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DOES ORGANIZED SPORT PARTICIPATION DURING YOUTH PREDICT HEALTHY HABITS IN ADULTHOOD? A 28-YEAR LONGITUDINAL STUDY

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Running head: Healthy habits in adulthood

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## ABSTRACT

Health behaviors in youth can predict the same behaviors later in life, but the role of sport participation in predicting healthy lifestyle habits is unclear. This study aimed to investigate the association between participation in organized youth sport and adult healthy lifestyle habits. Data from the longitudinal Cardiovascular Risk in Young Finns Study (YFS) with a 28 year follow-up was used. The participation in sport-club training sessions was self-reported by 9–18-year olds in 1983 and 1986 (n=1285). During 2011, participants (aged 37–43-year old) reported their smoking status, alcohol consumption, fruit and vegetable consumption and physical activity. Odd ratios (OR) were calculated using logistic regression, to examine how participation in organized youth sport was associated with having three or four versus fewer (0-2) healthy habits in adulthood. Participants who were active in youth sport in both 1983 and 1986 had almost two times greater odds of having three or four healthy habits in adulthood than those who were not active at both time points (OR: 1.75, 95%CI: 1.11-2.76). When the analyses were stratified by sex, the findings were statistically significant among females (OR: 2.13, 95%CI: 1.13–3.99) but not males (OR: 1.27, 95%CI: 0.63-2.58). The results suggest that participation in organized youth sport could promote healthy lifestyle choices.

**Keywords:** sport, youth, health behaviors, physical activity, longitudinal

## INTRODUCTION

The benefits of healthy lifestyle habits are well established among the general population<sup>1</sup>. It is stated that healthy lifestyle habits such as exercising regularly, eating fruits and vegetables daily, consuming alcohol in moderation and not smoking are associated with a significant decrease in mortality and lower rates of cardiovascular disease<sup>2,3</sup>. Hulsegge et al.<sup>4</sup> found that adults who maintained four or five healthy habits over a 5-year period had a 2.5 times lower risk of cardiovascular disease and mortality than those who maintained an unhealthy lifestyle. However, only a small proportion of the adult population have a healthy lifestyle<sup>2</sup>.

There is evidence of early consolidation and tracking of healthy lifestyle habits<sup>5</sup>. The literature suggests that behaviors in youth predict the same behaviors later in life: e.g. physical activity during adolescence is an important contributing factor to adult physical activity<sup>6-8</sup>, past smoking is a good predictor of future smoking, alcohol consumption predicts future alcohol use<sup>9,10</sup> and childhood diet is a significant determinant of adult diet<sup>11</sup>.

Healthy behaviors often cluster together, however, it is not clear whether one healthy behavior in youth predicts other healthy behaviors in adulthood. In the Cardiovascular Risk in Young Finns study (YFS), young adults who remained physically active, smoked less than those who had been inactive during the 6 year follow-up<sup>12</sup>. Mikkilä et al.<sup>13</sup> reported that participants with a more unhealthy diet were less physically active and were more likely to smoke than those with a health-conscious diet. In another Finnish study, Paavola et al.<sup>12</sup> found that physical activity was inversely related to smoking at the ages of 15, 21 and 28 years. These results suggest that physical activity could be a gateway behavior to other health behaviors, but more research is needed to clarify whether physical activity in youth can predict other health-protective behaviors later in life.

In most Western countries, organized youth sport is very popular with approximately half of children and adolescents participating in sport<sup>14</sup>. In Finland, participation in organized youth sport has increased over recent decades.<sup>15</sup> Recent nationwide data suggests more than 60 percent of Finnish children and adolescents aged 9 to 15 years took part in sport club activities and only 13 percent had never participated<sup>16</sup>. However, participation in organized sport declines with age,<sup>17</sup> and among Finnish adolescents aged 15–19 years, only one-third participated in sport club activities<sup>18</sup>.

It is a common belief that children and adolescents who participate in sport club activities have a healthier lifestyle than non-participants. There is evidence that sport participants are more physically active, fitter and have less body fat than non-sport participants<sup>19</sup>. Participation in sport may also be associated with improved psychosocial and social health<sup>20</sup>. However, the results are not always favorable, and some studies have indicated that not all sport participants meet the recommended daily level of physical activity<sup>19,21</sup>. Sport club participants have been shown to smoke less, but use more smokeless tobacco<sup>22,23</sup> and drink more alcohol than non-participants<sup>23,24</sup>. An investigation of participation in youth sport and its influences on healthy lifestyle habits is an

important issue, since it is suggested that youth sport clubs are an important setting for health promotion<sup>25</sup>.

