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More active and less fit: Changes in physical activity in the adult Norwegian population from 1985-2011

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PURPOSE

The purpose of this article is to describe and attempt to explain changes in physical activity during the leisure time of Norwegian adults, 15 years and above, for the period from 1985-2011. The focus is on changes in the total activity level in leisure time[i], as well as activity patterns in subgroups defined by age, sex, education, income and occupation. The article also examines factors influencing the changes and looks at both life stage affects and cohort effects.

BACKGROUND

Modern elite sport is becoming a spectacular success as measured in terms of media coverage and economic output, and new types of sports are developed due to new technology and entrepreneurship. The X games show the success of the new extreme sport, while commercial fitness has spread very quickly and become one of the most popular forms of training in the adult population in many countries (Steen-Johnsen and Kirkegaard, 2010). In contrast to these trends, one can observe an obesity epidemic in European and other Western countries that seems to signal a decline in total physical activity level in large segments of the population (Steene-Johannesen, 2009; Kolle, 2009). Norwegians used to consider themselves to be an active and healthy population, although obesity is also a growing problem in Norway, among children, youth and the adult population (Andersen et al., 2008). Several studies measuring physical fitness reveal a decline in both strength and endurance capacities in selected groups of the population such as military conscripts (Dyrstad, 2006). The increase in weight and the decrease in physical fitness may be the result of more sedentary work and transport patterns. It is likely that physical activity in leisure time is increasing, but obviously not enough to compensate for the growing physical inactivity at work and transport. Since our study focus on leisure only further studies are needed to show how physical activity levels during leisure time interact with work and transport patterns.

Modern societies are in a continuous state of change, and different factors may influence people in opposite directions in relation to physical activity. Expectations concerning leisure time activity levels are dependent upon our theoretical expectations about basic human behavioral instincts (Levy, 1978; Bouchard et al., 1997), which may be shaped by a long evolutionary process. There are three alternative models: 1) Humans may be genetically primed to be physically active from birth and onwards during their entire lifespan. In this case, inactivity is due to external influences and barriers; 2) By nature, humans may be uninterested in active movement behavior unless there are good reasons such as hunger, enemies or to burn calories; 3) A combinatory model would predict childhood and adolescence as biologically primed periods for playful and explorative physical behavior; thereafter, the biological impetus for movement will gradually be diminished and finally extinguished. In this case, physical activity among adults and the

elderly would be determined by instrumental reasons and external causes. In earlier societies such as hunter-gatherers, the necessities of life, like the need for nutrition and protection, may have caused a physically active lifestyle to continue after adolescence, whereas in modern societies technology has made most strenuous physical activity superfluous. Consequently, physical activity among adults and older age groups needs to be instilled through internal or external motivations of various types such as competitions, flow experience, well-being or material rewards (Kretchmar, 1994; Breivik et al., 2011). The background hypothesis about physical activity will therefore influence our evaluation of whether a certain activity level in a population, and its various parts, is above or below what we should expect.

There are good reasons and a certain amount of evidence to consider the third model to be the most plausible. Hence, we would expect relatively high levels of play and explorative behavior among children and adolescents across quite different kinds of societies. Thus, we would expect activity patterns among adults to be dependent upon internal reasons and external rewards that are produced differently and in different amounts in varying types of societies. As a result, we would then combine a biological model with a sociological model. A balanced socio-cultural model is given by Bråten (1981), who distinguishes between three interacting fields: the symbolic, the structural and the material. Several symbolic, structural and material factors contribute to an increase or decrease in physical activity levels in the adult population and among children while growing up. Let us summarize some of the most important among them.

Important *positive factors in the material and economic field* are: Norway is a rich country with a positive economic development, which means that more people can afford to take part in physical activities, even expensive ones. More economic resources from state and private sectors are used to build sports and leisure facilities, and there has been a steep increase in the provision of traditional sports facilities, commercial fitness centers, extreme sport facilities, leisure parks and recreational areas (Rafoss and Troelsen, 2010; Breivik et al., 2011). The sports market provides better and more relevant sports equipment for people at different performance levels in both new and old sports.

In terms of the *negative factors in the material and economic field*, we would mention new technology, such as electronic media, that makes people, particularly children and young people, more inactive. Increasingly, people use passive transport such as cars, buses and trains to go to work, school and training (Vaage, 2008). There are also certain economic barriers for lower social classes since sports equipment has become very expensive in certain sports, though these barriers only exclude people from some sports and activities. For this reason, our hypothesis is that from 1985 to 2011 better material and economic conditions for the general population have helped to increase physical activity during leisure time in the population, in addition to relatively higher activity levels among the upper socio-economic strata.

An important *positive factor in the structural field* for many people is a shorter amount of work time, even if people in some occupations choose to work longer hours. There has been a sharp decline in physically difficult and exhaustive types of work, with fewer

people working in traditional industry, fishing, farming and forestry (Frønes and Kjølsrød, 2010). Most jobs are not physically demanding, thus potentially leaving room for a possible demand for leisure time activity. Both physical work and competitive sports used to be men's arenas, but new gender roles have led to new and better opportunities for women in sport. Better pension systems and early retirement provide more opportunities for activity at an older age. Traditional sports organizations have been challenged by a variety of new organized and non-organized sports, including commercial training centres, individual strength and endurance training, outdoor activities, lifestyle sports and extreme sports (Breivik et al., 2011).

Among the *negative aspects in the structural field,* we would point to the possible effect of more sedentary jobs, hence it is not unlikely that this will lead to a more physically passive lifestyle for some also after work. It is not certain as to whether there is a compensation effect that leads from an inactive job to an active leisure time. Another factor is connected to the growing concern for control and safety, in addition to an increasing number of children spending their first years in kindergartens. Children in both kindergarten and school have a less stimulating environment for physical activity and exploration compared to a previously more active, free and explorative upbringing (Sandseter, 2010). This may have influence on their behavior as adults. Nevertheless, in conclusion we think the positive structural factors outweigh the negative. We expect there to be a growing number of active women and elderly people, especially after retirement, and we also expect more compensatory physical activity in leisure time among people with physically inactive jobs.

There are strong *positive factors in the symbolic field*. Traditional community-oriented sports participation is increasingly being replaced by individualized lifestyles expressed in new activities such as commercial fitness and lifestyle sports (Breivik et al., 2011). This increased focus on body and appearance makes people search for activities that shape the body in the desired way, whether it be in the direction of calorie burning or muscle building. There is a strong focus in media and government programmes on a healthy and active lifestyle to increase subjective well-being and health and to reduce obesity and lifestyle-related illnesses (Departementene, 2004), while the media is also full of advertisements and programmes about outdoor activities, expeditions and travels to spectacular places and landscapes.

