1695

ULTS WITH MENTAL
NESS AND ADAPTIVE

er's Thesis in Sport Pedagogy

g 1999

ersity of Jyväskylä

life for adults with mental
or. University of Jyväskylä.

alth related fitness (HRF) and
dation (MR) as significant
le relationship between HRF
vels (low, moderate, high) in
liovascular endurance (CVE),
flexibility. Static balance and
nts of HRF. These variables
stand, purdue peg board test,
. The body composition was
eight in kilograms by his/her
ouped in six components out
f-care, independent function,
evocational skills, and self
d questionnaire administered

34-39 with mild to moderate
Finland living in different
oo. Specifically, 12 % were
, 42 % in group homes, and
worked in different kinds of
yment, 16 % were occupied
d.

f individuals with MR was
r differences were studied for
sit-ups, BMI, and hand-grip
gnificant difference was in
ation coefficient was used to
sults indicated a number of
Lastly, one way ANOVA was
ls in variables of AB. The
vels in self-care, work, and

ne intervention programs for
QOL leading to physical,

ehavior, mental retardation

CONTENTS

INTRODUCTION

During the last years the concept of quality of life (QOL) related to people with disabilities has been widely discussed. It has been perceived by so many different ways that makes it a multielement construct. It has been viewed as one's intrinsic needs, desires, capacities which are interrelated with environmental expectations for orienting one's life satisfaction (Hoover, Wheeler & Reetz 1992; Fidler 1996). It is the psychological, physical, and material wellbeing together with social status and ecological fit (Hughes, Hwang, Kim, Eisenman & Killian 1995). It is also related to participation in health related physical activities (Singer 1996) as well as to AB which is the ability to cope with the physical and social demands of the environment leading to the development of a positive self-concept (Ferguson 1997).

But, is it easy for someone with MR to participate in health-related activities, make self-determined and self-directed choices and be able to adjust and cope with his/her environment? This question emerged our interest to investigate two components of QOL: HRF and AB. Health related fitness is refered to the current health, potential resistance to diseases and premature death (Eichstaedt & Lavay 1992, 199; Hellison & Templin 1991, 78; Howley & Franks 1997, 16; Paffenbarger, Hyde, Wing, Lee, Jung & Kampert 1993; Rinne & Toropainen 1998; Sytkowski, Kannel & D'Agostino 1990; Wannamethee & Shaper 1992). It implies a specified level of functioning in such areas as body composition, CVE, muscle strength and endurance, and flexibility (Dunn 1997, 508-509; Eichstaedt & Lavay 1992, 199; Hellison & Templin 1991, 77; Short 1995).

Previous researchers stressed that the fitness level of individuals with MR is low due to inactivity and sedentary lifestyles (Cressler, Lavay & Giese 1988; Fernhall & Tymeson 1987; Fernhall, Tymeson & Webster 1988; Fernhall & Tymeson 1988; Kittredge, Rimmer & Looney 1994; Lavay, Reid & Cressler-Chaviz 1990; Pitetti, Fernandez, Pizarro, & Stubbs 1988; Pitetti & Tan 1990; Pitetti, Rimmer & Fernhall 1993; Seidl,

Reid & Montgomery 1987), but that can be enhanced by well structured training programs leading to independency and decreasing health risk factors (Anchuthengil, Nielsen, Schulenburg, Hurst & Davis 1992; Horvat, Croce & McGhee 1993; Tomporowski & Ellis 1984).

Considering the benefits of physical activity, the purpose of this study was to investigate the level of HRF and AB of adults with MR as well as the possibility of a relationship between those aspects. There is lack of research regarding this kind of relationship and it is possible that participation in health-related activities leads to coping with one's environment and adapting to its social and natural demands. If this is true then specialists who work with children, adolescents, and adults with MR will notice the importance of HRF and AB and adapt their programs by focusing on them. They will find ways to motivate people with MR to engage in healthy and ative lifestyles.

This research is a part of a longitudinal study started in 1973 in Central Finland, where the first measurements took place. The second measurements occured in 1979 and the third in 1996. In this study only the 1996 measurements were included which contain both qualitative and quantitative data. The first ones deal with self-care, independent function, communication/community use, mobility, vocational/prevocational skills, and self direction/responsibility. The second ones are related to CVE, muscular strength and endurance, flexibility, body composition, balance and fine motor skills. The purpose of this study was to examine the level of HRF and AB of adults with MR on the above components. In addition, possible relationship between HRF and AB as well as differences among three HRF levels in AB were to be investigated.

1 MENTAL RETARDATION

Definitions of mental retardation have been changing during the last decades. According to the American Association on Mental Retardation (AAMR) a revised definition of MR had been set forth contributing to diagnosis, classification and intervention (Luckasson et al. 1992, 1. In Smith 1994). Specifically, "MR refers to substantial limitations in present functioning. It is characterized by significantly subaverage intellectual functioning, existing concurrently with related limitations in two or more of the following applicable adaptive skill areas: communication, self-care, home living, social skills, community use, self-direction, health and safety, functional academics, leisure and work. Mental retardation manifests before age 18".

The phrase "limitations in present functioning" indicates that MR is regarded as a current state, rather than as a permanent trait. This change in the new definition emphasizes the transitory condition of MR. (Smith 1997.) That is, life functioning of a person can improve with appropriate support resources sustained over a period of time. These support resources have substituted the traditional labels such as mild, moderate, severe, and profound MR. They can contribute to assessment, placement, and intervention programs based on what people can do in particular environments and not on their limitations. (Sherrill 1998, 522; Polloway 1997.)

Significant subaverage intellectual functioning is defined as an intellectual quotient (IQ) score lower than 70-75. However, this 70-75 criterion is less rigid (not always followed) due to IQs variations from test to test. (Sherrill 1998, 523.) Of the many standardized tests used to measure IQ, the most prevalent are: Stanford-Binet Intelligence scale and Wechsler Intelligence Scale for Children-Revised (WISC-R) (Sherrill 1998, 523; Krebs 1995).

Limitations in adaptive behavior are seen as deficits in effectively meeting general standards of maturation, learning, personal dependence, and/or social responsibility within the context of community setting and sociocultural background typical to the individual's age peers and to the person's individualized needs for supports (Eichstaedt & Lavay 1992, 6; Polloway1997).

Based on this new definition of MR, a shift can be noticed from focusing on IQ testing towards general functioning and behavior of the individual regarding its cultural, linguistic characteristics as well as the environmental settings and support systems. This shift can be expected to have positive effects on choosing appropriate settings, intervention programs and direct or/and indirect services. Individuals can be respected and viewed as unique personalities and not as labels or categories. Negative and biased attitudes may be diminished and the abilities of people with MR can be stressed rather than their disabilities. Of course, this is not always the case, but improvement in attitudes can be accomplished moving to a more holistic and humanistic perception of individuals with MR.

2 QUALITY OF LIFE

2.1 Definitions of quality of life

Quality of life is a multidimensional construct. Its components differ depending on the different perspectives of the researchers, so that the definitions of this concept are almost as many as its investigators. (Felce & Perry 1995; Pain, Dunn, Anderson, Darrah & Kratochvil 1998.) For example, Goode (1994, 148) asserts that QOL a) contains the same factors for persons with and without disabilities, b) requires that "one's basic needs be met," so that one has the "opportunity to pursue and achieve goals in major life settings", c) is connected with others' QOL in a specific environment, and d) "can be consensually validated by a wide array of persons representing the viewpoints of persons with disabilities, their families, professionals, service providers, advocates and others". In general, QOL is "an elusive concept approachable at varying levels of generality from the assessment of societal or community wellbeing to the specific evaluation of the situations of individuals or groups" (Felce & Perry 1995).

After a literature review of community psychology, mental health and employment, 44 definitions of QOL were identified from 1970 through 1993 for people with disabilities (mainly MR). A consensus list was also proposed of 15 dimensions incorporated QOL such as psychological wellbeing and personal satisfaction; social relationships and interaction; employment; physical and material wellbeing; self determination, autonomy and personal choice; personal competence, community adjustment, and independent living skills; community integration; social acceptance, social status and ecological fit; personal development and fulfillment; residential environment; recreation and leisure; normalization; individual and social demographic indicators; civic responsibility; and support services received. This conceptual list can be expected to be useful for programming and evaluation, research synthesis, and policy development. (Hughes et al. 1995.) Some of these areas will be discussed in the next sections in order to present a more global view of QOL.

2.2 Components of quality of life related to this study

QOL has been perceived as the most important theme of human existence. Wellness and well-being are associated with QOL and are the result of participation in purposeful and meaningful activities which focus on maximizing one's strengths and capacities. The characteristics of these activities, which are personally and socially oriented, are in congruence with the biopsychosocial characteristics of the person. That is, during maturation and socialization each person develops a configuration of activity patterns which can be characterized as a lifestyle. Person's intrinsic needs, desires, capacities are interrelated with environmental expectations to develop and maintain these activity patterns for the overall wellbeing and QOL be derived. A positive interplay of personal and environmental characteristics will evolve and sustain healthy lifestyles with a general feeling of life satisfaction. (Fidler 1996; Hoover et al. 1992.)

Further, four areas have been proposed which account for the engagement in an activity and its meaningfulness in QOL: a) Self care and maintenance; Both of them are the expression of self and self-other link. They are addressed as the universal human need to achieve and maintain a sense of autonomy, uniqueness, and differentiation from others. b) Societal contribution; It is the need of fulfillment and welfare of others. For example, engagement in societal or vocational activities may contribute to the survival and wellbeing of a group in society. c) Interpersonal engagement; It is the sense of personal acceptability and interpersonal worthiness. A repertoire of activities which develops and maintains reciprocal relationships is essential for a satisfied lifestyle of oneself and those with whom one shares living, and d) Intrinsic gratification; It is the participation in activities for the experience of enjoyment and fun. This experience is important for awareness of self, skills, capacities as well as of others' values and abilities. (Fidler 1996.)

However, from the high range of opinions about the concept of QOL, mainly it has been perceived by several researchers as a continual pursuit for enriching, stimulating and participating in healthy activities. The intrincic motivation to engage in an active lifestyle is associated with enjoyable experiences, challenging opportunities and

meaningful accomplishments. "Movement, health and fitness truly contribute to QOL". (Singer 1996.)

Self-determination is also a contributor to QOL. It refers to "acting as the primary causal agent in one's life and making choices and decisions regarding one's QOL free from undue external influence or interference". (Wehmeyer, Kelchner & Richards 1996.) In this definition the essential characteristics of self-determined actions are: autonomy, self-regulation, psychological empowerment, and self-realization. In general, self-determination contributes to a more positive QOL for people with MR. It has also been discovered that self-determination is higher in individuals who live in integrated settings than those who live in limited environmental circumstances. (Wehmeyer & Schwartz 1998.) In addition, significant differences have existed among individuals with MR in exhibiting self-determined behaviors such as autonomy, self-regulation, psychological empowerment, and self-realization. Autonomy and choice-making opportunities were the primary predictors of these differences. That is, persons who had been described as self-determined had higher scores in autonomy and choice-making opportunities than those who did not display self-determined behaviors. However, in the other areas of self-determination there was no significant difference. (Wehmeyer et al. 1996.)

On the basis of these arguments, it can be claimed that environmental settings which offer inependency, opportunities to self-choice decisions and participation in any kind of activities, as well as self-determined behaviors will enhance and improve QOL of people with disabilities, especially with MR. It has been proved that opportunities for self-determined behaviors and activity experiences as well as the extent of social network is limited in people with disabilities compared with their age peers having negative influense in their lives. This limitation is not due to cognitive capacities but to inadequate environmental supports. By this sense, QOL is socially constructed addressing increased consideration for the kind of settings individuals live in. (Sands & Kozleski 1994.)

Opportunities for self-determination, input, and personal choice should be provided in every life setting and especially in the area of recreation and leisure which is considered a major contributor to QOL for people with MR. It must not be assumed that simply

because individuals with MR may achieve competitive employment and reside in communities, have a satisfactory QOL; use of free time must also be considered (Hoover et al 1992).

Besides all these, QOL is associated with adaptive behavior. In essence, AB has been conceptualized as the ability to cope with the physical and social demands of the environment leading to the development of a positive self-concept (Ferguson 1997). Considering this, we can, also, assume that AB and physical activity are interrelated, since the latter can lead to positive self-esteem and self-concept, development of empowerement, enhanced mood, stress reduction, improvement of cognitive skills for people with disabilities or without, which are prerequisite skills for managing in society and coping with daily activities and demands of life (Berger 1996; Dunn & Sherrill 1996; Sherrill 1997). Therefore, participation in physical activities may lead to improvement of AB skills which are significant components of QOL.

Further, the ability to confront with the physical and social demands may be enhanced or limited by a thoughtfully designed or restricted environment, respectively. For people with disabilities, a modified and least restricted environment offers them an opportunity to engage in a wide range of societal activities, to exhibit their abilities and be familiar to the general population by eliminating the stereotyped and negative attitudes. This could lead to the development of a positive self-esteem and self-concept and generally to better QOL. Therefore, adaptive behavior can be facilitated by adapted environments which have a positive effect on the self-concept of persons with disabilities (Ferguson 1997). Both, development and improvement of AB as well as engagement in an active and healthy lifestyle can be significant contributors to QOL.

2.3 A model of quality of life

Up to now, we have presented a conceptual framework with 15 dimensions which compose QOL and are accepted by many researchers. Nevertheless, we also found considerable overlap among authors on what constituts relevant areas of QOL. In particular, based on the literature review by Felce and Perry, 1995, a comprehensive model of QOL is shown in Fig.1.