The aim of this study was to examine associations between participation in organized youth sport and healthy adult lifestyle habits, such as moderate alcohol consumption, not smoking regularly, high consumption of fruits and vegetables, and high physical activity. Specifically, we wanted to determine how persistent, organized sport participation in youth (over three years) predicted healthy habits in adulthood.

## **METHODS**

### **Design and study population**

The data were drawn from the Cardiovascular Risk in Young Finns Study (YFS), a large multidisciplinary longitudinal study of cardiovascular disease risk factors and their determinants. In 1980 cohorts of 3, 6, 9, 12, 15 and 18-year-old boys and girls (N=3596) were examined for the first time and the same participants have been followed since. All the participants were randomly selected from five Finnish university cities (Helsinki, Kuopio, Oulu, Tampere and Turku) and their surrounding communities. Equal number of females and males were invited to baseline measurements, but more females participated than males.

The current study uses data from the 1983, 1986 and 2011. The sample includes 1285 individuals (669 females and 616 males), who reported their participation in organized sport in 1983 (aged 9, 12 or 15 years) and in 1986 (aged 12, 15 or 18 years). Data regarding healthy habits in adulthood were collected during 2011 (aged 37, 40, or 43 years), when participants reported their smoking habits (n=771), consumption of alcohol (n=767), physical activity level (n=739) and consumption of fruits and vegetables (n=631).

More females (66%) than males (56%) participated in the 2011 follow up study ( $p < 0.001$ ).

Participation rates in 2011 varied between 49 to 60% depending on the question. Although the number of subjects lost was relatively high, no systematic selection in regard to sport participation was found. Reasons for non-participation have been reported earlier by Raitakari et al.<sup>26</sup>

## **Ethical issues**

The ethics committees of the participating centers approved the study protocol. Details of the project have been described previously<sup>26</sup>.

## **Measurements**

### **Participation in organized youth sport in 1983 and 1986**

In Finland, youth sport is mainly organized outside the school system by local sport clubs, under national sport federations. The frequency of participation in sport-club training sessions among 9-18-year olds was assessed in 1983 and 1986 by self-reported questionnaire. For the analyses, participation in sport-club training was divided into two categories a) regularly, at least once a week or b) no participation or less than once a week.

To study the effect of persistent participation in organized youth sport on adult healthy habits, the participants were divided into four groups: those who participated in sport-club training at least once a week in 1983, and also three years later 1986 (actives), those who participated in 1983 but not 1986 (dropouts), those who did not participate in 1983 but did in 1986 (beginners), and those who participated in neither 1983 nor 1986 (non-actives). Table 1 shows the sex and age characteristics of the four groups.

More males (20.1%) than females (12.6%) were categorized as actives, and more females (65.8%) than males (56.0%) were categorized as non-actives. The mean age of the participants in 1983 was 12.0 years for females and 11.8 years for males (table 1). The mean age of the beginner group was significantly lower than other sport participation groups for females (10.6 years,  $p < 0.005$ ) and males (10.3 years,  $p < 0.004$ ). Among males, the mean age of the dropout group (12.5 years) was significantly ( $p < 0.002$ ) higher than the active and beginner groups.

## Healthy lifestyle factors in adulthood (2011)

During 2011, healthy habits were assessed by a self-reported questionnaire consisting of questions concerning: smoking, alcohol consumption, diet and physical activity. These healthy habits were chosen based on previous studies<sup>4</sup>. Participants' smoking status was categorized as a) regularly, at least once a day or b) nonsmoker or infrequent smoker (smoked less than daily).

To estimate the frequency of heavy episodic (or binge) drinking, participants reported how often they had six or more alcohol portions during one drinking occasion. Based on the mean annual numbers of heavy episodic drinking occasions for Finnish men and women<sup>27</sup>, "infrequent heavy episodic drinking" was defined as no more than once a month for women and no more than 2–3 times a month for men.

Food consumption data were collected using a 131-item food frequency questionnaire (FFQ), developed and validated by the Finnish National Institute for Health and Welfare<sup>28</sup>. The participants were asked to report their average daily frequency and serving size of selected foods and dishes during the previous 12 months. The average consumption of fruits and vegetables (g/day) were calculated based on these questions. The Finnish National Nutrition Council recommends at least 500g of vegetables, fruits and berries should be eaten every day<sup>29</sup>. Participants who, on average, consumed at least 500g per day were classified as having healthy fruit and vegetable intake.