We also see *negative factors in the symbolic field* in relation to an increasing interest in attractive, passive life lifestyles such as the new café culture in cities and the many versions of an electronic lifestyle with a corresponding intensified use of internet, new media or computer games. Sport encompasses not only participation, but also spectatorship, and there are new possibilities for the passive consumption of sport, especially on television.. From kindergartens to homes for the elderly, a focus on safety leads to less activity, with the increasing medicalization in modern societies leading to less pain tolerance and a decline in hardiness, thereby influencing participation in sports and outdoor activities in a negative way. Similarly, social safety nets and the dependence on expertise leads to less initiative and self-efficacy in physical activity and sports.

Factors in the symbolic field point in opposite directions. A focus on body, health and adventure should increase physical activity levels, whereas a focus on control, safety and pain avoidance may curb activity demands. Due to the combined focus on a physically active lifestyle from media as well as health authorities we presume that the net effect will be positive for physical activity levels.

Taken together, it seems that for each of the three fields the positive effects on physical activity outweigh the negative effects. The toal positive effect may benefit some groups more than others, as already mentioned: women more than men, the elderly more than the young, higher social classes more than lower and people from urban more than those from rural areas. These hypotheses will be tested in our data analysis.

We have hypothesized changes in physical activity in three different fields and among different subgroups, which can come about in three different ways (Hellevik, 2008): A) *Changes* are caused by changes during a person's lifespan, and we suppose that young people are more physically active than adults and that adults are more active than older people. If this is true, it means that a change in the age composition of the total population may change the respective activity levels; B) *Generation changes* are caused by new generations that introduce new attitudes or behaviors that are preserved over time since the young in a new generation may become more active. Additionally, a new generation may appear that entertains the idea of vigorous and lifelong physical activity as being normal, which may generate higher activity levels in older age groups. For instance, it seems that people growing up in the first part of the 20th century in Norway thought that sport was for young people, whereas those who grew up in the second half increasingly thought that sport and physical activity were a lifelong affair. Over time, this will influence the activity level for the population as a whole due to generational replacement; C) *Period changes* take place when events occur at a certain period in time that affect the ideas of all members of the population. What is popular and fashionable changes, the "spirit of the time" is not constant, ideologies grow and fade and sporting participation is open to changing winds in popularity. Using a cohort analysis, we will determine which of the three types of changes has been most dominant in the period from 1987 to 2011.

Earlier research on physical activity development in Norway and other European countries

Studies of physical activity levels in Norway, conducted between 1946 and 1987 used different concepts and different parameters to measure activity levels (Breivik and Vaagbø, 1998). Hence, it is difficult to compare the results and ascertain whether activity during leisure time has increased or not. Most studies have reported physical activity levels between 40 and 50%. In a 1946 survey by Statistics Norway, the official Norwegian statistics bureau, 39% reported that they were active in some form of sport. In 1987, 41% of the population 16 years and older said that they exercised regularly (at least once every other week) (Dølvik et al., 1988). Since 1985, the Norwegian Monitor (NM), which is the leading data source in addition to Statistics Norway with regard to self-reported physical activity levels in the population, has surveyed the population every

other year (Breivik, 1996; Breivik and Vaagbø, 1998; Hellevik, 2008). Data from the Norwegian Monitor was also used by Fridberg (2010) in a special issue of Sport in Society (2010), which contains discussions of various aspects of physical activity and sport in Scandinavian countries. Fridberg demonstrates that there has been an increase in physical activity levels in Norway, Denmark and Sweden since 1985, with the data from Denmark going as far back as 1965 and revealing an increase for the entire period up to 2005.

While Norwegian in general consider themselves to be very physically active data based on European Time Use surveys (HETUS) and reported by Vaage (2008) found that Norwegians were almost at the bottom of European countries when time for travel by foot, travel by bicycle, hiking and training/sport were combined. Norwegians were among the most active in sports, training and outdoor activities, but had extremely low physical activity levels in relation to transport and work. There has probably been a decrease in overall daily physical activity since the 1980s or even earlier, and Dyrstad (2006) found that Norwegian military recruits in 2001 had a 7.6% decrease in endurance capacity compared with recruits from 20 years earlier. . It is therefore not surprising that in a study using an accelerometer to find the total activity level among people, Andersen et al. (2009) found that only 20% of Norwegians complied with the advice from health authorities, which proposes a total amount of at least half an hour of moderate physical activity five days a week.

In contrast, several reports demonstrate an increase in self-reported leisure-time physical activity, both across various timespans and various segments of the population (Odden, 2008; Mortensen, 2008; Bakken-Ulseth, 2008; Breivik et al., 2011). It is the goal of this article to give a clearer and more comprehensive picture of how physical activity in leisure time has developed in the adult Norwegian population since 1985.

DATA AND METHODS

Despite many studies of physical activity within the Norwegian population over the last decade, we still need more precise answers to several questions. The current article will try to improve our knowledge of self-reported physical activity in relation to previous studies in several ways:

1. We use a dataset that has been collected biannually over a long time period (1985-2011), with a high number of respondents (averaging more than 3,000) at every data collection point. The data set has displayed a high reliability and validity (Hellevik, 1993, 2002, 2003, 2008)
2. The size of the data set (approximately 45,000 respondents) makes it possible to study developments in subgroups of the population over time, and to study changes over a lifespan from one year to the next.
3. The sample size and time series make it possible to perform cohort analyses over the period from 1985 to 2011, thus identifying the nature of the changes in physical activity levels in the population over time.

Based on earlier research and what was said in the introduction, we have the following hypotheses:

- There has been an increase in the percentage of people who are physically active during leisure time for the period from 1985-2009;
- Activity levels have particularly increased among women, the elderly, the well-educated and people in non-physical jobs;
- Predictors of high physical activity levels are age, education, income, type of job and concern for own health;
- The change in physical activity levels cannot be totally explained by generation and lifespan effects.

The data used in this article is from the Norwegian Monitor (NM), which is a series of large surveys, both in terms of the sample size (increasing from 2,200 in the first wave in 1985 to around 4,000 in the last eight) and number of questions asked (close to 3,000), carried out biannually by the Norwegian market research institute, Markeds og Mediainstituttet (MMI), which is now called Ipsos MMI. Previously done in the home of the respondent, since 1997 the introductory questions have been asked by an interviewer over the phone, while the major part is included in a self-completion questionnaire. The samples are representative of the population aged 15 and above (previously a two-stage cluster sampling was used, from 1997 simple random sampling from telephone directories has been employed). In the latest data collections (2007, 2009 and 2011), approximately 25 percent of those asked were willing to be interviewed, with two-thirds of these agreeing to receive the mail questionnaire, and two-thirds of these again filling in and returning the questionnaire, yielding a response rate of only approximately 10% among those contacted by phone. Fortunately, the pattern of refusals seems to be random rather than systematic, as indicated by analyses comparing sample distributions with known population characteristics (Hellevik, 2008). The sample is weighted according to sex, age and geographical region.

