The Impact of Advancements in Science and Technology on Cypriots' Physical Activities over Time

Authors' contribution:

- A) conception and design
of the study
- B) acquisition of data
- C) analysis and interpretation
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- D) manuscript preparation
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ABSTRACT

Due to special historical circumstances, advancements in science and technology have affected various aspects of Cypriot people's life relatively late. However, since the modern way of life requires less and less compulsory physical activity, this has manifested itself recently in the spreading of a sedentary lifestyle in Cyprus also. The purpose of this paper is to present the changes in the frequency, intensity and type of physical activity throughout three Cypriot generations. It is based on a part of research carried out by survey method of the population of that consisted of secondary school students, their parents, and their grandparents. The sample was selected by stratified, random, and snowball selection (N = 1067). With the youngest generation, the data were collected in groups at their school by questionnaire; the members of other two groups answered the questionnaires individually. In order to analyze the data, the Wilcoxon two related sample test and chi-square analyses were performed. The results revealed that the older generations' everyday life encompassed more active elements in their childhood and youth than the youngsters' life comprises nowadays. Both intragenerational and intergenerational changes in daily living and health-related physical activity occurred, and the advancements in science and technology have had a contradictory impact on these processes. In the conclusions, the necessity of taking measures to stop the decline of physical activity is emphasized.

KEYWORDS

intragenerational changes, intergenerational changes, physical inactivity, way of life

Introduction

Physical activity is defined by the World Health Organization (2011) as any bodily movement produced by skeletal muscles that require energy expenditure. According to Bryant and McElroy (1997), physical activity cannot be defined in a monolithic sense, but four major categories can be distinguished: daily living, occupational, sport spectacle, and health-related physical activity. In older times, everyday life and work contained sufficient physical activity to satisfy the human body's need for it. Advancements in science and technology in the 20th century, which generally speaking can be characterized both by positive and negative consequences, have changed this situation, because during the second half of the 20th century the physically inactive way of life spread. Physical inactivity, which has been identified as the fourth-leading risk factor for global mortality, causes an estimated 3.2 million deaths globally (World Health Organization 2011).

Elements of a physically inactive way of life are growing worldwide, which is why the importance of physical activity is vastly evolving globally and, consequently, relevant researches are conducted both on international and national levels (Fügedi et al. 2009). Researchers deal with, among other issues, changes in work conditions (Digel 2005); individual preferences concerning mental or intellectual jobs; leaving behind manual labor and therefore aiming to achieve higher education (Hardmann & Stensel 2003, Fügedi et al. 2009); the relationship between physical activity and health (Hardman & Stensel 2003), with sedentary behavior as a predictor of adolescents' health (Tabak et al. 2012).

Due to special historical circumstances, mainly being a colony until 1960, the advancements in science and technology affected various aspects of Cypriot people's lives relatively late. According to Bathrellou et al. (2007), rapid urbanization, large amounts of migration, and major demographic changes only occurred in Cyprus in the last three decades. However, since the modern way of life has gained ground in Cyprus in the end, and this lifestyle requires less and less compulsory physical activity, the negative elements that can be derived from science and technology have also manifested themselves in the spreading of sedentary lifestyles in Cyprus, which is highly influenced by the citizens' socioeconomic characteristics (Christodoulides 2006). The acceleration of urbanization, the development of transportation and communication, and the increasing use of mass media and the internet resulted in the deterioration of the health of the Cypriot population, the latest sign of which is a severe obesity problem on the island (Savva et al. 2002, Lazarou & Sotiriades 2010).

Cypriot experts also paid attention to the one-sided preferences of the youngsters to complete their education with additional lessons after school. Since classes at primary and secondary school finish shortly after noon, children attend a number of lessons outside of school: first of all music, foreign languages, and art. As such, sports in private academies or sport clubs are of secondary importance. The same authors also studied the differences in physical activity between urban and rural schoolchildren in Cyprus. They revealed that although they have more access to sport equipment and facilities, kids from urban areas attend more private lessons not involving physical activity after school and they spend more time playing video games than rural school children both in summer and winter. On the other hand, rural schoolchildren have more access to natural spaces and to safe neighborhoods, and these factors probably drive them to playing outdoors (Loucaides et al. 2004).