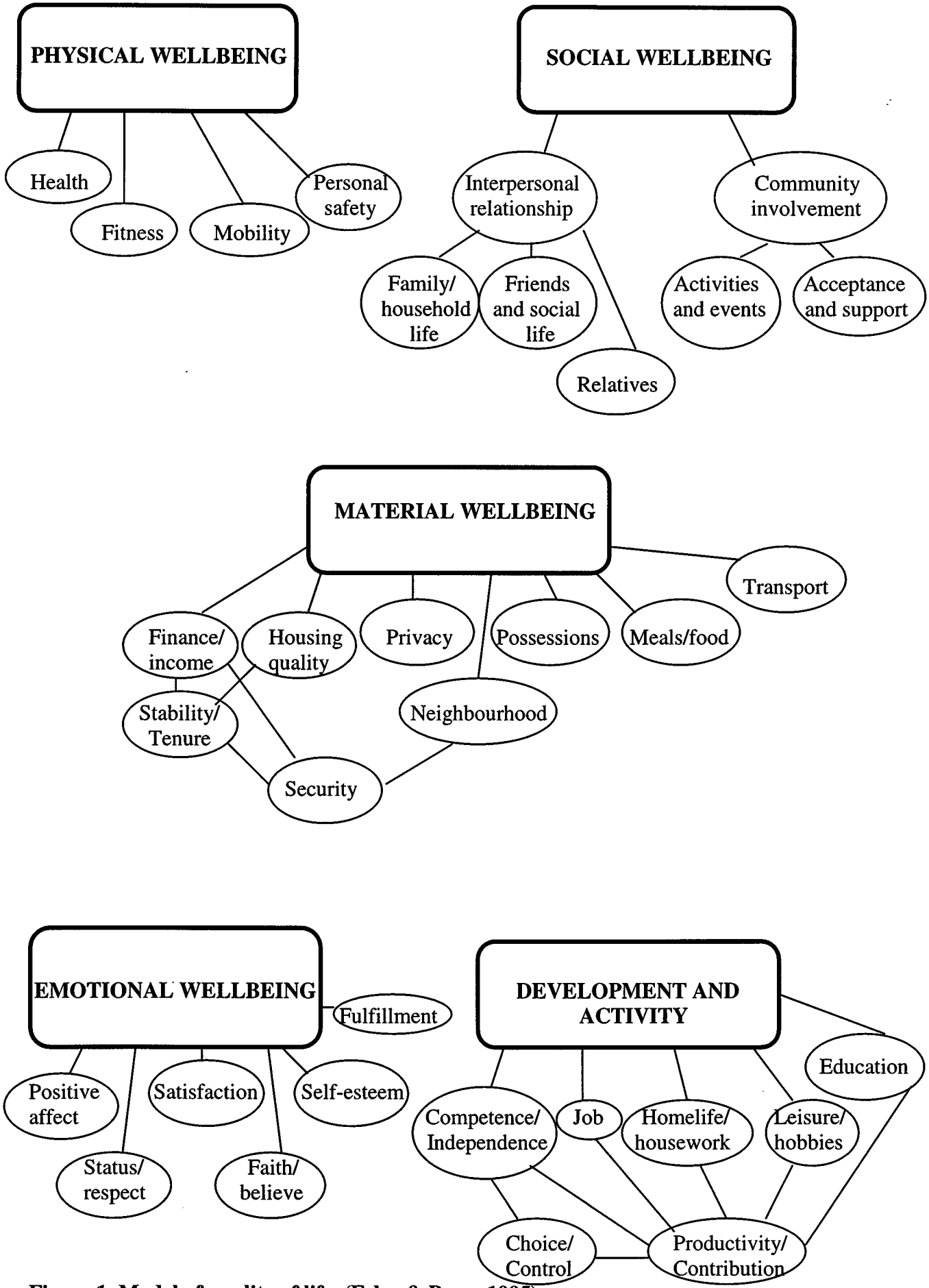


Figure 1. Model of quality of life. (Felce & Perry 1995).

This model is presented in order to better perceive the different components of QOL and to show how many of those components are interrelated with each other. In particular, what can be noticed from this model is that different aspects of different domains may overlap with each other. For example, the aspects fitness and mobility of physical well-being which are defined as functional capacities relative to specific activities may partially overlap with development and activity (productive wellbeing). The areas of productive well-being, such as self-competence, independence, choice-control and contribution to self and others which can be expressed in different functional activities at home, work, leisure and education may dynamically interact with material, social, and emotional wellbeing. Therefore, many of these areas are interrelated and one may lead to another and vice versa. (Felce & Perry 1997.)

Another observation which can be inferred from this model is that AB and health-related fitness (analyzed later) are important parts of QOL, since lots of their elements are included in the model, like: work, independency, health and mobility, fitness, communication, home living etc.

2.4 Quality of life objectively and subjectively defined

Life domains can be assessed objectively by biological, material, social, behavioral or psychological indicators. Yet, subjective feelings of life may be reflected in terms of satisfaction and well-being. (Felce & Perry 1995.) Therefore, a big difference can prevail if QOL is entirely measured objectively or subjectively. Taylor and Bogdan (1990) (In Brown 1997, 62) claim that the concept of QOL has meaning only when it reflects personal feelings and experiences. However, research of people with intellectual disabilities living relatively independently has provided a picture where subjective and objective appraisals do not meet. Specifically, these individuals maintain their lifestyle satisfaction in spite of many adverse lifestyle conditions including: poverty, social isolation, threats to health and safety, unemployment. (Close & Halpern, 1998; Edgerton, Bollinger and Herr, 1984; Flynn, 1989. In Brown 1997, 63.)

Consequently, the multielement framework of QOL is needed and could be defined as a combination of one's life conditions (objective appraisal) with his/her life satisfaction

(subjective appraisal) with the specific life conditions. These two concepts must be valued in relation to the personal values, aspirations, and expectations, so that the construct of QOL be formed. (Borthwick-Duffy 1992. In Felce & Perry 1995.) These three elements are not static nor uniform. In contrast, they change always and one dimension may affect another. For example, increasing wealth and life comfort that income brings may lead a person appreciate it as an important element. On the other hand, the deterioration of values and ethics may lead another in the opposite direction, a non-materialistic way of life as a better mode of existence. Therefore, the interrelation of these domains must be taken into account when trying to define QOL and especially when referring to people with MR. Autonomy and independent skills are lacking in this population resulting in them residing in settings where other people construct. (Felce & Perry 1997.)

Conceptualizing QOL by this approach, a number of scales have been constructed combining both objective and subjective considerations (e.g Schalock, Keith and Hoffman, 1990. In Brown 1997, 63). That is, objectively assessable aspects as well as subjective apraisals of lifestyle according to the weight a person gives to each aspect of lifestyle are summed to form a single personalized index of QOL (Felce & Perry 1997).

In conclusion, according to the model as well as all the literature review of QOL presented above, it is quite obvious that QOL is a multidimensional field. Knowing this, our focus is on the aspects of adaptive behavior and HRF (which will be analyzed in the next chapters) as significant components of QOL. Physical activity which is health-oriented and connected with the overall psychological well-being of a person (especially a person with MR) gives as the urge to delineate this kind of relationship. In particular, lack of research on how AB (coping with daily demands) may be interrelated to HRF emerged our interest to analyze if there is any specific connection between those domains. Another factor contributing to this interest is that for individuals with MR, who have low health levels and lack of cognitive skills, the importance of improving health, as well as developing motor and cognitive skills for independent functioning must be stressed. A demonstration of the benefits of HRF and its connection with AB would help specialists and researchers comprehend better the different types of needs of this population and where the intervention programs should focus on.

3 HEALTH RELATED FITNESS

3.1 Health-related fitness

Physical fitness is a component of the physical domain (Eichstaedt & Lavay 1992, 23). It implies a specified level of function that has been achieved pertaining to the physiological entities of muscular strength and endurance, cardiovascular endurance, body composition and even to psychological well-being. Physical activity and exercise imply participation in an activity which is physical in nature. (Compton, Eisenman & Henderson 1989.) A new concept of health related fitness has been coined which refers to the current health as well as potential resistance to disease and premature death (Eichstaedt & Lavay 1992, 199; Hellison & Templin 1991, 78; Howley & Franks 1997, 16; Paffenbarger et al. 1993; Rinne & Toropainen 1998; Sytkowski et al. 1990; Wannamethee & Shaper 1992). Its components differ regarding the different meaning each researcher gives to it. For example, based on Compton et al. (1989), HRF is composed by CVE, muscular strength and endurance, flexibility and percent body fat. In her HRF battery Suni et al. (1996) includes the different areas of HRF such as body composition, CVE, motor fitness (coordination, balance), and musculoskeletal fitness (flexibility, muscular strength and endurance). According to Dunn (1997, 508-509), Eichstaedt and Lavay (1992, 199), Hellison & Templin (1991, 77), and Short (1995), the HRF components are: CVE, muscle strength and endurance, body composition and flexibility.

In this paper, the domains of HRF for people with MR include those of Eichstaedt & Lavay (1992) which are related to health and resistance to diseases, but also include fine motor skills (eye-hand coordination) and balance. The latter areas are embraced in the domain of perceptual-motor development which demands cognitive abilities emerging from the perceptual-motor process. However, the ability to pay attention to and integrate all the sensory inputs for a proper motor/behavior output is limited among people with MR. This limitation causes impairment in the performance and function of specific motor and daily activities, which demand perceptual-motor skills such as balance, eye/ear hand coordination, spatial orientation, kinesthetic perception. (Koutsouki 1998, 179; Winnick 1995, 271, 274, 276, 279.) Functioning successfully in daily activities

contributes to independency in life. Independency may lead to participation in societal and physical activities without hesitation, so that social interaction, HRF, and a positive self-esteem are evolved and maintained. Consequently, a focus on both HRF and perceptual motor skills - as skill related components of HRF (Winnick 1995, 244) - will facilitate the design and implementation of adequate intervention programs.

3.2 Level of health related fitness among people with mental retardation

Beginning in early 1980s, Reid, Montgomery & Seidl (1985) compared the fitness level of adults with MR to their non-retarded peers by the Canadian Standardized Test of Fitness. They found out that CVE, muscular strength and endurance of the adults with MR was significantly lower than that of their non-retarded peers. In addition, the reliability data showed that selected items of the Canadian Standardised Test were consistent indicators of fitness.

In 1989, Fernhall, Tymeson, Millar & Burkett, estimated the metabolic data (V0max, HRmax, RER) of CVE in individuals with MR including down syndrome (DS) while performing on a treadmill. They concluded that their fitness level was very low and this could be accounted for by low activity level or a sedentary lifestyle. In addition, it has been argued that the inherent cardiovascular capacities of individuals with DS are lower than those of their peers without DS (Pitetti, Climstein, Campbell, Barrett & Jackson 1992).

These studies are in congruence with previous and new ones which have revealed inferior scores in physical fitness for adults with MR compared with their counterparts (Cressler et al. 1988; Fernhall & Tymeson 1987; Fernhall et al. 1988; Fernhall & Tymeson 1988; Kittredge et al. 1994; Lavay et al. 1990; Pitetti et al. 1988; Pitetti & Tan 1990; Seidl et al. 1987).

The difference between retarded and non-retardrd groups in specific motor fitness variables such as cardiovascular endurance, flexibility, leg strength, sit-ups and ball throwing is larger when the non-retarded groups are of the same chronological age rather than of the same mental age. Therefore, the discrepancy in fitness level between

individuals with MR and those without is less once they are of the same mental-age. (Kioumourtzoglou, Batsiou, & Theodorakis 1995.)

Another issue related to physical fitness is obesity which is predominant in people with MR compared with their nonhandicapped peers (Frey & Rimmer 1995). In addition, for this population obesity increases with age limiting employment opportunities and independency (Fernhall 1993). Body mass index (BMI) is a common method in expressing the degree of obesity. According to Rimmer, Braddock and Fujiura (1994) BMI greater than 27 is a risk factor for heart diseases and diabetes mellitus. They found also that skinfold measurements should be employed when assessing person's at-risk status. Kelly, Rimmer and Ness (1986) made skinfold measurements to observe obesity in 553 institutionalized, mentally retarded adults and discovered that 45 % of men and 51% of women were obese. Sedentary lifestyle is implicated as a major factor for the development of obesity. Therefore, some form of intervention is feasible to prevent its development and preserve lean body tissue (Fernhall 1993).

Consequently, fitness level and especially CVE which is considered the best indicator of overall physical fitness (American College of Sport Medicine 1990) is low in individuals with MR. This low level may be due to their poor physical activity habits and extremely sedentary lifestyles increasing the risk factor for developing cardiovascular diseases compared with their age peers. Other factors contributing to inferior fitness level are lack of cognitive ability to make self-directed lifestyle choices, lack of good quality instruction and opportunities in sport and recreation, physical characteristics (e.g., body weight and stature) and medical consideration (e.g., congenital heart diseases). (Deener & Horvat 1995; Eichstaedt & Lavay 1992, 200-202; Pitetti & Campbell 1991; Shephard 1990, 170, 239.)

3.3 Physical fitness training

In view of the low health-related fitness level of individuals with MR, an examination of the effects of a physical training program on it is of major importance. According to studies, exercise training programs can improve the physical fitness of individuals with MR (Anchuthengil et al. 1992; Tomporowski & Ellis 1984). According to Eichstaedt &

Lavay (1992, 371, 372) regular exercise improves the efficiency of the heart and increases the amount of oxygen the body can take up in a given amount of time. It can also increase muscle strength and endurance, develop greater resistance to stress and fatigue, and improve self-image which may contribute to better opportunities to work and leisure activities. Considering, also, that individuals with MR use more physical rather than cognitive skills in work related settings, the enhanced physical capacity may be a positive contributor to their lifestyles and reduce susceptibility to diseases (Horvat, Croce & McGhee, 1993).

Consequently, professionals who are working with persons with MR need to make efforts to design programs which are fun and motivational in order to provide participation in physical activities for a lifetime. Aerobic exercises like walking, jogging, biking and skiing are good activities to improve physical fitness, though the modern trend is to ride a bus, use elevator, and sit at home.

In particular, the participation of institutionalized adults in a physical education program results in better cardiovascular efficiency compared to only educational structured programs or sedentary lifestyles (Tomporowski & Ellis 1984). In fact, the physiological influences of physical training can be confirmed also in the population with Down Syndrome. Specifically, endurance training (walking, cycling or running more than 30 minutes per day) could have positive long-term effects on the pathophysiological consequences of DS and eventually on health. This procedure could be suitable to all individuals with DS for improving their well-being, life expectancy and generally quality of life. (Eberhard, Eterradossi & Debû 1997.)

Regular physical activity and particularly resistance training programs are important and valuable for significant changes in muscular strength and endurance by only 12 or even nine weeks of training (Rimmer & Kelly 1991; Suomi, Surburg & Lecius 1995).

In addition, physical education programs which use behavior modification techniques can substantially improve the fitness level and work productivity of adults with MR, proving that such exercise programs ought to be essential components of the education

and treatment of people with MR (Combs & Jansma 1990; Croce & Horvat 1992; Horvat, Croce and Mc Ghee 1993).

As to the obesity problems of individuals with MR, a combination of an aerobic verbally reinforced fitness program with token economy and dietary intervention has been effective to increase CVE as well as to decrease body weight and percent body fat (Croce 1990). In contrast, exercise alone has been ineffective in weight decrease and percent fat loss (Croce & Horvat 1992). These results have been confirmed by the study of Chanias, Reid & Hoover (1998) who estimated the exercise effects on health-related physical fitness in individuals with intellectual disabilities (ID). They concluded that the CVE and muscular endurance improved significantly whereas more research is needed in body composition, flexibility and muscular strength. Therefore, a combination of exercise and diet can accelerate fat loss and preserve lean body tissue.

According to the results described above, well-structured intervention programs can improve the different components of physical fitness for people with MR. This improvement leads to lower risks of developing health problems and to better function in everyday activities. But can persons with MR only by improving their HRF benefit in their life? It has been argued that physical activity per se is an important ingredient of QOL promoting physical, mental and psychological well-being (Howley & Franks 1997, 7). Increased physical activity even without an increase in physical fitness is beneficial and perhaps more applicable for the highest risk groups for diseases such as coronary heart disease (La Porte, Dearwater, Cauley, Slemenda & Cook, 1985). That is, it may not be possible for all individuals with disabilities to become fit, but still, they can benefit from regular participation in low intensity physical activities (Compton, Eisenman & Henderson 1989). Thus, the main goal of physical educators, and especially for people with MR, is not only to improve physical fitness, but also to motivate them be active. However, it should not be forgotten that motivational and comprehension problems may occur once individuals with MR are instructed to increase their fitness level.