RESULTS

Changes in activity levels in the general population

Since the start of the NM in 1985, the respondents have been asked the question, "How often will you say that you are engaged in physical activity in the form of training or exercise?" The answer categories are: Never, Less than every 14 days, Once every 14 days, Once a week, 2 times a week, 3-4 times a week, 5-6 times a week, Once or more every day. The development from 1985 to 2009 is presented in Figure 1, which shows that there has been a clear shift in the population towards more activity during leisure time.

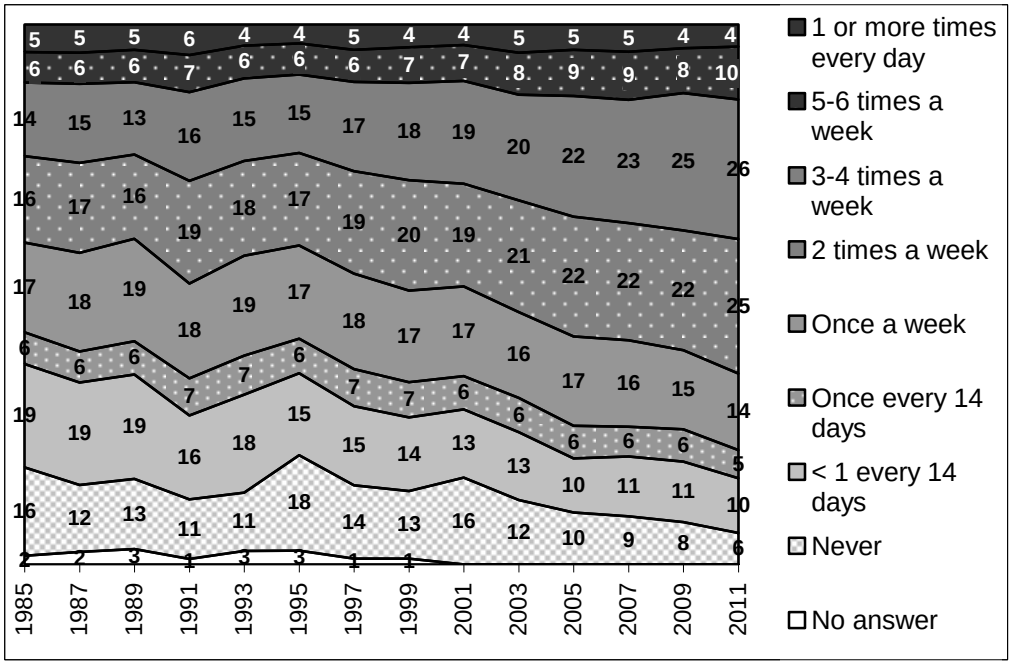

Figure 1. Changes in physical activity in the Norwegian population age 15 and above in the period 1985-2011.Percentages.

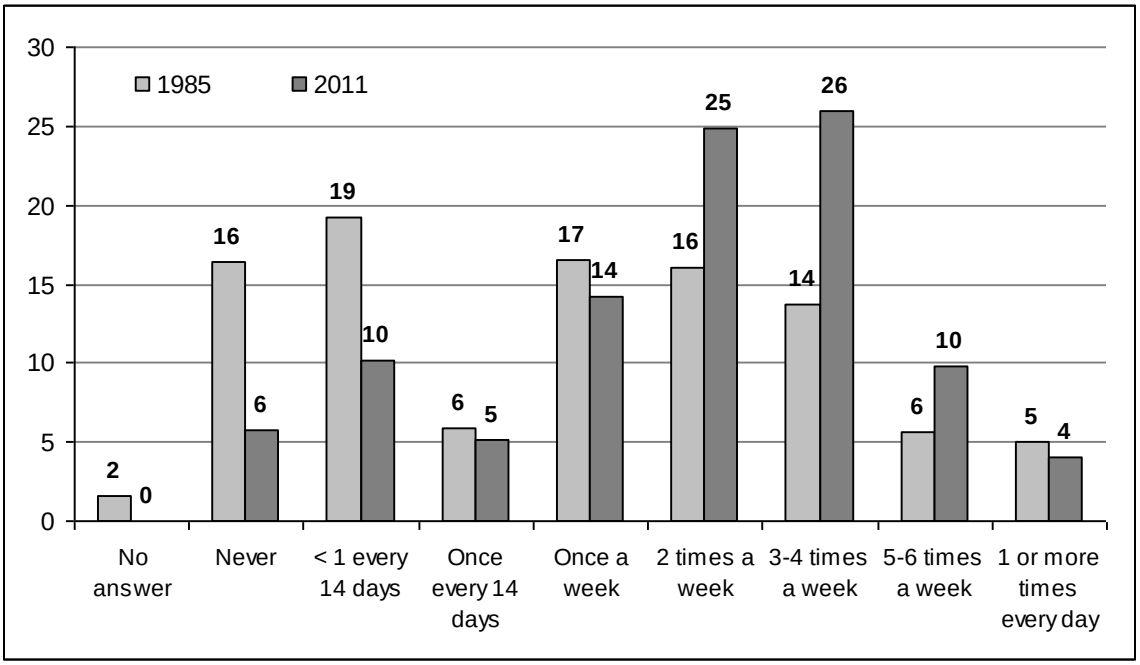

Figure 2. Comparison of physical activity levels in 1985 and 2011. Percentages

The change from 1985 to 2009 is highlighted in Figure 2, and we observe a decline from 1985 to 2011 in all low-activity categories (once a week and below) and an increase in all categories "2 times a week and above", except for the highest catgory, "once a day and more". Whereas physical activity "less than once every 14 days" was the largest single category in 1985 physical activity, "3-4 times a week" is the largest category in 2011. Moreover, we see that among physically active people, training or exercising 1 to 4 times a week is typical, with 79% of the population being active at least once a week, 40% at least 3 times a week and only 14% being active five times a week or more.