In the above studies, mostly sport and exercise are included in physical activity, but there is little scientific evidence concerning the Cypriot population's daily living and health-related physical activity in the meaning of the term used by Bryant and McElroy (1997). There is even less scientifically based information about the changes in everyday physical activity in one's lifetime and with people belonging to different age groups. The purpose of this paper is to fill in this gap. Based on part of an empirical investigation, an attempt is made to present the intragenerational and intergenerational changes in the frequency, intensity, and the kind of daily life physical activity throughout three generations. In order to realize the objective of this study, the following research questions were formulated:

How have customs related to selected daily life and health-related physical activity changed within the lifetime of middle-aged and elderly Cypriots?

How did customs related to selected daily life and health-related physical activity change from generation to generation over the last decades?

Methods

Sample and procedure

The sample of this study was selected from Cyprus's gymnasium and lyceum students from the mainland, coastal and mountain areas of Cyprus, as well as the parents and grandparents of the students (N=1067). It consisted of three sub-samples: 741 students, 229 parents, and 97 grandparents. The students' sub-sample was selected by gradual, stratified, and random methods. It was followed by a snowball selection

for the parents' and grandparents' sub-sample, via the students. The average age in the three sub-samples was the following: mean age_{students}=15 (SD=3), mean age_{parents}=45 (SD=8), mean age_{grandparents}=75 (SD=5).

With the youngest generation, the data were collected in groups at their school by questionnaire. The questionnaires contained open-ended, multiple choice, and semantic differential questions (altogether 31 questions) out of which 13 Likert scale questions related to the intensity of physical activity on a daily and weekly basis. The respondents of the other two groups received their questionnaires via their young family members and answered the questions individually at home. The questionnaires were found to be highly reliable (Cronbach's alpha = 0.87 and 0.89, respectively). Each student gave useable answers. The response rate with the parents was 77.4%, and with the grandparents, 65.5%.

Measures

In this research, people's physical activities were measured by the frequency, duration, and intensity of a few selected elements of their daily living and health-related physical activity. Participation in traditional sports was not measured during the investigation. Based on the concept of Bryant and McElroy (1997), out of the daily living activities physical activities in the house (household duties, gardening, etc.), indoor walking and walking from and to classes or work, out of health-related physical activities regular vigorous physical activities (minimum 30 minutes on most days, running or biking fast, lifting weights or heavy objects), regular moderate physical activities (about 30 minutes, 5 days a week at any intensity, walking, biking, swimming) and not regular physical activities (sporadic running, walking, biking, swimming, playing, dancing) were selected as indicators of frequency, duration, and intensity.

Data analysis

The data were analyzed using the SPSS program for Microsoft. In order to identify how physical activities have changed within one's lifetime and between generations, data of retrospective nature were also needed. The adult respondents were asked to clarify the number of days per week and the amount of time per day they used to spend at the age of 12-18 for those physical activities that were given to them alternatively. Similar questions were put to the youngsters concerning present time. To compare the two sets of scores, the Wilcoxon two related sample test (Wilcoxon Signed Rank Test) was used. In order to compare the observed data with data we would expect to obtain, chi-square analyses were performed.

Results

Intragenerational changes of physical activity

The findings of the Wilcoxon two related sample test related to the middle-aged people show that the ranks changed negatively. The differences between the frequency of the middle-aged people's physical activity at the present and at the age of 12-18 are significant in all areas, except the physical activity in the house (gardening, housework, etc.). It means that the middle-aged Cypriot adult's daily routine comprises significantly less physical activity than it did in their childhood and adolescent years. They walk less indoors and less frequently to and from their work places. The fact that at the same time they have more household chores does not justify this modification. Moreover, there are fewer kinds of health-related exercises in their weekly and daily program. The most considerable decline occurred in the intensity of their existing physical activity; the decrease in their vigorous physical activity is the most spectacular (Table 1).

Further analysis of the Wilcoxon Signed Rank Test also revealed the way in which the selected variables changed significantly. For instance, today's middle-aged adults were sitting less in their childhood during classes than they do nowadays in their work places ($Z = -3.008$, $p = .01$). On the other hand, they moved more outside of their school time than they do outside of their work time ($Z = -3.417$, $p = .01$). They played or practiced much more frequently in their youth – to the point of sweating – than today ($Z = -6.344$,

$p = .01$). Although the differences are not significant statistically, it is worth mentioning that middle-aged people watch TV or play video games more frequently in their adulthood than they were aged 12-18 years ($Z = -1.265$, $p = .21$). The latter fact is explained by the delayed spreading of television in Cyprus, which started as late as in 1976.