4 ADAPTIVE BEHAVIOR

4.1 Definitions of adaptive behavior

In the past, the definition of MR was based upon the intellectual functioning which was measured by the intellectual quotient testing (Binet & Simon 1905). Unfortunately, IQ not only was an intellectual functioning index representing the individual's degree of intellectual impairment, but also an indicator of the behavioral characteristics. Yet, the behaviors characterised the individuals were not the representative, but the labeled ones. The IQ concept was a restricted measure of human ability and disability. In addition, it caused misconceptions regarding the concept of MR. (Nihira 1969; Nihira, Foster & Spencer 1968.) Trying to remediate the definition of MR, the American Association on Mental Retardation (AAMD) added the new concept of adaptive behavior (AB), which was a separate dimension from measured intelligence. The definition was revised in 1961 (Heber 1961. In Nihira 1969), defining AB as: a) "the degree to which the individual is able to function and maintain himself independently", and b) "the degree to which he meets satisfactorily the culturally imposed demands of personal and social responsibility". Thus, AB consisted of two components: a) personal independency, and b) personal and social responsibility based on the cultural and social norms of the particular environment the individual is attempting to adapt. Similarly, Nihira, (1969) defined AB as "the effectiveness of the individual in adapting to the natural and social demands of his environment". But, the ability to adapt means to change into a changing environment. Therefore, ability to cope in one restricted environment does not mean that the person will successfully cope in any environment. (Spreat, Roszkowski & Isett, 1983.)

Some years later, in the definition of MR, prominence was given to the impairment of AB. In particular, AB was defined as: "significant limitations in an individual's effectiveness in meeting the standard's of maturation, learning, personal independence, and those social responsibilities that are expected for his or her age level". (Grossman 1983, 11. In Siperstein 1992.)

In the most recent revision of the definition of MR adopted by the AAMR in May 1992 (Luckasson et al. 1992, 1. In Smith 1994), the emphasis was not on IQ but on AB, environmental differences and support, as well as culture and linguistic diversities. Regarding AB, it was oriented as the individual's ability to mature personally and socially with age. Maturity is measured according to the individual's impairment in each of ten specific skills included in the definition. (Short 1995.)

4.2 The shift represented by the new definition of mental retardation related to adaptive behavior

The dramatic changes represented by the new definition of MR are of major importance and some of them are related to AB. In particular, the definition has broad applicability to the fields of education, community services, clinical psychology, medicine, early intervention, adult supports, law and governmental support. The purpose was to provide more accurate and contemporary view of the abilities and needs of individuals with MR. The central dimensions are not only the intellectual functioning but mainly the strengths and limitations on ten specific AB skills (communication, self care, home living, social skills, community use, self-direction, health and safety, functional academics, leisure and work) influenced by different environmental settings and personal maturity, linguistic and cultural diversities as well as differences in communication and behavior factors. Instead of using levels of deficit (mild, moderate, severe/profound), the new definition of MR uses levels of support (intermittent, limited, extensive and pervasive) which can be effective by increasing the degree of independence, productivity, and inclusion within the community. Therefore, the new definition of MR is functionally oriented whereby the degree of limitation is not based on IQ but on functioning on the specific adaptive skill areas and on the amount of the support the individual needs in a particular environment. This represents a diminished role of the IQ to define or classify MR. (Eichstaedt & Lavay 1992 5, 6; Polloway 1997; Short 1995; Smith 1997.)

4.3 Adaptive behavior and intellectual quotient

Although AB is considered a significant factor in defining and classifying individuals with MR, it was not accepted by everyone in the past. For example, some researchers believed that AB should have been excluded from the definition for several reasons such as a) deficiences in AB are not necessarily due to intellectual disability, b) the construct of AB is poorly defined and there are no adequate instruments to measure it, and c) it is not clear whether intelligence and AB are sufficiently independent of each other to require both of intellectual deficiency as criteria. (Clausen 1967, 1968. In Spreat et al. 1983; Clausen 1972a, 1972b.)

Regarding the third objection to inclusion of AB in the definition of MR, it has been proved that AB and IQ are distinct factors. In particular, Meyers, Nihira & Zetlin (1979) presented a number of characteristics which distinguished those two factors: a) Intelligence is measured for the assessment of individual's academic achievement, while AB is considered as the ability to cope with the environmental demands. b) Intelligence tests are based on trait theory, while the overt behavior competence does not need a specific competence trait to be regarded as valid. c) Intelligence tests are administered directly as first party instruments. On the other hand, AB measurements are secured by the so called third party informant who is familiar with the person being estimated. This situation occurs especially when the respondents' capabilities are limited. d) AB scales are not based on any unitary factor as IQ scales. Rather, they may use maladaptive behaviors which have minimal correlation with IQ. e) Lastly, intelligence scales are normed on general population, whereas AB scales are normed only on handicapped populations.

4.4 Relationship between adaptive behavior and intellectual quotient

Based on the arguments described above, it was suggested that the differences in relationship between intelligence and AB rests on three parameters: 1) "The subject characteristics", 2) "the variability of the scores within the samples studied", and 3) "the attributes measured by the particular AB scale" (Leland, Shellhaas, Nihira & Foster 1967; Meyers et al. 1979).

In particular, AB and IQ scores are lower in people with MR who are institutionalized than those who are deinstitutionalized. On the other hand, AB and IQ are higher in individuals with mild/moderate levels of MR than those with severe/profound ones. In addition, AB domains which measure communication and cognitive skills are strongly related to intelligence. In contrast, self-help skills have somewhat lower relationship with IQ. (Meyers et al., 1979.)

Indeed, individuals who are transfered into small community residences and have low levels of MR (mild/moderate) exhibit high scores in AB domains and specifically in language development, domestic activity, responsibility, social interaction, economic activity and independent functioning. This suggests that living in a more normalizing cottages than in more custodial and older institutional buildings would result in higher adaptive behavior scores and engenders clients' growth. (Fine, Tangeman & Woodard 1990; Kleinberg & Galligan 1983; Larson & Lakin 1989; Mac Eachron 1983; Maisto & Hughes 1995; Rose, White, Conroy, & Smith 1993; Voelker, Shore, Brown-More, Hill, Miller, & Perry 1990.)

However, regardless of these factors, some environments (cultures) of underdeveloped countries like those of West Bank Third-World region, not only could have a depressing impact on AB, but also they may influence it negatively. In particular, the nature and development of specific skills of AB (e.g., social/personal adjustment and sharing), which are environmentally dependent, on one hand do not improve or maintain and on the other drop significantly with age compared to developed countries. (Baker 1989.) These results emphasize the importance of the environment and culture on QOL and particularly on AB skills without focusing on IQ level.

According to these arguments, AB and IQ are associated with each other, but still they are distinct constructs. Diagnosis and classification of people with disabilities should not be based only on intellectual capabilities but also on other areas of life like behavior, cultural/environmental, communication and adaptive characteristics which may influence the functioning and QOL of individuals with MR. This is a reason leading us to strongly support the inclusion of AB in the new definition of the American

Association on Mental retardation (AAMR) and the efforts are being made for broader orientation and respect of individuality. Both AB and IQ should be included in the definition of MR for a more valid and reliable classification and diagnosis of individuals with MR. Proper diagnosis and classification can be regarded as a means of designing and implementing valuable physical education programs.

4.5 Measurability of adaptive behavior

In the past, over 200 instruments have been developed to assess AB (Spreat, Roszkowski & Isett 1983). Yet, major problems for instrument development have been presented, since: a) it was impossible to know all the settings an individual had to adjust, and b) a single scale could not measure all the relevant behaviors (Baumeister & Muma 1975).

Today, after continuous revisions of the definition of MR, the identification of the broadness and variance of AB between different environments and also within different times and individuals has raised and hence, a number of instruments have been developed to measure it. Three predominant trends affected the use of AB measures. The first was the broadening of the basic definition of MR bejond IQ. The second was the emphasis placed upon training, education and employment of individuals with MR in terms of behavior abilities rather than intellectual impairments. After a proper placement and training, evaluation of individual progress and program effectiveness was the third trend for AB measures. (Middleton, Keene & Brown 1990.)

However, even after the evolution of the new definition of MR, dissatisfactions still existed regarding the concept of AB. The critics of the measurability or even the existence of AB stressed that its domains lack specificity as well as empirical or theoritical basis. In addition, the tools for measuring these domains have not been fully developed increasing the danger of uninformed or irresponsible clinical judgment that could be very damaging in the MR diagnostic process. (Greenspan 1997; Smith 1997.) On the contrary, the advocates of AB maintain that the increased specificity of its areas in the new definition of MR is a conceptual improvement toward the development of

appropriate assessment instruments. In essence, evaluators will approach AB by specific skill areas rather than as a global skill. They will also be able to develop subskill profiles for academic and vocational reasons. Further, school districts and specialists will develop curricular designs, goals and methods for specific subskill areas making the assessment and evaluation processes more concrete. (Polloway 1997; Smith 1994.)

In our point of view, as we have already argued, the aspect of AB is invaluable and has been accepted by many researchers. Its concept is becoming more concrete as a leading promise for more valid and reliable instruments. A living proof of that development is the revisions of the old assessment scales like the Vineland Social Maturity Scale (VSMS) or the AAMD Adaptive Behavior Scale (ABS) as well as the development of others which have been used with success. Of course, we accept that limitations still exist for completely cover and accurately measure the AB skills, but we are not resistant to new ideas and trials for improvement. Still, we are reluctant to disregard or exclude AB even if it is not entirely oriented or though nothing else can replace it by now.

4.6 Summary

In all the above chapters three major areas have been analyzed: quality of life, health related fitness and adaptive behavior. QOL is viewed as a multielement concept defined subjectively as well as objectively. However, in this paper only the elements of HRF and AB are delineated which are considered significant components of QOL and especially for people with MR. Both aspects, HRF and AB have a positive influence on the life of individuals with MR. They can offer a health-related and independent lifestyle which leads to positive attitudes towards this population and acceptance by society. Of course, for this to be achieved better provision is required for the supportive systems and specialists who are responsible for individulas with MR. Until now, this has not yet been achieved but some improvements have been made and others can be viewed in the future.

5 PURPOSE AND RESEARCH QUESTIONS

5.1 Purpose of the study

The purpose of this study was to investigate the HRF and AB of adults with MR as significant components of QOL. Knowing the importance of these aspects in the lifestyles of persons with MR, an interest emerged to delineate possible relationship between HRF and AB. Is it possible that these two aspects be interrelated? In this study also possible differences among three HRF groups in AB areas were investigated. This kind of information is needed for conducting physical education programs for individuals with MR. The main focus of these programs should be on the enhancement of HRF and AB which can lead to independency and generally to better QOL. Concequently, the emphasis is on the whole personality and needs of individuals and not merely on diagnostic characteristics.

5.2 Research questions

The research questions of this study are the following:

1. Level of HRF
   1.1 What is the level of HRF for adults with MR?
   1.2 What are the differences of HRF between adults with MR and their age peers?
   1.3 What are the differences of HRF between genders?

2. Level of AB
   2.1 What is the level of AB for adults with MR?
   2.2 What are the differences of AB between genders?

3. Relationship between HRF and AB
   3.1 What is the relationship between HRF and AB?
   3.2 What are the differences in AB among HRF levels?

6 METHOD

6.1 Participants

The participants of this study were 64 adults (27 women, 37 men), aged 34-39 with mild to moderate MR (IQ = 30-70). Three different IQ tests were used (e.g., Wecsler Intelligence Scale for Children, WISC-test). The first IQ testing took place in 1973 when the subjects were 11-16 years old. Based on the records of the Finish Social Service System the participants had similar IQ level in the 1996 measurements of this study. The measurements took place in the area of Central Finland. Those who had other conditions like sensory, physical or psychological disabilities were excluded from the study.

The participants were living in different environments (Lahtinen 1986, p. 44) with almost 12 % living in their own homes, 38 % in their parental homes, 42 % in group homes, and almost 10 % in institutions. Their vocational settings also varied. In particular, almost 10 % of the participants worked in different kinds of supportive employment, about 65 % in sheltered employment, while 16 % worked with different tasks at home and only few were unemployed (Romar, Lahtinen, Rintala & Rusi 1998).

6.2 Measurements: reliability and validity issues

6.2.1 Health-related fitness instruments

The components of HRF for this research were CVE, muscular strength and endurance, body composition, fine motor skills, static balance and flexibility. However, flexibility was excluded from the study due to low correlation with the other components of HRF (Appendix 1). Cardiovascular endurance is defined as the amount of oxygen supplied per minute in maximal exercise (Dunn 1997, 509). Muscular strength is the ability of the muscle to generate the maximum amount of force whereas muscular endurance is the ability of the muscle to perform repetitive contractions over a prolonged period of time (Dunn 1997, 508; Howley & Franks 1997, 23). A person may have a good muscular endurance without being especially strong (Dunn 1997, 509). Balance is the ability to maintain a certain posture (static balance) or to move without falling (dynamic balance) (Howley & Franks 1997, 25). Body composition "refers to the degree of leaness or

fatness of the individual" (Short 1995). Anthropometric measures as well as height and weight assessment can be utilized in field settings to gather information on body composition (Short 1995). Regarding fine motor skills, visual-motor coordination (specifically eye hand coordination) was used which is the ability to coordinate vision with body movements. It is an aspect of visual perceptual-motor ability that combines visual, tactual and kinesthetic perception. (Winnick 1995, 276.)

In this study, a test battery was developed by Ulla Lahtinen and Pauli Rintala based on the recent literature to measure each of the HRF components. In particular, CVE was measured indirectly by the 1 mile-walking field test which has been proved a reliable and valid field test to predict CVE of men with MR. The formula used was: Peak Vo2 = 101.92 - 2.356 (mile-1 time) - 0.42 (weight). However, further research is warranted to clarify the reliability and validity of this test for others with MR such as women, adolescents and those with severe disabilities. (Rintala, Dunn, McCubbin & Quinn 1992; Rintala, McCubbin, Downs & Fox 1997.) In general, submaximal field tests have been recommended as a valid indicator for CVE for adults with MR (Fernhall & Tymeson 1988).

Regarding muscular strength and endurance, it has been proved that hand grip test is a valid and reliable test for persons with MR (Pitetti et al. 1988; Reid et al. 1985). Sit-ups can also be used as valid and reliable though motivational problems may occur (Reid et al. 1985). In addition, BMI has been used in many of epidemiological studies to identify subjects at risk of premature death and coronary heart disease (CHD) due to excess weight (Paffenbarger et al. 1993). It is calculated by dividing a person's body weight in kilograms by his or her height in meters squared. It is also recommended to be used when researchers lack training to take skinfold measurements (American College of Sports Medicine 1992. In Rimmer et al. 1994), though it should be employed together with skinfold measurements for better estimation of overweight persons with MR (Rimmer et al. 1994).

As for the perceptual motor activities, validity and reliability has been secured for static balance (Suni et al. 1996) as well as for purdue pegboard test (Reddon, Gill, Gauk &

Maerz 1988). Both of those tests have been identified as reliable and valid with individuals without MR.