In the presentation and analysis of subgroups, change factors and predictors of physical activity, we will use in the following at least "3 times a week" as our cut-off point. This means that we focus on those who are regularly active and with a certain commitment. In order to characterize the inactive or rarely active in contrast to those who have some level of regular activity, "once a week" could have been the cut-off point, but here we are interested in those that have a physical activity level close to a health-related minimum. The recommendation from the Norwegian health authorities is that people should be physically active every day or at least five times a week for half an hour or more, with at least moderate intensity levels (brisk walking) (Departementene, 2004). Since the recommendation includes physical activity in general; at work, transport and so on, it is not directly comparable to the Monitor data. The guidelines from the American College of Sports Medicine (ACSM), which also include those who exercise with some intensity for at least 20 minutes three times a week, are more relevant since they are more focused on training and exercise. . During an analysis of the NM data that included the length and intensity of exercise sessions, Breivik (2011) found that in 2009, 28% satisfied the ACSM criterion, whereas our criterion (three times a week or more) includes from 24 to 40% of the population 15 years and above in the period from 1985 til 2011 (Figure 1).

Changes in activity levels related to gender and age

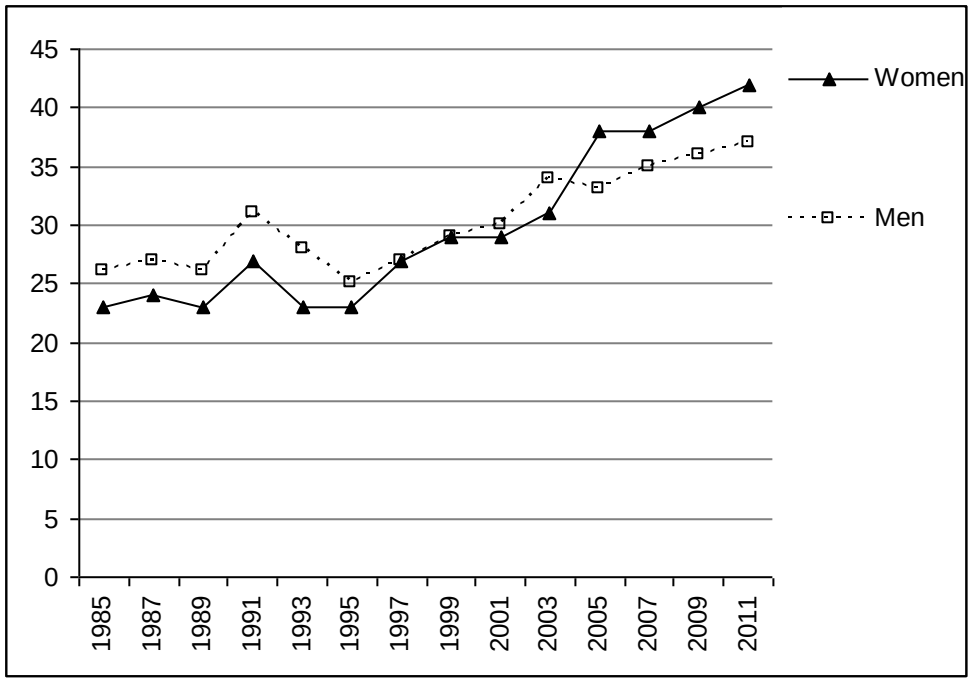

Figure 3. Gender and physical exercise. Percent active three or more days a week.

During the period starting in1985, men and women have switched places in being the most active gender, as significantly more men than women were physically active three times a week or more from 1985 to 1993, and in 2003. From 1995 to 2001, men and women were on the same level, while from 2005 to 2011, significantly more women than men have been physically active three times a week or more. An analysis of the data reveals that whether we use this criterion, or one or five times a week, the pattern is the same, as a higher percentage of women than men have been active since 2005.

In relation to age, this development is complex, as all age groups have had an increase in the percentage for physically active people. However, all of the three oldest age groups have had a higher increase than the three youngest, with the age groups of those from 45-54 years exhibiting an increase of 23 percentage points for active people in the period from 1985-2011. The lowest increase is in the youngest group, 15-24 years, with a movement of only 10 percentage points.

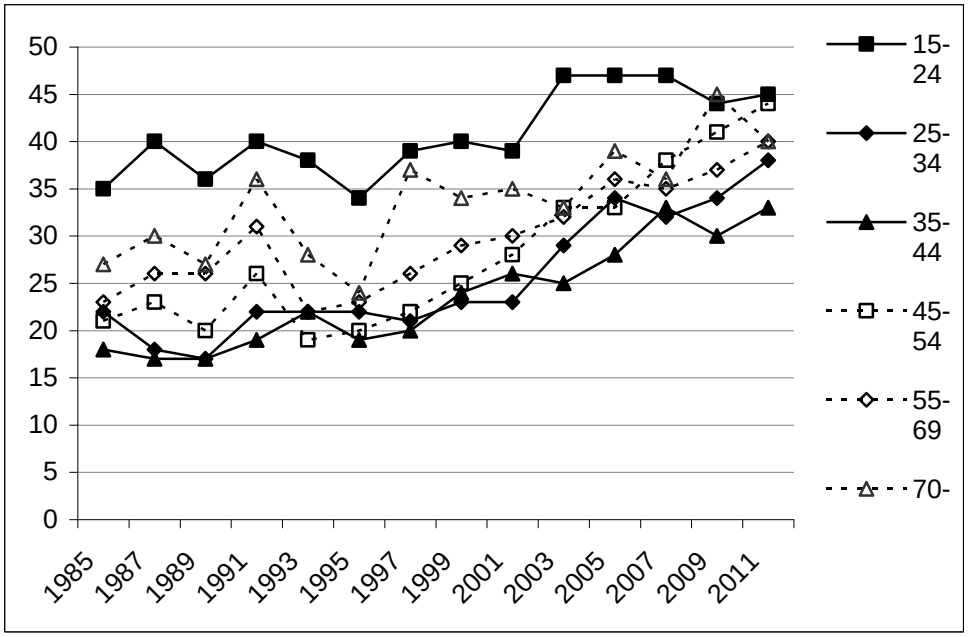

Figure 4: Age and physical exercise; percentage active three times a week or more