Table 1. Changes in the frequency and intensity of physical activity between the ages of 12-18 and the present time with the middle-aged generation (days/week)

	Negative Ranks <i>Present time < Age of 12-18</i>	Positive Ranks <i>Present time > Age of 12-18</i>	Ties <i>Present time = Age of 12-18</i>	Z	P
Vigorous physical activity	89	19	121	-6.667	0.01
Moderate physical activity	76	25	128	-5.440	0.01
Indoor walking	80	29	120	-4.744	0.01
Walking to and from school/ work	82	26	121	-5.887	0.01
Physical activity in the house	33	69	127	-4.289	0.01
Non-regular physical activity.	90	27	112	-5.988	0.01

Source: own study

Although the values of the scores are different, similar tendencies could be observed when the results of the Wilcoxon two related sample were evaluated with the group of the elderly. Comparing the negative and the positive ranks at the present time and at the age of 12-18 years, significant differences can be noticed in all daily living and health-related physical activity. The differences are striking in the case of vigorous physical activity and in the case of non-regular physical activity. In contrast of the middle-aged, the household chores did not increase but decreased with the elderly (Table 2).

Table 2. Intragenerational changes of the frequency and the intensity of physical activity between the ages of 12-18 and the present with the elderly (days/week)

	Negative Ranks <i>Present time < Age of 12-18</i>	Positive Ranks <i>Present time > Age of 12-18</i>	Ties <i>Present time = Age of 12-18</i>	Z	P
Vigorous physical activity	41	6	50	-4.918	0.01
Moderate physical activity	39	12	46	-3.981	0.01
Indoor walking	27	18	52	-2.173	0.01
Walking to and from school/ work	33	8	56	-4.074	0.01
Physical activity in the house	31	17	49	-2.334	0.01
Non-regular physical activity.	39	9	49	-4.172	0.01

Source: own study

A more detailed evaluation of the data gained with the help of the Wilcoxon test shows that the daily routine has also changed with the elderly concerning the frequency and the intensity of their different activities. In spite of getting old, the grandparents' generation spends less time in sitting than they did during their school years ($Z = -3.632$, $p = .01$). They are less frequently active to the point of sweating ($Z = -2.745$, $p = .01$) as they were in their childhood and youth, and the differences are significant ($Z = -2.745$, $p = .01$). They also walk less frequently indoors but in this case the differences are not statistically significant ($Z = -1.371$, $p = .170$). Finally, the variable in connection with watching TV or playing video games changed in a positive direction, but the differences are not statistically significant ($Z = -0.161$, $p = .872$). Although the elderly are sitting more frequently in front of the television and the computer than they did when they were aged 12-18 years, when these alternatives for spending free time did not exist, they use so little time for the latter activities that these are not the obstacles that prevent them from being more physically active.

Intergenerational changes in physical activity

Customs related to physical activity can change not only within lifetime of a generation, but they can be altered relative to the previous generations' life cycle. We examined some selected elements of the way of life regarding physical activity and inactivity with the three generations when they were the same age, more specifically, when they were 12-18 years old. It turned out that the younger a generation, the higher the chance that both physically active and inactive elements can be observed in its members' way of life.

The chi-square analysis showed significant intergenerational differences between the three generations concerning the following variables: "sitting at school" ($\chi^2 = 45.764, p < 0.01$); "walking to and from school" ($\chi^2 = 110.049, p < 0.01$); "indoor walking" ($\chi^2 = 55.921, p < 0.01$); "watching T.V or playing video games" ($\chi^2 = 230.333, p < 0.01$); "moving out of school" ($\chi^2 = 34.198, p < 0.01$); and "being active to the point of sweating" ($\chi^2 = 29.397, p < 0.01$).

The above results means that today's students are sitting in classes longer than their parents did when they attended school, and their parents were sitting more in classes than their own parents, that is, today's grandparents. The grandparents' generation spent more time on average with walking to and from school, and the same activity requires less time for their grandchildren. Not only because there are more schools than there used to be, but students go to school more often by public transport. Youngsters watch television much more frequently than the middle-aged, and the elderly are sitting in front of the television or the computer even less frequently than the middle-aged.