In the following the measuring instruments of this study as well as the components of HRF will be presented:

Measuring instruments	Components of HRF
One-mile walking test (ml/kg/min)	CVE
Hand grip (kg/Nt)	Muscular strength
Sit-ups (times)	Muscular endurance
BMI	Body composition
Purdue peg board test (sec)	Fine motor skills
Standing on one foot (sec)	Static balance

6.2.2 Adaptive behavior instrument

Adaptive behavior was measured by a structured questionnaire to participants' parents or custodians. This questionnaire was modified by Ulla Lahtinen (1986) who used 51 variables instead of 72 from Allen, Cortazzo and Adamo (1970) or 58 from Väisänen (1973). The reliability of this instrument was high (.92) (Lahtinen 1986) and (.93) (Väisänen 1973). In this study, the reliability of the questionnaire was reconfirmed by personal interviews of the participants' parents or custodians. The reliability analysis also showed a high reliability score (Cronbach alpha = .8611) (Appendix 3). For the purpose of this study the 51 variables of adaptive behavior (which were the measuring

variables of the questions) were conveniently grouped in six areas during the data analysis based on the literature, the new definition of MR and our logic. The answers of the parents or custodians were presented in a 5-point Likert scale (1 = highest ability, 5 = lowest ability). The areas of AB with some examples were the following:

Areas of AB	Examples
Self-care	Eating, using utilities, toiletting, dressing
Communication/community use	Understandable speech, social skills, friendship
Mobility	Fine-motor skills, walking
Vocational/prevocational skills	Working ability, speed, things ordering in work
Self-direction/responsibility	Helping others, general responsibility, initiativity
Independent function	Shopping, using public transportation, cleaning the room, taking care of one's things

6.3 Research Procedures

Before the HRF battery was administered, a pilot study was conducted to provide familiarization on the part of the testers and ensure the validity and reliability of the measurement procedures. Two adults with MR (one man and one woman who did not belong to the participants) performed all the different tests of the battery. The order of the tests was such that motivational problems or fatigue were minimized. The participants' parents or custodians were informed by letters and phone calls if they

agreed to fill in the questionnaire after explaining the purpose and the procedure of the study.

The environments where the measurements took place were the own homes of the subjects or their work places, so that comfort was secured. All the HRF tests took place inside except for the one-mile walking test which was performed in a track and field or flat area nearby the participants' homes. Specifically, in the walking test the instructions were as follows: "walk five rounds as fast as possible, as if you were in a hurry to go somewhere". In that way, problems in understanding were minimized. The tester was walking together with each subject motivating him/her to continue. Heart rate was measured by the Polar electro heart rater. The performance of the participant was tested by time (the less the better).

For the sit-ups the participants were taking a straight-back supine position with bent knees (about 90 degrees), arms at the sides and the feet placed flat on the floor. The tester was holding the ankles and counting the repetitions (maximum 50) without time limit.

In the static balance test the performers were standing on dominant leg while they were placing the heel of the opposite foot at the level of knee joint against the inner side of the supporting leg and rotated the thigh outwards. Arms were hunging relaxed at the participants' sides and possible movements were allowed when necessary. The participants were first instructed to familiarize themselves in balance position and were advised to stand as long as and as quitely as possible. Sixty seconds was the upper limit for the task. (Suni et al. 1996.)

As for the hand grip, the participants were instructed to exert their maximum hand effort in the dynamometer. During the performance they could watch the digital numbers on the dynamometer for motivational reasons. The istructor was also verbally motivating the participants.

In the Purdue peg board test the participants were required to take pins (pegs) with the prefered hand (e.g., right) from the wooden board and place them as quickly as possible

in the right column of holes, during a 30-second period (Spreen & Strauss 1998, 589). The starting point was at the top of the right-hand row. If a participant skipped a hole without inserting the pin he/she would be asked to fill it in and then move on.

In all the tests the participants had three trials and the best was counted for the data recording. Before starting the trials the participants were able to familiarize themselves with the test until they were ready to start. The instructions in all the tests were simple, precise, and age appropriate. Moreover, the tester was always motivating the participants during the performance.

6.4 Statistical analysis

Reliability analysis was used to confirm internal consistency of HRF and AB variables (Appendices 2, 3). For the differences of HRF between adults with MR and their counterparts (norms) one-sample t-test was used which determined if the mean of the norms differed reliably from the mean of the participants. Independent t-test was used to determine differences between the means of males and females in HRF and AB variables. Further, pearson product moment correlation was used to compute correlation between HRF and AB variables. Lastly, one-way ANOVA required to measure differences among three HRF levels in AB variables. (Thomas & Nelson 1996, 119,142, 155.)

7 RESULTS

7.1 Level of health-related fitness

Of major importance in this study was to present the status of individuals with MR regarding their HRF. The variables used to measure HRF were muscular endurance, static balance, fine motor skills, body composition, flexibility, muscular strength, and CVE (Table 1). As it can be seen from this table the SD is high and especially in muscular endurance (sit-ups), static balance, flexibility, CVE, and BMI.

Table 1. Descriptive statistics of the components of HRF of adults with MR

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Sit-ups (times)	60	50,00	,00	50,00	16,4333	15,8118
Static bal. (sec)	63	60,00	,00	60,00	14,9206	20,4192
Purdue peg (sec)	64	13,50	,00	13,50	8,1187	3,0973
BMI	64	52,57	17,53	70,10	29,0005	8,2258
Flexibility (cm)	64	45,00	5,00	50,00	28,8906	11,0671
Muscul. str. (Nt/kg)	59	6,80	1,00	7,80	3,4119	1,4416
CVE (ml/kg/min)	54	54,03	-6,14	47,89	29,1396	11,2356

These variables were transformed into Z-scores. After computing the reliability analysis of the HRF variables (Appendix 1) flexibility was noticed to have low correlation with HRF (.0176) and was therefore excluded from the study. After deleting flexibility the reliability analysis showed high Cronbach alpha = .7896 (Appendix 2).

7.1.1 Differences of health-related fitness between adults with and without mental retardation

For each of the HRF variables, presented in Table 1., we compared the mean scores of the participants with those of their non-retarded peers by using one sample T-test (Appendix 4). The results revealed significant difference between the two groups; adults with MR scoring much lower than their age peers in all variables. The differences were tested for each variable separately.

Muscular endurance

In muscular endurance (measured by sit-ups), the participants with MR scored very significantly lower than their peers [t(59) = -6,646, p = .000]. The extent of difference can clearly be seen in Fig. 2. The mean score of adults with MR was 16 repetitions, whereas that of their non-retarded peer norms[1] was 30.

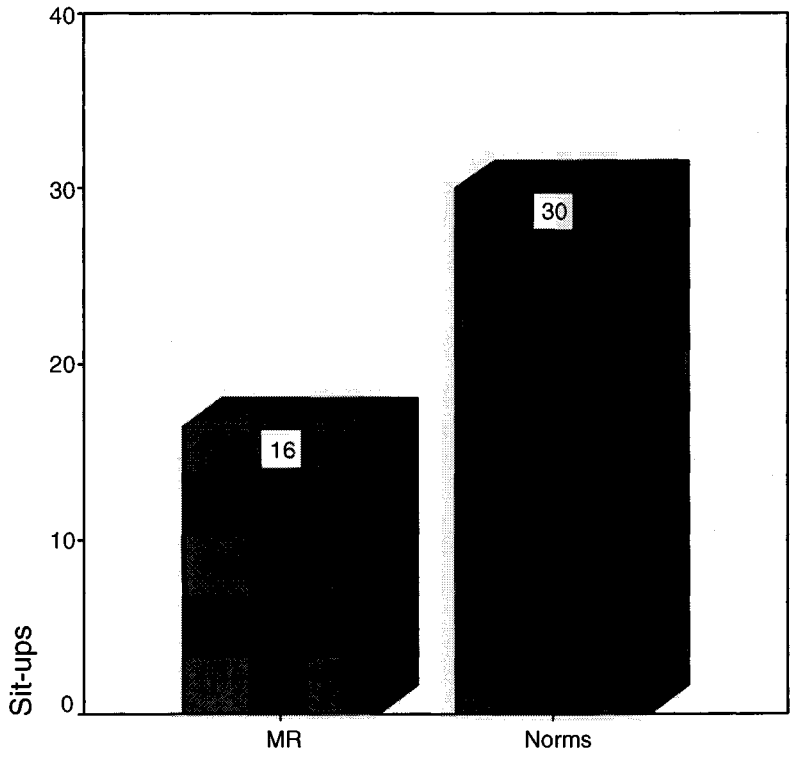


FIGURE 2. Means of sit-ups between adults with and without MR

[1] Source: Selän suoritustestistö. Invalidisäätiö (1990)

Static Balance

Corresponding results were found regarding static balance (measured by stork stand) where the t-value was very significant [t(62) = -17,523, p = .000] showing the high degree of difference between people with MR (M = 15 sec) and their peers (norms[2]) (M = 60 sec) (Fig. 3.).

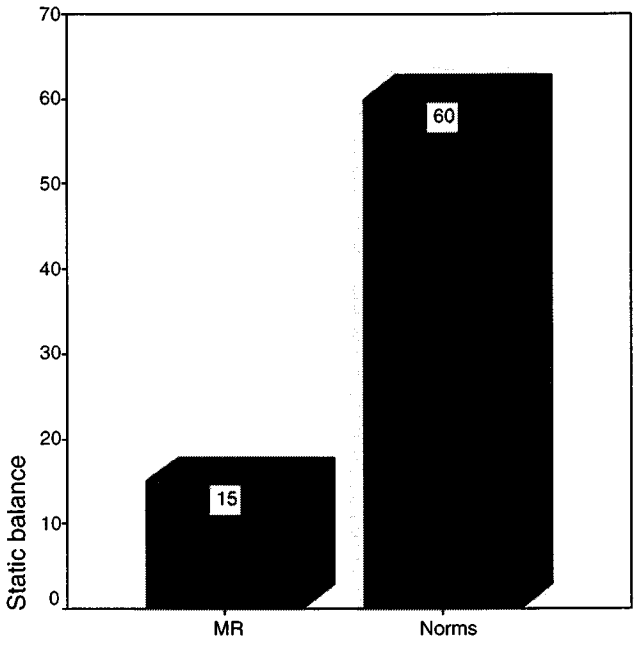


FIGURE 3. Means of static balance between adults with and without MR

[2] Source: Suni et al. (1997)

Body composition

The body composition of individuals with MR was measured by BMI and was significantly higher compared with typical population [t(63) = 3,404, p = .001]. The mean value 29 which was obtained in adults with MR showed that they were overweight compared with their peers (norms[3]) (M = 25,5). (Fig. 4).

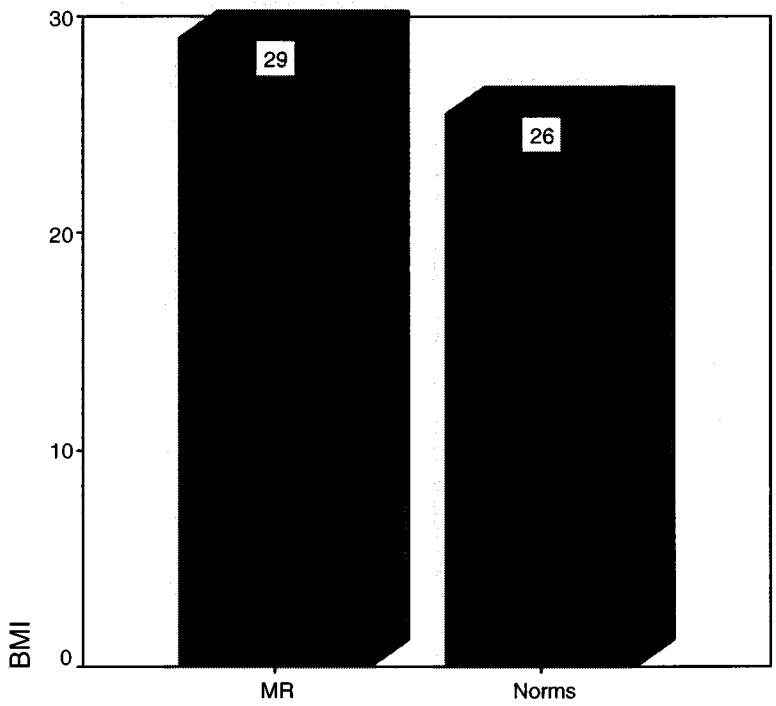


FIGURE 4. Means of BMI between adults with and without MR

[3] Sourse: Vartiainen et al.(1993)

Cardiovascular endurance

Cardiovascular endurance was measured indirectly by the one-mile walking field test. The calculated mean score for the participants was 29,1 ml/kg/min whereas the mean score for the norms[4] was 38 ml/kg/min. One sample t-test showed very significant difference between those means [t(53) = -5,926, p = .000]. (Fig. 5).

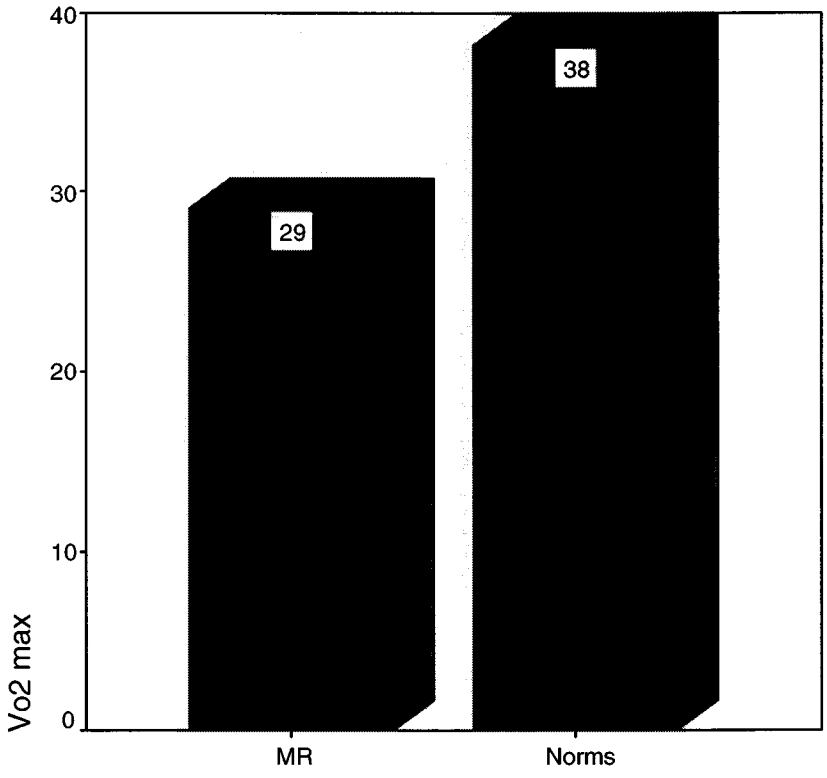


FIGURE 5. Means of Vo2 max between adults with and without MR

[4] Source: Viljanen, Viitasalo & Kujala (1990). In Kuntotestauksen perusteet (1994)

Muscular strength

Muscular strength was tested by the hand-grip dynamometer. The mean score was 3,4 Nt/kg which was significantly lower than the mean score of 5.9 Nt/Kg for the norms[5], [t(58) = -13,257, p = .000] Fig. 6.