Changes in physical activity in relation to education and residential area

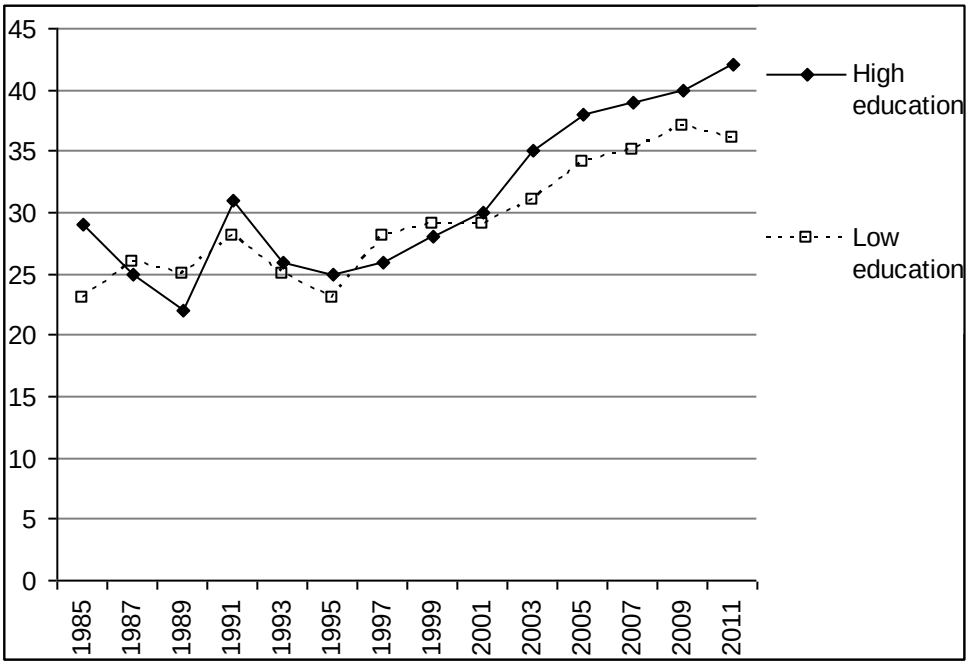

Figure 5: Education and physical exercise; percentage of those active three times a week or more

With the exception of 1985, for the years until 2003 the small differences between higher and lower educated people in physical activity are not statistically significant. But from 2005 onwards there is a change towards a significantly higher level of activity among those with a high education, with a difference of 4.5 percentage points for the period as a whole.

An analysis of activity levels related to type of residential area revealed only small differences. During most of the time period, people in cities have been in the lead, followed by towns and rural areas, and it was only in 1995 and 2003 that cities lost the lead. Rural areas had more active people than towns in only 1991, 2003, 2009 and 2011.

Changes during the life course and over the time period: an analysis of causal factors

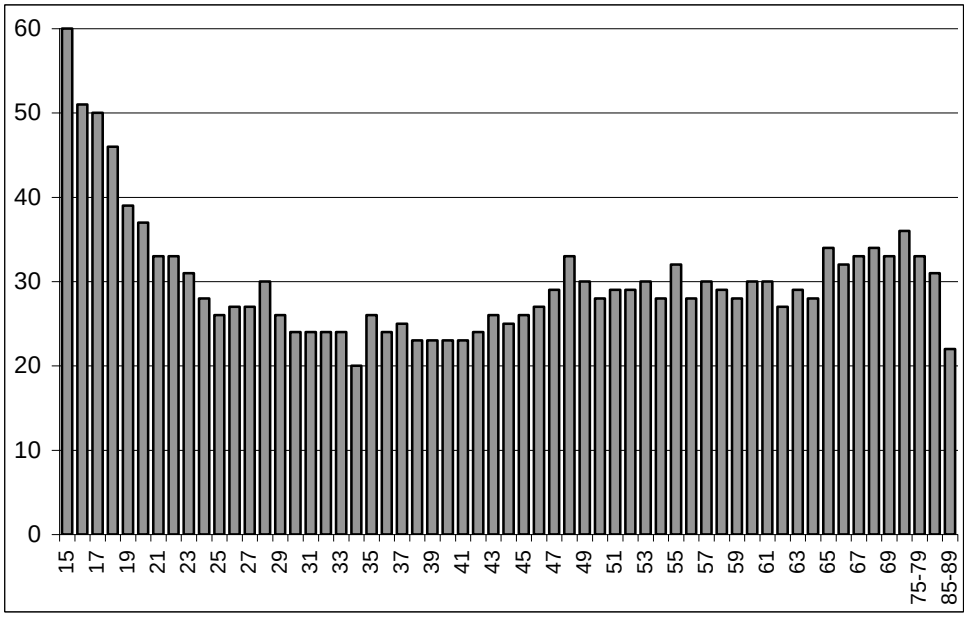

Figure 6: Age and physical exercise (percentage of those active three or more days a week, NM 1985-2011)

Young people are more active than older people, but the decline is not linear. In order to see how activity changes from one year to the next across the lifespan, we have looked at the total database from 1985 to 2011. Figure 6 shows that a sharp decline in activity for the first few years after age 15, whereas from round 20 to 30, the decline in physical activity levels out and activity remains stable during the 30s. Next, there is an increase in activity levels from about 40 to 50 years followed by a new stable period, before an increase in activity levels starts at 65 and lasts throughout the 70s. At around 85 years, we then see a sharp decline in physical activity.

The question is what lies behind this age pattern in terms of whether it reflects life stage changes or generational differences. This question may be answered through a *cohort*

analysis, as such an analysis will also shed light on the trend towards increased activity in the population discussed earlier in the article, whether this is due to generational replacement or historical events (period effects). A cohort analysis follows persons born within a certain period to see whether the cohort is different from other cohorts while preserving its characteristics over time. With time series data such as the NM, it is not the same persons, but rather representative samples from the cohorts that are compared, showing aggregate but not individual change. In a standard cohort table, the width of the age classes corresponds to the time span between the points of measurement, so that the results for a particular birth cohort are displayed along a diagonal (see Table 1).

The standard matrix is convenient in that all comparisons of interest can be made within the same table. The vertical columns reveal differences between age groups at various points in time that may be related to their position in the life cycle or cohort membership, while the horizontal lines show differences between various points in time for each age group, which may be a result of the effects of historical events or a reflection of generational differences. Finally, a diagonal reading shows changes within birth cohorts, which may be a life cycle and/or period effect.

The cohort analysis provides a better understanding of the processes behind long-term changes in population distributions, as such changes will either be due to generational replacement, to period effects or to a combination of the two. In the case of major changes in the age distribution of a given population, life stage differences may also have an impact, although this is not the case in Norway for this time period.

The results of the cohort analysis may also indicate likely future developments in the distribution of population characteristics. If age differences represent generational differences, the present trend may be expected to continue, at least in the near future. Period effects are less stable since they depend on specific historical events, and therefore may well change direction in the future.