To assess physical activity, participants reported the frequency and duration (hours) of their vigorous physical activity in a usual week. Participants were classified as having a healthy physical activity level if they engaged in vigorous physical activity or sport at least four times a week for at least 2–3 hours (in total) per week. This definition was modified from the Finnish recommendation for health-enhancing physical activity for adults (aged 18–64 years), which recommends at least 2 hours and 30min per week of moderate-to-vigorous-intensity physical activity and activities that develop muscle strength and balance at least twice a week<sup>30</sup>.

## **Covariates**

Mother's education level in 1983 was used as a proxy for the participant's socioeconomic status (SES) during childhood. Mother's education level was categorized into three groups: low (primary school or lower secondary school), middle (high school or vocational school) and high (university). Participants' own education level and occupation in 2011 were used as a proxy for their socioeconomic status (SES) in adulthood. Participants' education level was categorized into two groups: low-middle and high. The low and middle education groups were combined because there were few participants (n=24; 3%) with low education. Occupation was classified into three categories: manual, low-level non-manual and high-level non-manual workers. Participants' age (years), marital status, parental status (having children) and status of chronic diseases or disabilities (a diseased or not diseased) were selected as covariates because these factors can influence health behaviors<sup>31</sup>.

## **Statistical analysis**

The percentage of adults with each healthy habit were reported as descriptive statistics, stratified by sport participation group and sex. The number of healthy adult habits were summed and participants were divided into two groups according to the number of healthy habits (0–2 or 3–4) they had. Chi square-tests were used to compare differences between sport participation groups. Odds ratios (OR) and the corresponding 95% confidence intervals (95% CI) were calculated by logistic regression, to examine how persistence of participation in organized youth sport was associated with having three or four healthy habits in adulthood versus having two or less healthy habits. The non-actives (did not participate in organized sport in 1983 or 1986) formed the reference group. The models were adjusted for age, childhood SES (mother's education in 1983), participant's SES (education and occupation in 2011), marital and parental status and status of chronic diseases or disabilities. The analyses were conducted on the entire sample because the associations between organized youth sport participation and adulthood healthy habits were similar among both sexes. However, the analyses were also stratified by sex, because on average, females have healthier lifestyle habits than males.<sup>1, 32</sup> All analyses were conducted using IBM SPSS Statistics 20.



## RESULTS

Among all participants, actives, who participated in organized sport in their youth persistently, smoked less frequently in adulthood than dropouts and beginners (table 2). In addition, actives achieved the recommended physical activity level in adulthood more frequently than dropouts, beginners or non-actives. The percentage of infrequent heavy drinkers was significantly higher among non-actives than beginners.

Among females, actives smoked less frequently than dropouts. About one-third of female (30%) actives achieved the recommended physical activity level in adulthood compared with 15% of dropouts. The percentage classified as having infrequent heavy drinking and achieving the fruit and vegetable recommendations were highest among female actives but they were not significantly different to the other sport participation groups.

In males, (table 2) the only significant difference between actives' and the other sport participation groups was for physical activity in adulthood. Among males, 31% of the active group achieved the recommended physical activity level, compared with 10% of those who were non-actives. The percentage of males classified as infrequent heavy drinkers was significantly higher among non-actives (78%) than beginners (61%). The male active group had the highest percentage of non-smokers (91%) and the beginner group had the lowest (79%) but the difference was not statistically significant.

The number of healthy habits were significantly different ( $p=0.043$ ) between sport participation groups (figure 1). Among all participants, 37% of the active group had three or four healthy habits, whereas the proportion ranged from 23–27% among the other sport participation groups. Among females, about half the active group had three or four healthy habits in adulthood, which was almost 20 percentage points higher than the other sport participation groups (range 30–33%,  $p=0.043$ ). Among males, the percentage with three or four healthy habits ranged from 12–27% and was highest in the active group but there were no significant differences between groups. In general, healthy habits were more common among females than males ( $p<0.001$ ), with 34% of females and 20% of males having three or four healthy habits.

Among all participants, the odds ratio for having many (3–4) versus less (0–2) healthy habits in adulthood was 1.75 times greater for the active group than the non-active group (table 3). When the analyses were stratified by sex, female actives had over two times greater odds (OR 2.1) for having many (3–4) healthy habits in adulthood than non-actives. The association for males was smaller (OR 1.27) and not statistically significant.