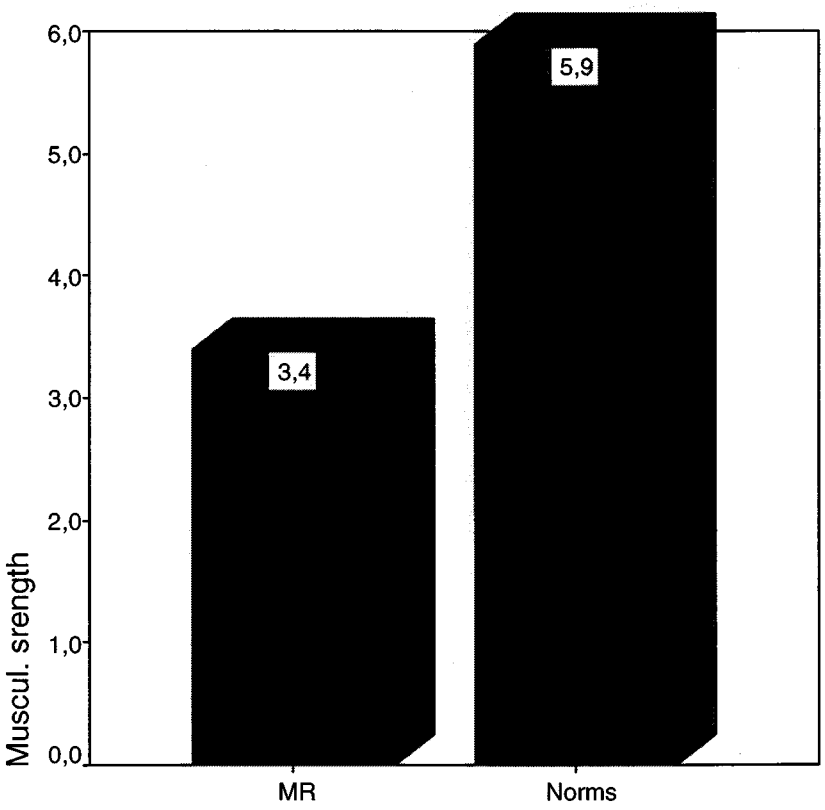


FIGURE 6. Means of muscular stength between adults with and without MR

[5] Source: Oja & Tuxworth (1995)

Fine motor skills

Fine motor skills were measured by the Purdue pegboard test. The mean score was 8,1 pegs/30 sec whereas the mean score of the norms was 16 pegs/30 sec. The norm[6] subjects were adults aged 31-40 years old. The difference between those means was very significant [t(63) = -60,418 p = .000] and shown in Fig. 7.

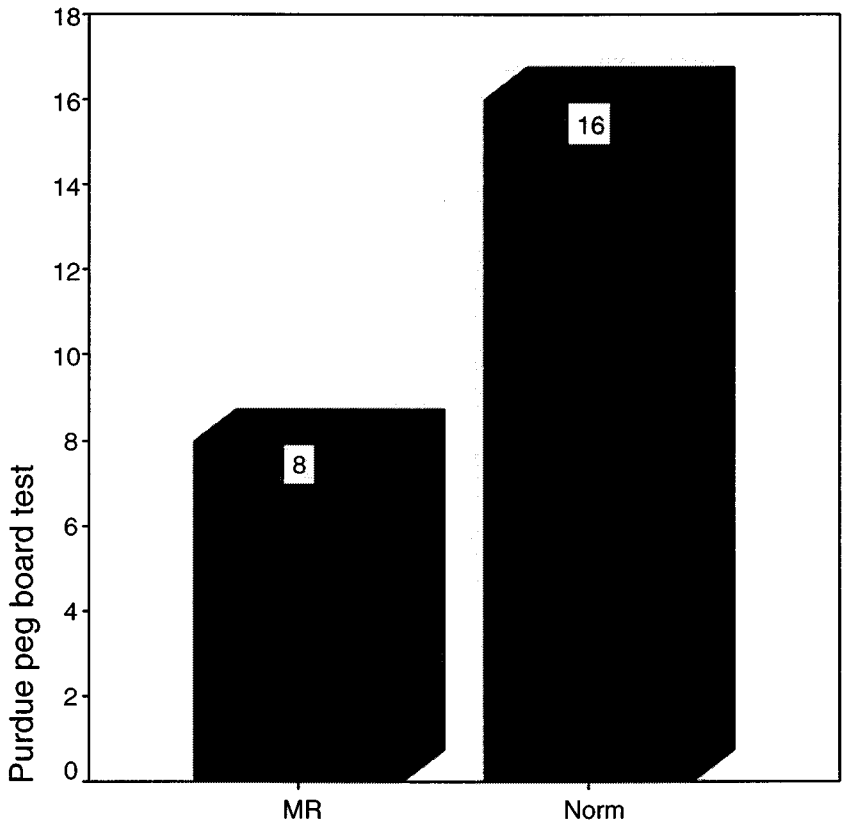


FIGURE. 7. Means of purdue peg board test between adults with and without MR

[6] Source: Yeudall et al. (1986)

7.1.2 Differences of health-related fitness between genders

The differences of HRF between males and females with MR were also examined (Table 2). This table indicates that men had better mean scores than women in five out of six HRF variables. Specifically, by independent t-test (Table 3), significant difference was revealed only for sit-ups [t(54,292) = -2.502, p = .015], BMI [t(62) = 2.077, p = .042], and muscular strength [t(53,645) = -4,732, p = .000].

Table 2. Means of HRF variables for men and women

	GENDER	N	Mean	Std. Deviation
Muscul. endur.	Women	25	11.1200	9.7182
	Men	35	20.2286	18.2097
Static balance	Women	27	10.8148	14.1205
	Men	36	18.0000	23.8268
Fine motor skills	Women	27	8.5000	2.9742
	Men	37	7.8405	3.1953
BMI	Women	27	31.4370	9.1132
	Men	37	27.2224	7.1223
Muscul. strength	Women	24	2.5667	.7817
	Men	35	3.9914	1.5106
Vo2 max	Women	22	26.2367	8.0444
	Men	32	31.1353	12.7239

Note: the lower the score in BMI the better

Table 3. Independent t-test between men and women with MR

	t-test for Equality of Means			
	t	df	Sig. (2-tailed)	Std. Error Difference
Sit-ups	-2.502	54.292	.015	3.6403
Static balance	-1.493	58.257	.141	4.8119
Purdue	.839	62.000	.405	.7858
BMI	2.077	62.000	.042	2.0293
Muscul. strength	-4.732	53.645	.000	.3011
Vo2 max	-1,597	52.000	.116	3.0672

7.2 Level of adaptive behavior

Another main issue in this study was to analyze the level of AB for adults with MR. Selected six variables to measure AB embraced fifty one areas. These six variables were: self-care, communication/community use, mobility, vocational/prevocational skills, self-direction/responsibility, and independent function. The reliability of these variables was high, Cronbach alpha = .8611 (Appendix 3). The level of AB can be seen in Table 4 (1 = highest level, 5 = lowest level). In four variables of AB (self-care, communication, mobility and self-responsibility) the level was high.

Table 4. Level of adaptive behavior

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Self-care	57	2.40	1.00	3.40	1.6193	.6704
Indep. Function	55	3.55	1.00	4.55	2.8000	.9775
communication	56	3.50	1.00	4.50	1.9405	.7159
mobility	58	2.50	1.00	3.50	1.6121	.5945
work	58	3.75	1.00	4.75	2.6595	.8321
responsibillity	58	2.00	.29	2.29	1.1970	.4597

Differences between genders in AB were investigated by using independent t-test (Appendix 5). There were no statistical differences between men and women in all six AB variables, except for communication where women had better score [t(54) = -2.282, p = .026] (Fig. 8).

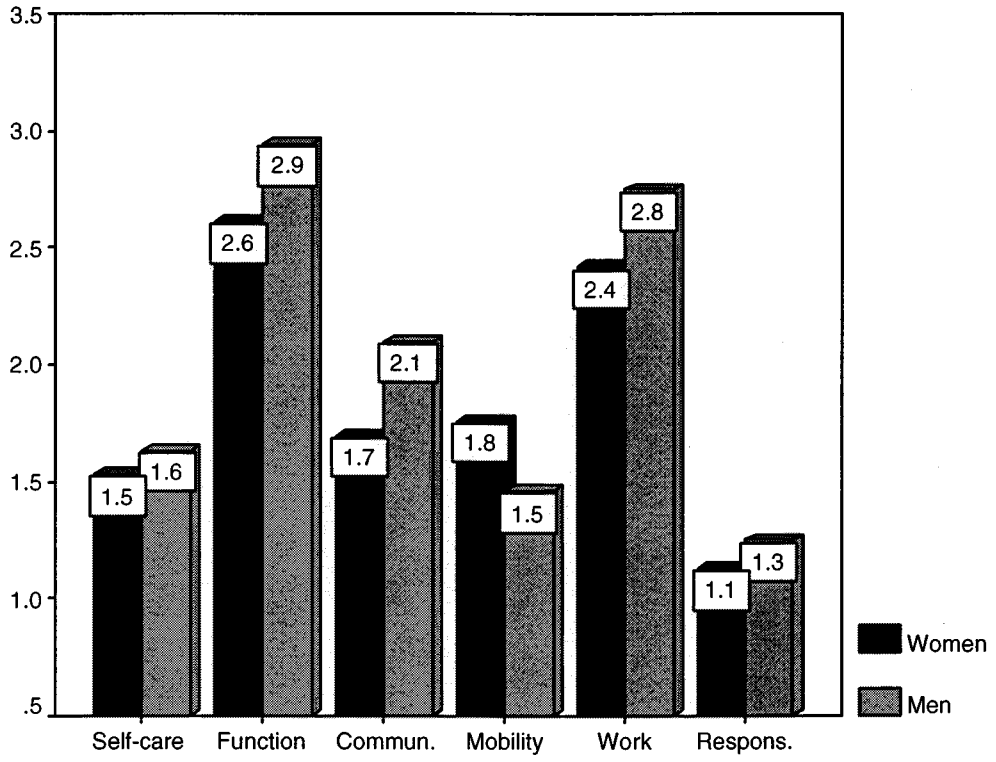


FIGURE 8. Mean scores for men and women in AB variables

7.3 Relationship between health-related fitness and adaptive behavior

Using the pearson product moment correlation coefficient significant negative correlation between HRF and AB was found in most of the variables (Table 5). That is, the less the fitness level the less the AB level. In addition, mobility was significantly correlated with all HRF variables except for BMI.

Table 5. Pearson correlations between health related fitness and adaptive behavior

		Sit-ups	Static balance	Purdue peg test	BMI	Muscul. strength	Vo2 max
Self-care	Pearson Correlation	-.258	-.440**	-.592**	-.059	-.245	-.045
	Sig. (2-tailed)	.060	.001	.000	.661	.080	.763
	N	54	57	57	57	52	47
Function	Pearson Correlation	-.036	-.470**	-.666**	-.255	-.130	-.187
	Sig. (2-tailed)	.798	.000	.000	.060	.367	.213
	N	52	55	55	55	50	46
Communication	Pearson Correlation	-.033	-.319*	-.336*	-.272*	-.007	.264
	Sig. (2-tailed)	.811	.016	.011	.042	.960	.073
	N	54	56	56	56	52	47
Mobility	Pearson Correlation	-.332*	-.432**	-.479**	.151	-.350*	-.437**
	Sig. (2-tailed)	.013	.001	.000	.257	.010	.002
	N	55	58	58	58	53	48
Work	Pearson Correlation	-.240	-.427**	-.477**	-.006	-.333*	-.188
	Sig. (2-tailed)	.078	.001	.000	.962	.015	.200
	N	55	58	58	58	53	48
Responsibillity	Pearson Correlation	-.129	-.393**	-.296*	-.104	-.310*	-.155
	Sig. (2-tailed)	.350	.002	.024	.439	.024	.293
	N	55	58	58	58	53	48

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Differences among health related fitness levels in adaptive behavior variables were studied as an extension to the correlation of AB and HRF. We divided the participants in three groups: low (=1), moderate (=2) and high (=3) fitness level. The main purpose was to investigate to what extent the scores on AB variables may differ on different fitness levels. To do this, the raw data of the HRF variables were tranformed into Z-scores and the overall Z-fitness level was computed. Secondly, the participants were grouped in equal intervals regarding their Z-fitness distribution at the scatter plot (Appendix 6). According to the scatter plot, the participants were divided as following: from -.5 and lower equals to low fitness level (n=16). From -.5 to .5 corresponds to moderate fitness level (n=30). And from .5 and higher addresses the high fitness level (n=18).

Based on this HRF distribution, the one-way ANOVA was used to measure differences between HRF levels in AB variables (Table 6). From the table it can be seen that significant difference existed among the three HRF levels in self-care, mobility, and work. By using Tukey's post-hoc test (Appendix 7), it appeared that for self-care there was a significant difference between the participants with low and high HRF. The same also appeared in work, whereas in mobility a difference was obtained among all of the three HRF groups (low, moderate, high). By comparing the means between the three HRF groups and the AB variables (self-care, mobility, work) the participants with high HRF had higher scores in all three AB variables than those with low HRF (Table 7). Therefore, the higher the fitness level the higher the AB.

Table 6. One-way ANOVA between health related fitness levels and adaptive behavior

		Sum of Squares	df	F	Sig.
Self-care	Between Groups	3.571	2	4.464	.016
	Within Groups	21.598	54		
	Total	25.169	56		
Function	Between Groups	4.611	2	2.552	.088
	Within Groups	46.983	52		
	Total	51.593	54		
Communic.	Between Groups	.611	2	.587	.560
	Within Groups	27.580	53		
	Total	28.190	55		
Mobility	Between Groups	5.012	2	9.108	.000
	Within Groups	15.134	55		
	Total	20.147	57		
Work	Between Groups	6.576	2	5.499	.007
	Within Groups	32.886	55		
	Total	39.462	57		
Responsibillity	Between Groups	1.229	2	3.126	.052
	Within Groups	10.815	55		
	Total	12.044	57		

Table 7. Means comparison between levels of HRF and AB variables

HRF		Self-care	Mobility	Work
1 = Low	Means	1.8800	2.0333	3.1000
	SD	.7867	.6999	.5886
2 = Moderate	Means	1.6963	1.5982	2.6875
	SD	.6466	.5152	.8488
3 = High	Means	1.2200	1.2167	2.1667
	SD	.3840	.2814	.7830

8 DISCUSSION

The purpose of this study was to investigate selected aspects of QOL for adults with MR, specifically their HRF and AB. In addition, a statistical trial was made to examine possible relationship between the variables of HRF and AB as well as differences in AB scores between different HRF levels.

8.1 Level of health related fitness

By using a battery of different tests the level of health related fitness between adults with MR and their counterparts as well as between males and females was examined. As it was expected, adults with MR exhibited significantly lower scores in all HRF variables compared with their age peers. The variance among the subjects was high. This result is in agreement with several other studies (Cressler et al. 1988; Fernhall & Tymeson 1987; Fernhall et al. 1988; Fernhall & Tymeson 1988; Kittredge et al. 1994; Lavay et al. 1990; Pitetti et al. 1988; Pitetti & Tan 1990; Seidl et al. 1987).