*Table 1. Cohort matrix. Physical exercise depending on age and period (Percent active three or more days a week. NM 1985-2011)**

Age	1986	1990	1994	1998	2002	2006	2010	Birth cohort	Cohort change	Age differ.
14-17 Y	54	49	47	51	53	55	54	1993-96		0
18-21 Y	35	40	40	41	44	44	47	1989-92	(-8)	12
22-25	23	26	24	28	31	29	39	1985-88	(-14)	16
26-29	21	23	22	24	27	36	43	1981-84	(-8)	22
30-33	19	17	22	20	24	33	32	1977-80	(-15)	13
34-37	17	17	19	22	23	31	31	1973-76	(-18)	14
38-41	17	18	18	21	26	29	33	1969-72	-11	16
42-45	18	18	23	23	27	33	32	1965-68	-3	14
46-49	20	25	21	24	31	37	44	1961-64	10	24
50-53	23	22	19	23	31	37	42	1957-60	21	19
54-57	24	30	19	23	27	34	40	1953-56	21	16
58-61	24	25	22	25	29	33	39	1949-52	22	15
62-65	22	19	18	29	34	37	37	1945-48	20	15
66-69	30	38	30	33	34	37	38	1941-44	20	8
70-73 O	28	34	23	40	42	41	42	1937-40	23	14
74-77 O	27	35	28	35	30	39	45	1933-36	22	18
Young-Old	17	10	18	9	13	10	7	Mean	15	15
All	25	27	25	28	31	36	39			**14**

* Two and two waves combined: 1985&1987= 1986, etc. Cohort change / Age difference: 2010 – 1986.

In the cohort matrix, two and two waves of the Monitor study have been combined in order to increase the sample size in each cell, thereby reducing the random sampling error. The pattern of change within the cohorts indicates a clear life cycle effect, with a reduction in activity early in life and an increase later in life. This curvilinear pattern means that the gap in activity level between the youngest and the oldest age groups is relatively small, and that activity is at its lowest level when people are in their 30s or 40s.

Change within a cohort over time may either be caused by period or life cycle effects, and since historical events may be expected to affect the entire population in the same direction, a reversal in tendency from a reduction in activity among the young to an increase among the old from one point in time to the next cannot be explained as a period effect. It seems likely that the negative trend in the early years of life and the positive trend in later years are life stage effects.

Is the increase in activity for the population as a whole a result of a period effect or generational replacement? Since the age differences at each point in time are rather modest, generational replacement cannot have much of an effect. What can be seen from the cohort matrix, and is even clearer from Table 2, which displays changes for age and period transitions, is that there was a negative period effect between 1990 and 1994, followed by a tendency towards higher activity in the following periods.

*Table 2. Changes in physical exercise for age and period transitions (Difference for percentage being active three or more days a week. NM 1985-2011)**

	Change in period: From -> To						
Change in age	*1986*	*1990*	*1994*	*1998*	*2002*	*2006*	
From -> To	*->1990*	*->1994*	*->1998*	*->2002*	*->2006*	*->2010*	Mean
14-17 -> 18-21	-14	-9	-6	-7	-9	-8	-8.8
18-21 -> 22-25	-9	-16	-12	-10	-15	-5	-11.2
22-25 -> 26-29	0	-4	0	-1	-5	4	-1.0
26-29 -> 30-33	-4	-1	-2	0	6	-4	-0.8
30-33 -> 34-37	-2	2	0	3	7	-2	1.3
34-37 -> 38-41	1	1	2	4	6	2	2.7
38-41 -> 42-45	1	5	5	6	7	3	4.5
42-45 -> 46-49	7	3	1	8	10	11	6.7
46-49 -> 50-53	2	-6	2	7	6	5	2.7
50-53 -> 54-57	7	-3	4	4	3	3	3.0
54-57 -> 58-61	1	-8	6	6	6	5	2.7
58-61 -> 62-65	-5	-6	7	9	8	4	2.8
62-65 -> 66-69	16	11	15	5	3	1	7.3
66-69 -> 70-73	4	-15	10	9	7	5	3.3
70-73 -> 74-77	7	-6	12	-10	-3	4	0.7
Mean	0.8	-3.5	2.9	2.2	2.5	1.9	1.1

* Calculated from Table 1.

A multivariate analysis of the causal factors

Thus far, we have looked at factors that may affect the tendency to be physically active one at a time. A multivariate analysis makes it possible to discern what each factor in itself contributes, i.e. the direct effect of the factor on the level of activity. Table 3 shows the results of bivariate and multiple regressions for a set of social background and other variables. Model 1 includes just the social background variables, Model 2 adds a value indicator (concern for one's own health) and Model 3 includes satisfaction with one's own health, body and BMI. For the last three variables, the causal direction in relation to physical activity is uncertain, as there is probably an influence in both directions.

*Table 3. Effect on average number of days with physical exercise in a week (Unstandardized regression coefficients from bivariate and multiple regression analyses. NM 2007-2011)**

	Bivar.reg.	Model 1	Model 2	Model 3
Intercept	-	2.25	2.17	1.65
Woman	0.28	0.26	0.15	0.14
25-34 years (ref.cat. 15-24)	-0.18	-0.28	-0.24	-0.13
35-44 years - " -	-0.40	-0.50	-0.48	-0.34
45-54 years - " -	(-0.01)	(-0.04)	(-0.09)	(0.08)
55-69 years - " -	-0.14	-0.15	-0.22	(0.00)
70- years - " -	(-0.06)	-0.16	-0.25	(-0.04)
Education: Univ. Level	0.21	0.29	0.20	0.11
Lives in big/medium city	0.22	0.18	0.16	(0.10)
White collar occupation	-0.12	-0.15	-0.14	-0.14
High household income	(0.01)	(0.08)	(0.05)	(0.03)
Values good health	0.98		0.93	0.76
Satisfied own health	0.81			0.55
Satisfied own body	0.50			0.22
BMI below 27	0.65			0.34
Explained variance (adj.)	-	2.0%	6.5%	9.8%

* All independent variables except for age are dichotomized. Coefficients in parentheses are not significant at the 5% level.

All variables of Models 1 and 2 except for income and the 45-64 age group have significant effects on activity level in relation to the average number of days in a week that the respondent exercises. The results of the earlier bivariate analyses are confirmed in the multivariate analysis, with women being more active than men, which to a large extent (one-half of the bivariate effect) is explained by the value they put on good health. The difference between the reference age group of 15-24 years and the older groups is slightly increased when we control for the other variables in Models 1 and 2, and the same holds for the effect of education for Model 1. Satisfaction with own health and own body, and a BMI below 27 all go together with an increased activity level, but it is not possible to say what the causal direction is in this case. Controlling for these variables the differences between the age groups for the most part disappears, expect for the low activity level among the 25-34 and especially the 35-44 years old. The very modest level of the explained variance in Model 1 tells us that the variation in activity level between social categories is limited.

