decision span in generalization according to Kennedy (1976). However, this study follows a second decision span (Kennedy,1976), which is concerned with applying the findings about a case who participated in the swimming program to a second case, which is considered to be sufficiently similar to the first to warrant that generalization (Kennedy,1976).

Additionally, the dependability-analogous to reliability- (Robson,1993), and the confirmability (objectivity) of this study was enhanced by following acceptable, clear, systematic, and well documented-based on references-processes. For example: a) The Rutter Scale by Rutter (1967), b) The Red Test of the Halliwick Method (Association of Swimming Therapy, 1992) and c) The coding system of scoring the swimming activities based on the different amounts of support as described by the Association of Swimming Therapy (Kokaridas, 2003), all of them linked to the purpose of the study (Halpern,1983), which can «constitute a dependability test» (Robson,1993, page. 406).

Results

According to the initial measurements, the participant was a beginner in swimming as she failed to perform the initial Red Test of the Halliwick Method prior to the application of the swimming program. Her body posture was very poor with a degree of kyphosis-scoliosis exceeding 40°. Furthermore, according to the Rutter Scale the individual surpassed the 9 points' limit that indicates the presence of an antisocial or neurotic behaviour. In particular, the participant was designated as neurotic, with a tendency to appear miserable, unhappy and distressed.

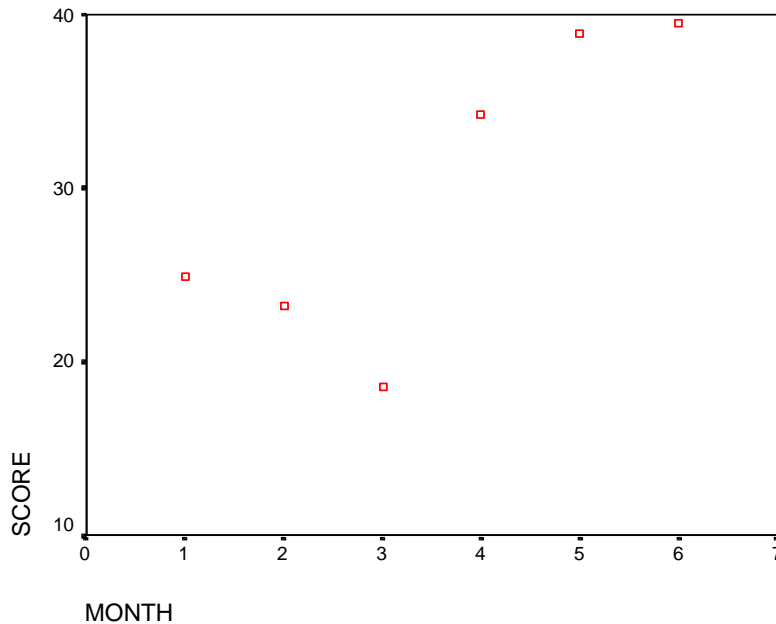
During the first three months the participant had a stable swimming performance, that is, she achieved approximately the same medium average during each month (Table 3). Due to the fact that each month had a higher level of difficulty as the program continued, the stability of results of the individual is considered a positive finding. However, the participant had difficulty to maintain a safe breathing position in the water due to her body shape that caused the two centres of gravity and buoyancy forces to stay out of line and consequently to initiate rotation. Furthermore, the participant continued to appear stressful, as it was her first time participating not only in the swimming courses, but also in physical education activities in general.

Table 3. Swimming Performance

Month	Mean Score
1	24,87
2	23,25
3	18,5
4	34,25
5	38,87
6	39,5

Since the end of the third month, however, her performance has been significantly improved as the much higher medium averages of the later three months indicate (Table 3). Her improvement can be attributed to many factors. First, the participant learned how to float horizontally in the water by turning the head and arms on the opposite direction of the rotation caused by her body shape. In addition, the participant got used to the new swimming environment and surpassed her

fear of water. The contact with other individuals practicing at the same time in the swimming pool helped her socialisation, whereas at the same time a relation of confidence was finally built



between her and the swimming teacher. Consequently, the completion of the Rutter Scale at the end of the swimming program revealed her significant improvement of behaviour, with the individual achieving a score below the 9 points' limit that indicates the presence of a neurotic behaviour. According to her words, she apparently enjoyed the swimming lessons. The positive influence of the swimming program led the participant to adopt an active style of life, as she became a member of sports club. Above all, her improvement in swimming was apparent and at the end of the 6th month she managed to achieve the long-term goal and swim according to the English Back Stroke.

The posture activities included in every lesson helped her to understand the proper body posture that she has to adopt in every situation. However, it cannot be said that the exercises helped the degree of kyphosis-scoliosis to decrease, as her skeletal growth had been already completed.

Discussion

The results of this case study revealed the positive effect of the swimming lessons in terms of improving the swimming abilities and the behaviour of an individual with kyphosis-scoliosis by following an individualised education approach based on the Halliwick Method.

This study appears the first of its kind and is inevitably limited in its exploratory nature. Furthermore, circumstances such as the action research approach itself adopted in this study with the teacher being the researcher at the same time as working with a participant with spinal column deviations were both factors that put restrictions on the research program. Additionally, the lack of literature in terms of action research and especially swimming in an individual with kyphosis-scoliosis has placed further limitations on this study.

However, the major limitation of this study is its small sample. Because of this, generalisations concerning individuals with spinal column deviations cannot be made. Rather, it can be said that,

for this specific case with kyphosis-scoliosis the findings suggest the positive effect of the adapted swimming program on the performance and behaviour of the participant. Future studies will need to use larger samples to further specify the swimming program suitable for the needs of individuals with kyphosis-scoliosis.

Following an action research approach, the overall intention of this study is to present its findings to swimming teachers, and in the light of these findings to encourage them to investigate their own situation and practice as reflective practitioners and to adapt some of the procedures presented, with a view to bringing about improvements in the development of future swimming programs. Clearly, physical education today requires diverse approaches relevant to different conditions.

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