Further, it has been identified that several factors could cause low levels of HRF. Specifically, it has been proved that sedentary lifestyles, poor physical activity habits, obesity, physiological differences (e.g., low maximal heart rates), medical considerations, physical characteristics, poor coordination, lack of instruction quality, living conditions, prominent behavioral characteristics (e.g., abnormal fears, hyperactivity) are some of the factors which may account for the inferior scores in fitness level of individuals with MR. In addition, problems in validity and reliability of the measurements, unfamiliarity with tests or test personnel, and problems in motivation, understanding and cadence adherence may influence negatively the performance of this population in HRF variables. (Fernhall & Tymeson 1987; Fernhall et al. 1988; Fernhall et al. 1989; Fernhall 1993; Kelly et al. 1986; Lavay et al. 1990; Pitetti & Tan 1990; Seidl et al. 1987; Shephard 1990, 170, 239.)

Considering this study, there was little limitation in HRF performance due to lack of validity or reliability, poor motivation during test performance, and cadence adherence, since almost all of the tests of the battery have been proved valid and reliable even with

limited motivation considerations by participants. On the contrary, the main cause of these results could be sedentary lifestyles and obesity as well as lack of motivation to participate in physical activities. Further, low maximal heart rates could be a partial reason since 30% of the subjects were persons with DS. That is, individuals with DS have a low aerobic capacity (defined by Vo2 peak) and lower peak heart rates than their peers with MR who do not have DS (Fernhall et al. 1996). The low peak heart rates may be related to the lower peripheral oxygen extraction, requiring a higher cardiac output to maintain oxygen consumption (Pitetti et al. 1992).

Nevertheless, future studies should be conducted to examine the validity of the one mile-walking test in women and among varying defined levels of MR. The reliability and validity of the purdue peg board test for individuals with MR should be also considered a subject of investigation in the future. In general and in relation to this study, more research is needed in overcoming possible problems in administration, validity and reliability of the tests as well as in comprehension, and motivation on the part of the participants. Further, more norms are required in static balance and purdue peg board test for people with MR. Lastly, issues of establishing familiarization protocols with the recommended criteria for the advancement of a participant to the real test should be considered (Rintala, McCubbin & Dunn 1995).

Regarding the differences between males and females, there were significant differences in muscular strength and endurance as well as in body mass index with men scoring better than women. As for BMI there is consent to studies that women are overweight compared with men (Kelly et al. 1986; Pitetti et al. 1988; Reid et al. 1985). Regarding the other variables the results are varied. For example, in the study of Fernhall et al. (1989) there was no significant difference between men and women in CVE, whereas in the study of Fernhall et al. (1996) males had better scores than females in the same variable. Neverhteless, there are limited number of studies conducted in this topic, thus more research is needed in gender differences for HRF and possible causes for these differences.

Consequently, according to the results of this study, HRF is low in individuals with MR though it is a significant component in their lives and maybe more important than that of

their counterparts' lives. A reason for the importance of HRF in persons with MR is that success or failure in employment is often depending upon one's capabilities to efficiently sustain long periods of moderate physical activity. It is also more likely for individuals with MR to use physical rather than cognitive skills in work related settings which enhances the requirement of obtaining satisfactory fitness level. An adequate level of HRF would allow such persons to participate in any kind of activities (leisure, recreational, competitive) which will facilitate a more productive and healthy pattern of living and offset the risk factors associated with inactivity. (Croce & Horvat 1992; Deener & Horvat 1995; Eichstaedt & Lavay 1992, 361-365; Fernhall & Tymeson 1988.) In addition, participation in physical activities can develop, improve or maintain social and communication skills, self-concept and self-esteem, stress management, empowerment, cognitive skills and generally independency (Berger 1996; Dunn & Sherrill 1996; Sherrill 1997). Therefore, adequate physical activity is an important contributor to QOL for individuals with MR.

Physical fitness for persons with MR (including DS) can be enhanced by well conducted training programs which must be motivational, enjoyable, in accordance to physical fitness principles (in case the goal is improvement of fitness), and in combination with dietary interventions for decreasing percent body fat (Anchuthengil et al. 1992; Chanias et al. 1998; Combs & Jansma 1990; Croce 1990; Croce & Horvat 1992; Eberhard et al. 1997; Horvat, Croce & Mc Ghee 1993; Rimmer & Kelly 1991; Suomi et al. 1995; Tomporowski & Ellis 1984). Yet, more research is needed in programs using behavior management techniques for identifying the most efficient ways to obtain positive behaviors and eliminate negative ones.

8.2 Level of adaptive behavior

The investigation of the level of AB was also one of the purposes of this study. The participants' scores in AB variables were high except for work and independent function for which the values were close to moderate. As for the possible differences in AB variables between genders, there were no statistical significant differences except for communication where men had a lower score. Possible explanations for high AB scores

could be that most of the participants were living in group homes, their own or parental homes and very few in institutions. Participants had also mild to moderate MR which is a significant factor for high AB skills.

The findings of this study are in congruence with previous research studies which have revealed that individuals who are deinstitutionalized (transfer from large institutions to smaller facilities such as group homes) and have mild/moderate MR show better scores in AB skills than those who are institutionalized and have severe or profound MR. Deinstitutionalized facilities are smaller, more domestic in appearence and maybe more integral into neighboring communities providing extensive and structured programs. Residents in these types of placements are more independent like the participants of this study, though the trend to serve persons with severe MR in deinstitutionalized settings has increased. (Cunningham & Mueller 1991; Fine, Tangeman & Woodard 1990; Kleinberg & Galligan 1983; Larson & Lakin 1989; Mac Eachron 1983; Maisto & Hughes 1995; Rose et al. 1993; Voelker et al. 1990.) Yet, not everybody is in favour of deinstitutionalization and especially the parents. This happens due to poor information regarding the benefits of a move to a group home. (Spreat, Telles, Conroy, Feinstein & Colombatto 1987.) Therefore, more studies are required regarding relative merits of a movement to deinstitutionalized placements (Maisto & Hughes 1995).

The participants in this study had lower scores in work and independent functioning compared to other AB scores. Maybe, the services were such that the participants did not have the chance to develop their possible work and independent functioning abilities. This could be very possible for those living with their parents or in institutions. Thus, it would be worthwhile in the future to investigate the different kinds of programs offered in different settings together with possible outcomes regarding AB.

Regarding the differences in AB by gender, there is lack of research and this issue should be considered in the future. The findings in this study are in congruence with those of Fine, Tangeman & Woodard (1990) who found higher total scores in AB functioning for females than males. More research is needed in this issue. Of course, the kind of the program, environmental and cultural deviations as well as individual characteristics may have great impact on AB functioning.

In conclusion, AB is an important factor in independent functioning in daily activities for persons with MR and should be taken into consideration when conducting intervention programs for this population. Independency and freedom in life choices are of major significance for one's QOL and especially for someone with MR.

8.3 Relationship between health related fitness and adaptive behavior

In order to better understand the importance of AB and HRF as significant components of QOL for people with MR we tried to investigate possible relationship between them. In addition, possible differences in AB between three overall fitness groups (low, moderate, high) were examined. The findings showed significant negative relationships between most of the AB and HRF areas. This means that the lower the fitness level the lower the AB. Mobility was correlated with all HRF variables except for BMI which seems that mobility is a very important factor in achieving well in HRF variables and maintaining a health related QOL. Muscular strength was also highly correlated with work which reveals once more its importance in vocational requirements regarding adults with MR.

This kind of relationship presented above could have been better comprehended by observing the differences among different levels of fitness in AB variables. Specifically, those with the highest overall fitness level had better scores in self-care and work than those with the lowest, whereas in mobility the difference was significant among all the three fitness levels. This suggests the importance of HRF in independent functioning for individuals with MR. However, more consciousness is required in this aspect since the results of this study revealed that adults with MR have lower scores in all HRF variables than their age peers. On the contrary, their AB level was high. Therefore, it is not clear if HRF and AB are always interrelated and this should be aspect viewed in the future.

Nevertheless, HRF and AB are significant components of QOL and specialists who work with people with MR should stress both variables in their curriculum programs. Intelligence should not be viewed as a limitation in the opportunities offered to

individuals with MR. The future of those persons must be viewed in a non-categorical approach with respect to uniqueness and individuality offering them more opportunities for a better health related QOL.

References

Allen, R.M., Cortazzo, A.D., & Adamo, C. (1970). Factors in an adaptive behavior checklist for use with retardates. *Training School Bulletin*, **67**, 144-157. This article was found in Lahtinen, U. (1986). *Begåvningshandikappad ungdom i utveckling: En uppföljningsstudie av functionsförmåga och fysisk aktivitet hos begåvningshandikappade ungdomar i olika livsmiljöer. Studies in Sport, Physical Education and Health 21.* Jyväskylä: University of Jyväskylä.

American College of Sport Medicine. (1990). The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults: A position stand. *Medicine and Science in Sports and Exercise*, **22**, 265-274.

American College of Sports Medicine. (1992). *ACSM fitness book.* Champaign, IL: Leisure press. This book was found in Rimmer, J.H., Braddock, D., & Fujiura, G. (1994). Congruence of three risk indices for obesity in a population of adults with mental retardation. *Adapted Physical Activity Quarterly*, **11**, 396-403.

Anchuthengil, J.D., Nielsen, D.H., Schulenburg, J., Hurst, R., & Davis, M.J. (1992). Effects of an individualized treadmill exercise training program on cardiovascular fitness of adults with mental retardation. *Journal of Orthopaedic and Sports Physical Therapy*, **16**, 220-228.

Baker, A.M. (1989). Nature of adaptive behavior deficits among individuals who are moderately-severely mentally retarded in the West Bank. *Education and Training in Mental Retardation*, **24**, 201-206.

Baumeister, A.A., & Muma, J.R. (1975). On defining mental retardation. *Journal of Special Education*, **9**, 293-306.

Berger, B.G. (1996). Psychological benefits of an active lifestyle: What we know and what we need to know. *Quest*, **48**, 330-353.

Binet, A., & Simon, T. (1905). New methods for the diagnosis of the intellectual level of subnormals. *L'Annee Psychologique*, **11**, 191-244. This article was found in Jenkins, J.J., & Paterson, D.G. (eds) (1961). *Studies in individual differences.* NY: Appleton-Century-Crofts.

Borthwick-Duffy, S.A. (1992). Quality of life and quality of care in mental retardation. This reference was found in Felce, D., & Perry, J. (1995). Quality of life: Its definition and measurement. *Research in Developmental Disabilities*, **16**, 51-74.

Brown, R.I. (ed). (1997). *Quality of life for people with disabilities. Models, research and practice* (2nd ed). Great Britain: Stanley Thornes.

Chanias, A.K., Reid, G., & Hoover, M.L. (1998). Exercise effects on health-related physical fitness of individuals with an intellectual disability: A meta-analysis. *Adapted Physical Activity Quarterly*, **15**, 119-140.

Clausen, J. (1967). Mental deficiency - Development of a concept. *American Journal of Mental Deficiency*, **71**, 727-745. This article was found in Spreat, S., Roszkowski, M.J., & Isett, R.D. (1983). Assessment of adaptive behavior in the mentally retarded. *Advances in Mental Retardation and Developmental Disabilities*, **1**, 45-95.

Clausen, J. (1968). A comment on Halpern's note. *American Journal of Mental Deficiency*, **72**, 950. This article was found in Spreat, S., Roszkowski, M.J., & Isett, R.D. (1983). Assessment of adaptive behavior in the mentally retarded. *Advances in Mental Retardation and Developmental Disabilities*, **1**, 45-95.

Clausen, J. (1972a). Quo Vadis, AAMD? *Journal of Special Education*, **6**, 51-60.

Clausen, J. (1972b). The continuing problem of defining mental deficiency. *Journal of Special Education*, **6**, 97-106.

Close, D.W., & Halpern, A.S. (1988). *Transitions to supported living, in community residences for persons with developmental disabilities: Here to stay.* (eds M.P. Janicki, M.W. Krauss, & M.M. Seltzer). Baltimore: Brookes. This book was found in Brown, R.I. (1997). *Quality of life for people with disabilities. Models, research and practice* (2nd ed).Great Britain: Stanley Thornes (p.63).

Combs, C.S., & Jansma, P. (1990). The effects of reinforcement-based fitness training on adults who are institutionalized and dually diagnosed. *Adapted Physical Activity Quarterly*, **7**, 156-169.

Compton, D.M., Eisenman, P.A., & Henderson, H.L. (1989). Exercise and fitness for persons with disabilities. *Sports Medicine*, **7**, 150-162.

Cressler, M., Lavay, B., & Giese, M. (1988). The reliability of four measures of cardiovascular fitness with mentally retarded adults. *Adapted Physical Activity Quarterly*, **5**, 285-292.

Croce, R.V. (1990). Effects of exercise and diet on body composition and cardiovascular fitness in adults with severe mental retardation. *Education and Training in Mental Retardation*, **25**, 176-187.

Croce, R., & Horvat, M. (1992). Effects of reinforcement based exercise on fitness and work productivity in adults with mental retardation. *Adapted Physical Activity Quarterly*, **9**, 148-178.

Cunningham, P.J., & Mueller, C.D. (1991). Individuals with mental retardation in residential facilities: Findings from 1987 National medical expenditure survey. *American Journal on Mental Retardation*, **96**, 109-117.

Deener, T.M., & Horvat, M. (1995). Effects of social reinforcement and self-recording on exercise duration in middle school students with moderate mental retardation. *Clinical Kinesiology*, **49**, 28-33.

Dunn, J.,M., & Sherrill, C. (1996). Movement and its implications for individuals with disabilities. *Quest*, **48**, 378-391.

Dunn, J.M. (1997). *Special physical education. Adapted, individualized, Developmental* (7th ed). Madison, WI: Brown & Benchmark.

Eberhard, Y., Eterradossi J., & Debu, B. (1997). Biologogical changes induced by physical activity in individuals with Down's Syndrome. *Adapted Physical Activity Quarterly*, **14**, 166-175.

Edgerton, R.B., Bollinger, M., & Herr, B. (1992). The cloak of competence: after two decades. *American Journal of Mental Deficiency*, **88**, 345-351.

Eichstead, C.B., & Lavay, B.W. (1992). *Physical activity for individuals with mental retardation*. Champaign, IL: Human Kinetics.

Felce, D., & Perry, J. (1995). Quality of life: Its definition and measurement. *Research in Developmental Disabilities*, **16**, 51-74.

Felce, D., & Perry, J. (1997). The scope of the term and its breadth of measurument. In R.I. Brown, (ed). *Quality of life for people with disabilities. Models, research and practice* (2nd ed). United Kingdom: Stanley Thornes (p. 56-71).

Ferguson, R.V. (1997). Environmental design and quality of life. In R.I. Brown, (ed). *Quality of life for people with disabilities. Models, research and practice* (2nd ed). Great Britain: Stanley Thornes (p. 251-269).

Fernhall, B., & Tymeson, G. (1987). Graded exercise testing of mentally retarded adults: A study of feasibility. *Archives of Physical Medicine and Rehabilitation*, **68**, 363-365.

Fernhall, B., & Tymeson, G. (1988). Validation of cardiovascular fitness field tests for adults with mental retardation. *Adapted Physical Activity Quarterly*, **5**, 49-59.