Discussion

In this paper, intragenerational and intergenerational changes in daily living and in selected health-related physical activity are discussed with young, middle-aged, and elderly Cypriots. The finding show that both the frequency and intensity have been decreasing within the lifetimes of the middle-aged and the elderly, partly in a similar, partly in a dissimilar way than it occurs in most other European countries. Moreover, significant differences could be noticed between the physically active and inactive elements in the three examined generations' way of life. The observed changes can be explained by the process of getting older only to a small extent. They are rather rooted in the contradictory impact of the slow advancements in science and technology on Cypriots' everyday life and in the particular characteristics of physical culture in Cyprus.

Like all over Europe, the duration of education became longer during the 20th century, and the younger generations spend more and more time with sitting at classes. Parallel with this, there has been rapid progress in transportation, progress which was not as rapid in Cyprus as it was in the western part of the continent. Therefore, not only the elderly but also even the majority of the middle-aged population went to school on foot in their childhood. It is only today's school children that can use public transport widely, or can have a bicycle, especially one that is technology-intensive.

The rise and spread of the television has produced a new leisure time culture and contributed to sedentary behavior all over Europe since the 1950s-1960s, but it became a national mass media only in the second part of the 1970s in Cyprus. Since TV became a cultural force here decades later, it was lacking from the children's and youngsters' way of life not only with the today's elderly but with middle-aged people as well. In want of the temptation by the television and the public transport, Cypriot children's daily life used to be more active physically than today. The delayed advancements in the other fields of technology might have had a positive impact even on the adult generations' everyday life, since to have to complete more household chores comprised physical activity. Although occupational physical activity was not an aim to study empirically this time, it has to be noticed that the physical and energetic requirements of the jobs of today's grandparents were generally greater than their son's jobs. When Cyprus became independent in 1960, the majority of the economically active population worked as farmers, and even in the 1970s one-third of them worked in agriculture, where their job demanded high levels of physical activity.

The heavy physical requirements of the dominating agricultural jobs might have contributed to the fact that the importance of sport and exercise for adults used to be underestimated for a long time in the Cypriot culture. Generally speaking, the middle-aged and the elderly were socialized without learning that intensive physical activity are needed in all ages. Many of them do not believe that physical activity can be beneficial not only to young people's development but also to the adult individual's physical, mental, and psychological states. This ignorance can also be in connection with the low level and low status of physical education at their schools where attention had not been paid at all to discuss such relevant issues (Christodoulou 2010). Consequently, they do not highly appreciate the health-related physical activity for adults. In accordance with their disparaging opinion, not too any of them practice such activity. An exercise-intensive approach is far from the majority of them. The decline in vigorous physical activity is drastic after their youth is over, but the decrease in moderate and in even non-regular physical activity is significant within their lifetime.

It is know that Cyprus has undergone sweeping changes during a relatively short amount of time recently. The exploitation of scientific and technological development as an integral phenomenon has accelerated on the island; it can be characterized in contemporary Cyprus by impressive progress. However, like everywhere the advancements in science and technology have both positive and negative sides in Cyprus as well. On the one hand, it has tremendously improved the Cypriot population's quality of life. On the other hand, it must not be denied that besides other negative consequences (the pollution of air and seas around the inland, the depletion of the ozone layer, toxic waste, etc.) the utilization of technological advantages promoted a physically inactive lifestyle.

The major conclusion of our study is that effective measures have to be taken in the very near future to stop the spreading of the observed and obviously increasing inactivity among the Cypriot population. According to the European Commission, the EU and its Member States must take proactive steps to reverse the decline in physical activity that has grown faster over the past decades (Van Tuyckam & Scheerder 2010). The quest for physical fitness has grown already at least in the western world (Volkwein 2000). Cyprus should follow the good practices and make attempts to counterbalance the negative consequences of the increasingly inactive nature of daily life. As a first step, the Cyprus Sport Organizations has already taken a few measures to promote people's awareness in connection with the health benefits of regular exercise as well as their need for physical activity, and several local communities have started offering more access to recreational sports and exercise.

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