DISCUSSION

The results (Figures 1 and 2) showed that there has been a clear increase in physical activity in leisure time during the period 1985-2011. There is a decrease in groups that train or exercise little or never and a parallel increase in groups that train between 2 times and 6 times a week. Our hypothesis of increasing physical activity during leisure time is thus confirmed. We see, however, that in 2011 only 14 percent were engaged in physical activity in the form of training or exercise 5 times a week or more. If we use the ACSM criterion and include more intense training forms three times week or more, we still find,

according to the study by Breivik (2011) that only 27% of the adult population comply with the criterion. Even if we add physical activity related to transport and work it is probably far from enough to fulfill the recommendations of the health authorities or the ACSM criterion. The European comparison presented by Vaage (2008) showed that Norwegians were almost at the bottom of the list in total physical activity, only Belgium was lower.. A study of total daily physical activity, using objective measures in the form of accelerometers, confirmed this picture and found that about 20% in the Norwegian adult population had a total physical activity level that was acceptable from a health perspective (Andersen et al., 2009). In any case, this means that the main part of the population is not active enough. Our initial evolutionary perspective suggested that internal motives and environmental pressures are needed to make adult people physically active. The shift from more physical activity-based transport and work patterns a generation or two ago, to the present inactive lifestyles have obviously not created the necessary internal motivations or environmental inducements to become active enough. Even if physical activity in leisure time has increased it is far from enough from a health and lifestyle perspective. .

Figure 2 showed that in 2011, 40% were active three times a week or more, which means that they have a certain regularity and seriousness in their exercise and training, and thus enjoy benefits of various kinds from their activity. Health is not all, especially if it is interpreted too narrowly. Friendship and sociality, joy and play, competition and challenge are all reasons found for activity, particularly among the young. Additionally, certain segments of the population also use physical activity and training to build confidence, lose weight or build muscles.

Even if people have different reasons for physical activity, they are not strong enough to make them more physically active. In general, they may lack the necessary inner drive, or there may be obstacles that prevent them from being as active as they want. Breivik (2011) found that the obstacles or barriers for physical activity were generally not very strong. The most important barrier for not being active, or not as active as one wanted, was “do not have the time/takes too much time”, with 20% of the population who thought that time was very important as a problem. The other barriers had scores below 10% as “very important”, while 8% felt that “injury/physical handicap” was a very important barrier.

The findings have some relevance in relation to our three hypothetical models, as it is obvious that the first model that predicted lifelong voluntary physical activity as a “normal” and typical type of behavior is not supported by our findings. A high proportion of the population is inactive during leisure time, and our modern industrial and technological society obviously does not provide strong enough impulses to stay physically active. Activities such as hunting, gathering, working in the fields, being in the woods or fishing are obsolete in modern society, or do not necessitate physical activity any more. Even if there are few barriers, many opportunities and several good motives and reasons for activity during leisure time, people are not active enough, which leaves us with the last two models. Let us examine the lifespan perspective.

Figure 6 shows that the percentage of people who are active three times a week or more declines sharply from 15 years of age and onwards. Sixty% are active when they are 15, while only 39% are active when they are 19 years old and only 26% of those aged 25 are active three times a week. That means that less than half remain active in the 10 years from 15 to 25, through high school and through the first years at college or university. This development may be due to internal or external factors, therefore lending support to the two remaining models, which we can call the sedentary and combinatory models. According to the combinatory model, children and young people are by nature playful, active and explorative until the impetus to this behavior gradually declines as they become adolescents and adults. If not internally instilled motives or external pressure induce them to activity we will see a decline in leisure time physical activity. It should then not come as a surprise as to what we see in Figure 6. The only thing to discuss is the onset of the decline in activity, how steep it should be and when the decline should stop and level out. In many societies, including Norway in earlier centuries, young people were considered adults when they reached 15-16 years of age; at that point, they had to work, marry and raise children. A combinatory model fits with this scheme, as activity from 15-16 years and onwards is determined by external influences, opportunities and restrictions.

According to the sedentary model, the activity among children is hard to explain since childhood seems full of spontaneous and explorative play behavior. However, in any case, the decline in activity from 15 to 25 years of age would have to be explained by external factors. According to many studies, what takes place in this period is a change in interests, more work at school as well as new leisure interests and opportunities (Seippel, 2005; Seippel et al,. 2011; Ommundsen and Aadland, 2009). Whereas physical education in school does not change much from 15 to 19 years of age, many young people drop out of organized sports, often as a result of higher demands for training, specialization and success (Seippel, 2005). The combined effect of this may be less physical activity during leisure time, except for hard core enthusiasts. Even if many drop out from organized sports, there are many opportunities in non-organized contexts, including new lifestyle sports, training centers, outdoor activities, individual training (endurance or strength) and training with friends (ball games and team sports). Enthusiasts may therefore be motivated by enjoyment from the activity itself, the health benefits, the challenge (risk and extreme sports) and competition, which may help to explain why many young people still carry on with activities of various kinds.

Military conscripts are about 20 years old, with elite athletes a little older. From a young age, there is a steady decline in physiological and physical capacity. Hence, we should expect a steady decline over the lifespan in terms of the percentage of people who are active at least three times a week. Figure 6 clearly shows that this is not the case. On average, activity is at its lowest between 25 and 45, higher between 46 and 65 and even higher between 65 and 80 years, which in this dataset mean that the highest levels of activity are found among the youngest and oldest. Figure 4 showed that between 1985 and 2009, the three older age groups increased their activity levels more than the three youngest. In 2011 the differences leveled out to a certain extent, but still the youngest age group has had a weaker increase in activity level than the three oldest. This means that

changes in external factors can affect age groups differently. The pattern expected by a purely biological model can be counteracted by factors in the structural and cultural fields, as a high activity level in the age groups above 60 can be explained in part by the good Norwegian pension system, in which people can retire from the age of 62 and have the economic means to enjoy leisure activity, including physical activities of various types, including expensive ones.

The low level of activity in the age group between 25 and 45 can be partially explained by the structural factors related to an overall stressful life situation in which many things compete for one's attention such as career, family, small children and friends. As a result, the time for physical activity, cultural events, café life and other valued activities often need to be put on hold.

Based on several studies (Bakken Ulseth, 2008; Kolle, 2009; Mortensen, 2008; Odden, 2008; Seippel et al., 2011), we had two hypotheses concerning the development of physical activity during the period from 1985-2011. We expected an increase in the percentage of people who were physically active during leisure time, and we expected some groups to have increased their activity levels more than others. We also thought that women, especially the old, the well-educated and people in non-physical jobs, had increased their activity levels.

We see from Figures 1,3, 4, and 5 that our hypotheses were generally confirmed, though not to the same degree. The cohort analysis presented in Tables 1 and 2 was meant to discern whether the increase in activity for the population as a whole in the period from 1985 to 2011 was the result of generational replacement or period effects. Since the age differences were quite modest, the main changes in activity seem to be caused by period effects, as there was a negative period effect between 1990 and 1994 followed by a tendency towards higher activity in the subsequent periods. There are several possible explanations for changes in the 1990s. Around the middle of the 1990s we find an increasing number of Norwegian top level sport triumphs and a decreasing weight on health as a value. But it is difficult to explain why there should be a drop in participation in the years before the Lillehammer Winter Olympics in 1994.