Fernhall, B., Tymeson, G., & Webster, C.E. (1988). Cardiovascular fitness of mentally retarded individuals. *Adapted Physical Activity Quarterly,* **5**, 12-28.

Fernhall, B., Tymeson, G., Millar, L., & Burkett, L. (1989). Cardiovascular fitness testing and fitness levels of adolescents and adults with mental retardation including Down Syndrome. *Education and Training of the Mentally Retarded*, **24**, 133-138.

Fernhall, B. (1993). Physical fitness and exercise training of individuals with mental retardation. *Medicine and Science in Sports and Exercise*, **25**, 442-450.

Fernhall, B., Pitetti, K.H., Rimmer, J.H., McCubbin, J.A., Rintala, P., Millar, A.L., Kittredge, J., & Burkett, L.N. (1996). Cardiorespiratory capacity of individuals with mental retardation including Down Syndrome. *Medicine and Science in Sports and Exercise,* **28**, 366-371.

Fidler, G.S. (1996). Life-style performance: From profile to conceptual model. *The American Journal of Occupational Therapy*, **50**, 139-147.

Fine, M.A., Tangeman, P.J., & Woodard, J. (1990). Changes in adaptive behavior of older adults with mental retardation following deinstitutionalization. *American Journal on Mental Retardation*, **94**, 661-668.

Flynn, M. (1989). *Independent living for adults with a mental handicap: A place of my own. London*: Cassell. This book was found in Brown, R.I. (ed) (1997). *Quality of life for people with disabilities. Models, research and practice* (2nd ed). Great Britain: Stanley Thornes (p. 63).

Frey, B., & Rimmer, J.H. (1995). Comparison of body composition between German and American adults with mental retardation. *Medicine and Science in Sports and Exercise*, **27**, 1439-1443.

Goode, D.A. (ed) (1994). *Quality of life for persons with disabilities: International perspectives and issues*. Cambridge, MA: Brookline Books.

Greenspan, S. (1997). Dead manual walking? Why the 1992 AAMR definition needs redoing. *Education and Training in Mental Retardation and Developmental Disabilities*, **32**, 179-190.

Grossman, H.J. (ed). (1983). *Classification in mental retardation*. Washington, D.C: American Association on Mental Deficiency. This book was found in Siperstein, G.N. (1992). Social competence: An important construct in mental retardation. *American Journal on Mental Retardation*, **96**, 3-6.

Heber, R. (1961). A manual on terminology and classification in mental retardation. *American Journal of Mental Deficiency* (Monogr. Suppl.). This article was found in Nihira, K. (1969). Factorial dimensions of adaptive behavior in adult retardates. *American Journal of Mental Deficiency*, **73**, 868-878.

Hellison, D.R., & Templin, T.J. (1991). *A reflective approach to teaching physical education*. Champaign IL: Human Kinetics.

Hoover, J.H., Wheeler, J.J., & Reetz, L.J. (1992). Development of a leisure satisfaction scale for use with adolescents and adults with mental retardation: Initial findings. *Education and Training in Mental Retardation*, **27**, 153-160.

Horvat, M., Croce, R., & McGhee, T. (1993). Effects of a circuit training program on individuals with mental retardation. *Clinical Kinesiology*, **47**, 71-77.

Howley, E.T., & Franks, B.D. (1997). *Health fitness instructor's handbook* (3rd ed). Champaign, IL: Human Kinetics.

Hughes, C., Hwang, B., Kim, J., Eisenman, L.T., & Killian, D.J. (1995). Quality of life in applied research: A review and analysis of empirical measures. *American Journal on Mental Retardation*, **99**, 623-641.

Kelly, L.E., Rimmer, J.H., & Ness, R.A. (1986). Obesity levels in institutionalized mentally retarded adults. *Adapted Physical Activity Quarterly*, **3**, 167-176.

Kioumourtzoglou, E., Batsiou, S., & Theodorakis, Y. (1995). Age difference and physical fitness levels of mentally retarded and nonretarded individuals. *International Journal of Physical Education*, **32**, 24-28.

Kittredge, J.M., Rimmer, J.H., & Looney, M.A. (1994). Validation of the Rockport fitness walking test for adults with mental retardation. *Medicine and Science in Sports and Exercise*, **26**, 95-102.

Kleinberg, J., & Galligan, B. (1983). Effects of deinstitutionalization on adaptive behavior of mentally retarded adults. *American Journal of Mental Deficiency*, **88**, 21-27.

Koutsouki, D. (1998). *Kinhtikes diataraxes kai exelixh: Thewria kai methodologia.* [Movement disabilities: Theory and methodology]. Athens: Athlotupo.

Krebs, P.L. (1995). Mental retardation. In Winnick, J.P. (ed) (1995). *Adapted Physical Education and Sport* (2nd ed). Champaign, IL: Human Kinetics. (p. 93-109).

Lahtinen, U. (1986). *Begåvningshandikappad ungdom i utveckling: En uppföljningsstudie av functionsförmåga och fysisk aktivitet hos begåvningshandikappade ungdomar i olika livsmiljöer. Studies in Sport, Physical Education and Health 21.* Jyväskylä: University of Jyväskylä.

LaPorte, R.E., Dearwater, S., Cauley, J.A., Slemenda, C., & Cook, T. (1985). Physical activity or cardiovascular fitness: Which is more important for health? *The Physician and Sports Medicine*, **13**, 145-149.

Larson, S.A., & Lakin, K.C. (1989). Deinstitutionalization of persons with mental retardation: Behavioral outcomes. *Journal of the Association for Persons with Severe Handicaps*, **14**, 324-332.

Lavay, B., Reid, G., & Cressler-Chaviz, M. (1990). Measuring the cardiovascular endurance of persons with mental retardation: A critical review. *Exercise and Sport Science Review*, **18**, 263-290.

Leland, H., Shellhaas, M., Nihira, K., & Foster, R. (1967). Adaptive behavior: A new dimension in the classification of the mentally retarded. *Mental Retardation*, **4**, 359-387.

Luckasson, R., Coulter, D.L., Polloway, E.A., Reiss, S., Schalock, L.L., Snell, M.E., Spitalnik, D.M., & Stark, J.A. (1992). *Mental retardation: Definition, classification, and Systems of Supports*. Washington, DC: American Association on Mental Retardation. This book was found in Smith, J.D. (1994). The revised AAMR definition of mental retardation: The MRDD Position. E*ducation and Training in Mental Retardation and Developmental Disabilities*, **29**, 179-183.

MacEachron, A.E. (1983). Institutional reform and adaptive functioning of mentally retarded persons: A field experiment. *American Journal of Mental Deficiency*, **88**, 2-12.

Maisto, A.A., & Hughes, E. (1995). Adaptation to group home living for adults with mental retardation as a function of previous residential placement. *Journal of Intellectual Disability Research*, **39**, 15-18.

McCubbin, J.A, Rintala, P., & Frey, G.C. (1997). Correlational study of three cardiorespiratory fitness tests for men with mental retardation. *Adapted Physical Activity Quarterly*, **14**, 43-50.

Meyers, C.E., Nihira, K., & Zetlin, A. (1979). The measurement of adaptive behavior. In N.R. Ellis, (ed). *Handbook of mental deficiency, psychological theory and research* (2nd ed). Hillsdale, NY: Lawrence Erlbaum Associates. (p. 431-481).

Middleton, H.A., Keene, R.G., & Brown, G.W. (1990). Convergent and discriminant validities of the scales of independent behavior and the revised Vineland Adaptive Behavior Scales. *American Journal on Mental Retardation*, **94**, 669-673.

Nihira, K. (1969). Factorial dimensions of adaptive behavior in adult retardates. *American Journal of Mental Deficiency*, **73**, 868-878.

Nihira, K., Foster, R., & Spencer, L. (1968). Measurement of adaptive behavior: A descriptive system for mental retardates. *American Journal of Orthopsychiatry*, **38**, 622-634.

Oja, P., Tuxworth, B. (1995). *Eurofit for adults. Assessment of health-related fitness.* Finland: Council of Europe Publishing.

Paffenbarger, R.S., Hyde, R.T., Wing, A.L., Lee, I-M., Jung, D.L., & Kampert, J.B. (1993). The association of changes in physical activity level and other lifestyle characteristics with mortality among men. *The New England Journal of Medicine*, **328**, 538-545.

Pain, K., Dunn, M., Anderson, G., Darrah, J., & Kratochvil, M. (1998). Quality of life: What does it mean in rehabilitation? *Journal of Rehabilitation*, **64**, 5-11.

Pitetti, K.H., Fernandez, J.E., Pizarro, D.C., & Stubbs, N.B. (1988). Field testing: Assessing the physical fitness of mildly mentally retarded individuals. *Adapted Physical Activity Quarterly*, **5**, 318-331.

Pitetti, K.H., & Tan, D.M. (1990). Cardiorespiratory responses of mentally retarded adults to air-brake ergometry and treadmill exercise. *Archives of Physical Medicine and Rehabilitation*, **71**, 318-321.

Pitetti, K.H., & Campbell, K.D. (1991). Mentally retarded individuals - a population at risk? *Medicine and Science in Sports and Exercise*, **23**, 586-593.

Pitetti, K.H., Climstein, M., Campbell, K.D., Barrett, P.J., & Jackson, J.A. (1992). The cardiovascular capacities of adults with Down Syndrome: a comparative study. *Medicine and Science in Sports and Exercise*, **24**, 13-19.

Pitetti, K.H., Rimmer, J.H., & Fernhall B. (1993). Physical fitness and adults with mental retardation: An overview of current research and future directions. *Sports Medicine*, **16**, 23-56.

Polloway, E.A. (1997). Developmental principles of Luckasson et al. (1992) AAMR definition of mental retardation: A retrospective. *Education and Training in Mental Retardation and Developmental Disabilities*, **32**, 174-178.

Reddon, J.R., Gill, D.M., Gauk, S.E., & Maerz, M.D. (1988). *Purdue Pegboard: Test-retest estimates. Perceptual and Motor Skills*, **60**, 503-506.

Reid, G., Montgomery, D.L., & Seidl, C. (1985). Performance of mentally retarded adults on the canadian standardized test of fitness. *Canadian Journal of Public Health, 76*, 187-190.

Rimmer, J.H., & Kelly, L.E. (1991). Effects of a resistance training program on adults with mental retardation. *Adapted Physical Activity Quarterly*, **8**, 146-153.

Rimmer, J.H., Braddock, D., & Fujiura, G. (1994). Congruence of three risk indices for obesity in a population of adults with mental retardation. *Adapted Physical Activity Quarterly*, **11**, 396-403.

Rinne, M., & Toropainen, E. (1998). How to lead a group - practical principles and experiences of conducting a promotional group in health-related physical activity. *Patient Education and Counceling*, **33**, 69-76.

Rintala, P., Dunn, J.M., McCubbin, J.A., & Quinn, C. (1992). Validity of a cardiorespiratory fitness test for men with mental retardation. *Medicine and Science in Sports and Exercise*, **24**, 941-945.

Rintala, P., McCubbin, J.A., & Dunn, J.M. (1995). Familiarization process in cardiorespiratory fitness testing for persons with mental retardation. *Sports Medicine, Training and Rehabilitation*, **6**, 15-27.

Rintala, P., McCubbin, J.A., Downs, S.B., & Fox, S.D. (1997). Cross validation of the 1-mile walking test for men with mental retardation. *Medicine and Science in Sports and Exercise*, **29**, 133-137.

Romar, J-E., Lahtinen, U., Rintala, P., & Rusi, R. (1998). Health-related physical fitness, physical activity, and life quality of adults with mental retardation. In R.S. Feingold, C.R. Rees, G.T Barrette, L. Fiorentino, S. Virgilio, & E. Kowalski, (eds). Education for life: AIESEP- Adelphi proceedings. Garden City, NY: AIESEP/Adelphi (393-398).

Rose, K.C., White, J.A., Conroy, J., & Smith, D.M. (1993). Following the course of change: A study of adaptive and maladaptive behaviors in young adults living in the community. *Education and Training in Mental Retardation*, **28**, 149-154.

Sands, D.J., & Kozleski, E.B. (1994). Quality of life differences between adults with and without disabilities. *Education and Training in Mental Retardation and Developmental Disabilities*, **29**, 90-101.

Schalock, R.L., Keith, K.D., & Hoffman, K. (1990). *Quality of Life Questionnaire: Standardization Manual.* Mid-Nebraska Mental Retardation Services, Hastings, NE. This book was found in Brown, R.I. (ed) (1997). *Quality of life for people with disabilities. Models, research and practice* (2nd ed). Great Britain: Stanley Thorne (p. 63).

Seidl, C., Reid, G., & Montgomery, D.L. (1987). A critique of cardiovascular fitness testing with mentally retarded persons. *Adapted Physical Activity Quarterly*, **4**, 106-116.

Selän Suoritustestistö (1990). Helsinki: Invalidisäätiö.

Shephard, R.J. (1990). *Fitness in special populations.* Champaign IL: Human Kinetics.

Sherrill, C. (1997). Disability, Identity, and involvement in sport and exercise. In K. Fox, (ed.). *The physical self: from motivation to well-being.* Champaign, IL: Human Kinetics. (p. 257-286).

Sherrill, C. (1998). *Adapted physical activity, recreation and sport. Crossdisciplinary and lifespan* (5th ed.). Boston, MA: WCB Mc Craw-Hill.

Short, F.X. (1995). Physical fitness. In Winnick, J.P. (Ed). (1995). *Adapted physical education and sport* (2nd ed.). Champaign IL: Human Kinetics. (p. 243-252).

Singer, R.N. (1996). Moving toward the quality of life. *Quest*, **48**, 246-252.

Smith, J.D. (1994). The revised AAMR definition of mental retardation: The MRDD Position. *Education and Training in Mental Retardation and Developmental Disabilities*, **29**, 179-183.

Smith, J.D. (1997). Mental retardation as an educational construct: Time for a new shared view? *Education and Training in Mental Retardation and Developmental Disabilities*, **32**, 167-173.

Spreat, S., Roszkowski, M.J., & Isett, R.D. (1983). Assessment of adaptive behavior in the mentally retarded. *Advances in Mental Retardation and Developmental Disabilities*, **1**, 45-95.

Spreat, S., Telles, J.L., Conroy, J.W., Feinstein, C., & Colombatto, J.J. (1987). Attitudes toward deinstitutionalization: National survey of families of institutionalized persons with mental retardation. *American Association on Mental Retardation*, **25**, 267-274.

Spreen, O., & Strauss, E. (1998). *A compendium of neuropsychological tests. Administration, norms, and commentary* (2nd ed.). NY: Oxford University press.

Suni, J.H., Oja, P., Laukkanen, R.T., Miilunpalo, S.I., Pasanen, M.E., Vuori, I.M., Vartiainen, T-M., & Bös, K. (1996). Health-related fitness test battery for adults: Aspects of reliability. *Archives of Physical Medicine and Rehabilitation*, **77**, 399-405.

Suni, J., Oja, P., Miilunpalo, S., Fogelholm, M., & Vuori, I. (1997). *UKK-terveyskuntotestistö. Ohjaajan opas terveyskunnon mittaukseen. Luonnos 21.1.1997.* Tampere: UKK-Instituutti.

Suomi, R., Surburg, P.R., & Lecius, P. (1995). Effects of hydraulic resistance strength training on isokinetic measures of leg strength in men with mental retardation. *Adapted Physical Activity Quarterly*, **12**, 377-387.

Sytkowski, P.A., Kannel, W.B., & D'Agostino, R.B. (1990). Changes in risk factors and the decline in mortality from cardiovascular disease: The Framingham Heart Study. *The New England Journal of Medicine*, **322**, 1635-1641.

Taylor, S.J., & Bogdan, R. (1990). *Quality of life and the individual's perspective, in quality of life: Perspectives and issues* (Schalock, R.L. ed). Washington DC: American Association on Mental Retardation. This book was found in Brown, R.I. (ed) (1997). *Quality of life for people with disabilities. Models, research and practice* (2nd ed). Great Britain: Stanley Thornes (p. 62).

Thomas, J.R., & Nelson, J.K. (1996). *Research methods in physical activity* (3rd ed). Campaign IL: Human Kinetics.

Tomporowski, P.D., & Ellis, N. (1984). Effects of exercise on the physical fitness, intelligence, and adaptive behavior of institutionalized mentally retarded adults. *Applied Research in Mental Retardation*, **5**, 329-337.

Vartiainen, E., Jousilahti, P., Tamminen, M., Korhonen, H.J., Tuomilehto, J., Sundvall, J., Jauhiainen, M., & Puska, P. (1993). *Finriski '92: Tutkimus kansanterveydellisistä riskitekijöistä, niihin liittyvistä elintavoista, oireista ja terveyspalvelujen käytöstä.* Helsinki: Kansanterveyslaitoksen julkaisuja B9.

Viljanen, T., Viitasalo, J.T., & Kujala, U.M. (1990). Physical activity and aerobic power of healthy adults. World Congress on Sports for All. Book of abstracts, p. 21. Tampere. This book was found in Kuntotestauksen perusteet. (1994). Liikuntalääketieteen ja testaustoiminnan edistämisyhdistys Liite ry. Helsinki.

Voelker, S.L., Shore, D.L., Brown-More, C., Hill, L.C., Miller, L.T., & Perry, J. (1990). Validity of self-report of adaptive behavior skills by adults with mental retardation. *American Association on Mental Retardation*, **28**, 305-309.

Väisänen, E. (1973). *Adaptiivisen käyttäytymisen mittaaminen vajaamielispedagogiikassa.* Tutkimusraportti 10. Erityispedadogiikan laitos. Jyväskylän Yliopisto. This book was found in Lahtinen, U. (1986). *begåvningshandikappad ungdom i utveckling: En uppföljningsstudie av functionsförmåga och fysisk aktivitet hos begåvningshandikappade ungdomar i*

olika livsmiljöer. Studies in Sport, Physical Education and Health 21. Jyväskylä: University of Jyväskylä.

Wannamethee, G., & Shaper, A.G. (1992). Physical activity and stroke in British-middle aged men. *British Medicine Journal*, **304**, 597-601.

Wehmeyer, M.L., Kelchner, K., & Richards, S. (1996). Essential characteristics of self-determined behavior of individuals with mental retardation. *American Journal on Mental Retardation*, **100**, 632-642.

Wehmeyer, M., & Schwartz, M. (1998). The relationship between self-determination and quality of life for adults with mental retardation. *Education and Training in Mental Retardation and Developmental Disabilities*, **33**, 3-12.

Winnick, J.P. (ed) (1995). *Adapted physical education and sport* (2nd ed.). Champaign IL: Human Kinetics.

Yeudall, L.T., Fromm, D., Reddon, J.R., & Stefanyk, W.O. (1986). Normative data stratified by age and sex for 12 neuropsychological tests. *Journal of Clinical Psychology*, **42**, 918-946.

APPENDICES

Appendix 1

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

	Mean	Std Dev	Cases
1. ZV16 = Sit-ups	.1139	.9345	47.0
2. ZV20 = Static bal.	.1352	1.0472	47.0
3. ZV25 = Purdue peg	.1100	.8834	47.0
4. ZV192 = arm stren.	.0169	.8378	47.0
5. ZVO2 = Vo2 max	-.0125	1.0147	47.0
6. ZBMI = BMI	.1336	.6530	47.0
7. ZV27=flex.	.0983	.9729	47.0

Correlation Matrix

	ZV16	ZV20	ZV25	ZV192	ZVO2	ZBMI	ZV27
ZV16	1.0000						
ZV20	.2678	1.0000					
ZV25	.1496	.6253	1.0000				
ZV192	.5517	.3093	.2027	1.0000			
ZVO2	.6034	.3609	.3106	.5641	1.0000		
ZBMI	.4833	.0654	.0661	.5046	.8106	1.0000	
ZV27	.0089	.1365	.0524	.0995	-.0498	-.2507	1.0000

N of Cases = 47.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ZV16	.4815	11.1698	.5420	.4372	.6648
ZV20	.4602	10.9731	.4840	.4906	.6797
ZV25	.4853	12.2208	.3930	.4187	.7017
ZV192	.5785	11.3462	.5988	.4398	.6550
ZVO2	.6078	9.9954	.6863	.7967	.6207
ZBMI	.4618	12.9386	.4392	.7647	.6965
ZV27	.4970	14.3517	**.0176**	.1729	.7896

Reliability Coefficients 7 items

Alpha = .7239 Standardized item alpha = .7310

Appendix 2

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

	Mean	Std Dev	Cases
1.ZV16=sit-ups	.1139	.9345	47.0
2.ZV20=static bal.	.1352	1.0472	47.0
3.ZV25=purdue peg	.1100	.8834	47.0
4.ZV192=arm strength	.0169	.8378	47.0
5.ZVO2=Vo2 max	-.0125	1.0147	47.0
6.ZBMI=BMI	.1336	.6530	47.0

Correlation Matrix

	ZV16	ZV20	ZV25	ZV192	ZVO2	ZBMI
ZV16	1.0000					
ZV20	.2678	1.0000				
ZV25	.1496	.6253	1.0000			
ZV192	.5517	.3093	.2027	1.0000		
ZVO2	.6034	.3609	.3106	.5641	1.0000	
ZBMI	.4833	.0654	.0661	.5046	.8106	1.0000

N of Cases = 47.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ZV16	.3831	10.1095	.5669	.4368	.7511
ZV20	.3619	10.1747	.4610	.4904	.7817
ZV25	.3870	11.2344	.3946	.4156	.7907
ZV192	.4802	10.4319	.5946	.4162	.7460
ZVO2	.5095	8.8206	.7468	.7883	.7004
ZBMI	.3635	11.5436	.5368	.7293	.7647

Reliability Coefficients 6 items

Alpha = .7896 Standardized item alpha = .7944

Appendix 3

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

	Mean	Std Dev	Cases
1. Self-care	1.5925	.6266	53.0
2. Function	2.8062	.9424	53.0
3. Communic.	1.9340	.7289	53.0
4. Mobility	1.5849	.5738	53.0
5. WORK	2.6132	.8429	53.0
6. Respons.	1.2008	.4550	53.0

Correlation Matrix

	Self-care	Function	Communic.	Mobility	WORK	Respons.
Self-care	1.0000					
Function	.6950	1.0000				
Communic.	.5953	.5888	1.0000			
Mobility	.4110	.3689	.1593	1.0000		
WORK	.7144	.6257	.4362	.4047	1.0000	
Respons.	.7112	.6566	.6074	.3228	.7230	1.0000

N of Cases = 53.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
Self-care	10.1391	7.6181	.8154	.6714	.8125
Function	8.9253	6.3572	.7546	.5799	.8232
Communic.	9.7975	7.8747	.5928	.4808	.8488
Mobility	10.1466	9.1142	.4006	.2199	.8756
WORK	9.1183	6.8898	.7301	.6303	.8239
Respons.	10.5307	8.5293	.7882	.6576	.8321

Reliability Coefficients 6 items

Alpha = .8611 Standardized item alpha = .8733

Appendix 4

1. One-Sample T-Test for Sit-ups

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Sit-ups	60	16.4333	15.8118	2.0413

One-Sample Test

	Test Value = 30					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Sit-ups	-6.646	59	.000	-13.5667	-17.6513	-9.4821

2. One-Sample T-Test for Static balance

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Static bal.	63	14.9206	20.4192	2.5726

One-Sample Test

	Test Value = 60					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Static bal.	-17.523	62	.000	-45.0794	-50.2219	-39.9368

3. One Sample T-Test for Body Mass Index

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
BMI	64	29.0005	8.2258	1.0282

One-Sample Test

	Test Value = 25.5					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
BMI	3.404	63	.001	3.5005	1.4457	5.5552

4. One Sample T-Test for Vo2 max

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Vo2 max-1ml	54	29.1396	11.2356	1.5290

One-Sample Test

	Test Value = 38.2					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Vo2 max-1ml	-5.926	53	.000	-9.0604	-12.1271	-5.9937

5. One Sample T-Test for Hand-grip

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Hand-grip	59	3.4119	1.4416	.1877

One-Sample Test

	Test Value = 5.9					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Hand-grip	-13.257	58	.000	-2.4881	-2.8638	-2.1124

6. One sample T-Test for Purdue Pegboard test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Purdue peg-test	64	8.1188	3.0973	.3872

One-Sample Test

	Test Value = 16					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Purdue peg-test	-20.357	63	.000	-7.8813	-8.6549	-7.1076

Appendix 5

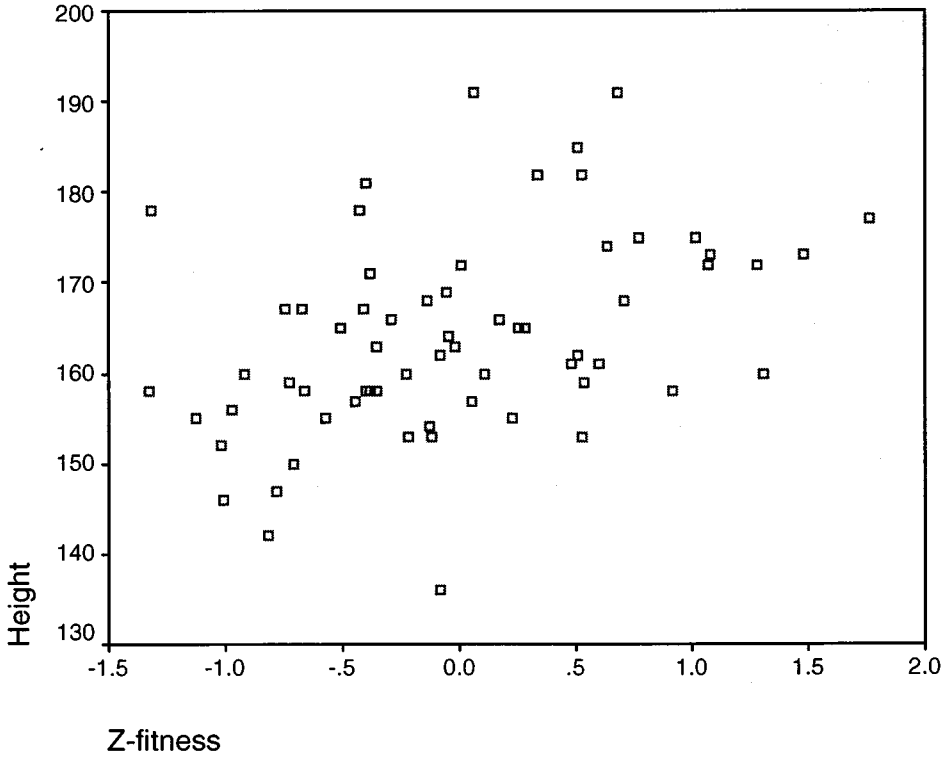
Independent T-test

Independent Samples T-Test between males and females in AB variables

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Self-care	Equal variances assumed	-.057	55	.954	-1.05E-02	.1826	-.3765	.3555
Function	Equal variances assumed	-.744	53	.460	-.1997	.2683	-.7379	
Communic.	Equal variances assumed	-2.282	54	.026	-.4278	.1874	-.8035	
mobility	Equal variances assumed	1.619	56	.111	.2531	.1563	-6.00E-02	.5662
work	Equal variances assumed	-1.315	56	.194	-.2898	.2204	-.7314	.1517
Responsibillity	Equal variances assumed	-.379	56	.706	-4.67E-02	.1235	-.2941	.2006

Appendix 6

Scatter- Plot



Scatter-plot of Z-fitness

*** Height was used only as an example**

Appendix 7

Post Hoc Tukey HSD Test

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) sfitness	(J) sfitness	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Self care	1.00	2.00	.1837	.204	.641	-.3071	.6745
		3.00	.6600*	.231	.016	.1035	1.2165
	2.00	1.00	-.1837	.204	.641	-.6745	.3071
		3.00	.4763	.204	.059	-1.452E-02	.9671
	3.00	1.00	-.6600*	.231	.016	-1.2165	-.1035
		2.00	-.4763	.204	.059	-.9671	1.452E-02
Function	1.00	2.00	3.728E-02	.313	.992	-.7180	.7925
		3.00	.6883	.359	.144	-.1785	1.5551
	2.00	1.00	-3.7278E-02	.313	.992	-.7925	.7180
		3.00	.6510	.313	.104	-.1042	1.4063
	3.00	1.00	-.6883	.359	.144	-1.5551	.1785
		2.00	-.6510	.313	.104	-1.4063	.1042
Communication	1.00	2.00	-.1255	.242	.863	-.7092	.4583
		3.00	.1214	.273	.897	-.5378	.7805
	2.00	1.00	.1255	.242	.863	-.4583	.7092
		3.00	.2468	.231	.537	-.3097	.8034
	3.00	1.00	-.1214	.273	.897	-.7805	.5378
		2.00	-.2468	.231	.537	-.8034	.3097
mobility	1.00	2.00	.4351*	.168	.032	3.082E-02	.8394
		3.00	.8167*	.192	.000	.3553	1.2780
	2.00	1.00	-.4351*	.168	.032	-.8394	-3.082E-02
		3.00	.3815	.168	.068	-2.275E-02	.7858
	3.00	1.00	-.8167*	.192	.000	-1.2780	-.3553
		2.00	-.3815	.168	.068	-.7858	2.275E-02
work	1.00	2.00	.4125	.247	.227	-.1835	1.0085
		3.00	.9333*	.282	.005	.2532	1.6135
	2.00	1.00	-.4125	.247	.227	-1.0085	.1835
		3.00	.5208	.247	.098	-7.514E-02	1.1168
	3.00	1.00	-.9333*	.282	.005	-1.6135	-.2532
		2.00	-.5208	.247	.098	-1.1168	7.514E-02
responsibillity	1.00	2.00	-.1262	.142	.649	-.4680	.2156
		3.00	.2286	.162	.342	-.1614	.6186
	2.00	1.00	.1262	.142	.649	-.2156	.4680
		3.00	.3548*	.142	.040	1.300E-02	.6965
	3.00	1.00	-.2286	.162	.342	-.6186	.1614
		2.00	-.3548*	.142	.040	-.6965	-1.300E-02

*. The mean difference is significant at the .05 level.