The overall increase during the whole period is quite remarkable and very steep, particularly from 2001 to 2011, with several factors in the material, structural and symbolic fields mentioned in the introduction as possibly contributing to this. It may be a bit speculative, but it seems that the provision of new activities, new types of equipment and new organizational forms is one important factor, as new paradigms of physical activity have developed, including new lifestyle sports, commercial fitness and training centers and the new endurance trend with jogging, cycling and cross country skiing events. In the symbolic field, we have witnessed a strong focus in the media and by the health authorities on physical fitness over the past 10 years in particular. The importance of physical activity for health and well-being is well documented, and has been strongly promoted by health authorities. This information is likely to be internalized, especially by the well-educated. In the mass media, a strong focus on obesity and the lack of physical

fitness has been paralleled by a focus on bodily appearance, slimness and muscularity as success factors.
During the period, we found that women overtook men as far as being more active, with the new training centers and the focus on health and appearance possibly affecting women in a positive way more than men. Furthermore, the well-educated internalize idealistic values and health-oriented life styles more than those with a low education, and we see this trend from 2001 in particular in Figure 5. In addition, our hypothesis concerning age was confirmed, as the older age groups have had a steeper increase in activity level than the youngest age group. It is a bit surprising that the youngest age group has not benefitted more from the new sports forms (e.g. board sports), the new types of equipment (e.g. bicycles or kites) and the new organizational freedom (lifestyle- and extreme sports). During the period under study, the sport clubs have not been able to keep more young people active in clubs as they grow from 8 to 24 years, and the drop-out rate is high. The percentage of boys who train and compete in sport clubs in 2009 shows a steep decline with age, both for boys and girls. Boys dropped from 66% in the 8-12 year group to 13% in the 20-24 year group.. For girls the pattern is similar: 57% in the 8-12 year group, to 14% in the 20-24 years group. Moreover, in all age groups between 8 and 24, there is a decline in participation in club sports for the period from 1992-2009 (Synovate, 2009). There are less hours for physical education in the Norwegian school system compared with many countries in Europe, and the hours did not increase during the period from 1992-2009. This means that the new possibilities outside physical education and sport clubs have not been enough to make young people more active. It may also be that the new generation, who have grown up with kindergartens, adult supervision and control, as well as a focus on safety, have not developed the necessary initiative to make use of the new opportunities given to them by new sports forms and new types of equipment outside those of traditional organizational settings (school and clubs).

The new popular lifestyles are primarily generated in cities, thus we expected that people in the cities would generally make more use of new possibilities and new types of physical activity. However, the differences between cities, towns and rural areas were quite small during for the entire period, with cities only marginally ahead of other environments, and the regression analysis confirmed this. Furthermore, the models showed that positive predictors for average number of days a week being physically were (in the final model) being a woman, being between 25 and 44 years old, having a high education, not having a white collar occupation, being satisfied with one's health and body, a BMI below 27 and an overall value of good health. Only 9% of the variance was explained by these factors, and in some cases, it is unclear in which direction the causal relationship goes. This means that differences in involvement in physical activity can only to a modest degree be explained by social differences. On can hypothesize that instead aspects connected with physical activity as such, and type of physical activity in particular, may explain differences in activity levels. People satisfied with their body and health may be more active because they have been genetically fortunate, but it may also be that over time physical activity generates a satisfaction with one's body and health. Our idea of white collar, non-physical jobs as causal compensatory factors for physical

activity during leisure time was not confirmed, as instead the opposite seems to be the case.

CONCLUDING REMARKS

In conclusion, only four out of 10 in the adult population are physically active three times a week or more during their leisure time. Only one out of five are active five times a week or more. The negative perspective is that a large proportion of the population experiences consequences such as poor motor abilities, weight problems, weak muscular strength and low endurance capacity, whereas the positive perspective is that approximately 40% of the population enjoy the various goods that can only be attained by taking part in physical activities of various kinds. These include not only health benefits, but also experiential flow, elated mental states, bodily coordination, advanced motor skills, environmental exploration, togetherness with friends in games and play, and winning and losing in competitions with others.

The evaluation of activity levels is dependent upon what we can expect, and we sketched three possible models. If humans are biologically determined to lifelong activity, the level of activity in the Norwegian population is low. If by nature we are lazy and sedentary, then only environmental necessity and our own needs make us active, with correspondingly high activity levels in present society. A combinatory model seems most realistic since human bodies are designed for activity, and we seem to enjoy a certain activity level through our entire lifespan. However, the strong impetus for play and explorative behavior, building motor skills and developing experience-based survival strategies are all factors that are strong in childhood and decline after puberty. This means that children and young people should be more active than adults and the elderly, and that sociocultural and environmental factors increasingly determine activity levels as people grow older. Such a general model fits our data relatively well, even if older people in Norway have higher activity levels than expected, which may be influenced by structural and material factors such as early retirement and the good pension system. Similarly, the low activity levels among those between the ages of 25 and 45 may be caused by time pressure and conflicting influences, in which physical activity has to give way to the pressing demands related to job, family and children.

We found that the increase in physical activity during the period from 1985-2011 was mainly caused by period effects, which may be material, structural and symbolic. In the symbolic field, there has not only been a strong focus on health and training, but also on body and appearance, thereby making physical activity an important success factor for many people, and not only the young. In the structural field, we can point to flexible training forms in commercial training centers, lifestyle sports such as snowboard or golf and individual endurance sports such as cycling and jogging. These training forms delimit the opening of time constraints and binding organizational commitments in the sport clubs. In the economic and material field, particularly over the last 10 years, we have seen new sports produce new arenas and equipment, including indoor climbing, snowboard and golf.

Physical activity is differentially enjoyed in the population, and for many, it is a surprise that the wider field of physical activity is attracting more women than men, while the more narrow competitive sports fields are still dominated by men. To a great extent, the increased activity among women seems to be caused by their health-oriented concerns since men are less focused on health (Hellevik 2002, 2008). The young, the well-educated, people in cities and health-oriented people are all more likely to be physically active, although as shown by our data and in the regression analysis, the differences are not big between the various segments. Lastly, Norwegians seem to be socially democratic and egalitarian in relation to physical activity.

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[i] The question that is asked to the respondents is: "How often would you say that you are engaged in physical activity in the form of training or exercise?" The alternatives are Never, Less than every 14 days, Once every 14 days, Once a week, Two times a week,3-4 times a week,5-6 times a week,1 or more times a day. The question thus relates to leisure time activity, unless people have the intention to combine walking to the job with training or exercise. In any case the intention or the interpretation must be that of training or exercise and in most cases that will be in the form of leisure time activity.