## DISCUSSION

In this study, we found, that consistent participation in organized youth sport was associated with more healthy habits in adulthood. Among all participants, the active group had almost two times greater odds for having three or four healthy habits in adulthood than the non-active group (OR: 1.75, 95%CI: 1.11-2.76). A higher percentage of actives were non-smokers in adulthood than dropouts or beginners. Actives achieved the recommended physical activity level in adulthood more frequently than the other sport participation groups.

Females were more likely to have three or four healthy habits in adulthood than males. This is consistent with several studies that have shown, on average, females have healthier lifestyle habits than males in adulthood<sup>1, 10, 11, 32</sup>. Sex differences in adult lifestyle habits could be one reason why the associations between organized youth sport participation and the number of adult healthy habits were significant only among females, when the analyses were stratified by sex. Another possible explanation is that females and males may have different motives to participate in youth sport. It has been shown that 11–15-year-old Finnish girls valued more health motives (like physical activity makes me feel good, physical activity is healthy, getting better fitness and maintaining normal weight) in physical activity and sport participation whereas boys valued competition, fight and speed<sup>33</sup>.

There are also differences in the types of sport that girls and boys most often engage in<sup>8</sup>. In this study, we did not analyze the type of youth sport but it is important to note that sport subcultures could affect health behaviors. Although, it is traditionally believed that participation in sports lead to a healthier lifestyle, this is not always true. It is shown that team sport participants are more likely to use snus (smokeless tobacco) than non-participants<sup>23, 34</sup> and binge drinking is more common among sport club participants than non-participants<sup>24, 25, 35</sup>. In addition, sport participants have higher risk of

disordered eating, especially in sports where performance success is also associated with having low body weight (eg. gymnastics, figure skating, ballet or cross-country running) compared to non-participants<sup>36</sup>.

There are few longitudinal studies examining health behaviors from youth to adulthood and we have not been able to identify many studies investigating whether organized youth sport participation predicts adult healthy habits. In Norway, Wichström and Wichström<sup>35</sup> studied whether participation in organized sport during adolescence predicted smoking of tobacco, alcohol intoxication and cannabis use from late adolescence (mean age 15 years) to adulthood (mean age 28 years). They found that sport participation in adolescence was associated with reduced adult tobacco and cannabis use, but may increase alcohol intoxication during early adulthood. Some Finnish studies have analyzed general physical activity (not sport participation specifically) and other health habits from adolescence to young adulthood<sup>10</sup> or only during adulthood<sup>37</sup>. Both Paavola et al.<sup>10</sup> and Laaksonen et al.<sup>37</sup> found that smoking has a central role among health behaviors and was associated with both alcohol use and physical activity. Adults who were smokers at baseline were more likely than nonsmokers to be high alcohol users, physically inactive and have an unhealthy diet at the 7-year follow-up<sup>37</sup>. Most studies have examined how health behaviors in youth predict the same behavior in adulthood, rather than how physical activity or sport participation predict other health behaviors. However, our results support earlier suggestions that some individuals have an overall positive health orientation with multiple health habits<sup>10,38</sup>. Based on our results, that tendency was most evident among females who were persistent participants in organized youth sport.

A well-known problem in longitudinal studies is loss to follow-up. In the present study, the number of participants in some of the sport participation groups were quite small when the analyses were stratified by sex, and therefore there may be insufficient statistical power to detect significant associations. Lower response rates are often observed among people with unhealthy behaviors than those with healthy behaviors<sup>39</sup>. In this study only 14% of adult participants smoked every day, however, the Finnish National Institute for Health and Welfare reported that during 2011, 21% of males and 15% of females aged 35–44 years smoked every day<sup>32</sup>. After 28 years of follow-up, participants get selected to some extent according to health habits, and therefore the current data may overestimate the healthy habits of Finnish adults. However, this would be more of an issue in a descriptive study. We have retained heterogeneity in the characteristics of the study participants, which is important in an analytic study such as this.

In this study, organized youth sport participation was measured at two time points 3 years apart, to obtain a better representation of sport participation during youth. However, it is not known how long individuals participated in organized youth sport (the total time), or how intensively or at what level of competition they participated. It is important to note that dropping out, or not participating in organized youth sport, does not mean that these youth were physically inactive. It is possible that dropouts or non-actives were active in self-organized activities. However, analysis of participants' physical activity in 1983 and 1986 showed that the physical activity level of dropouts decreased significantly after they stopped participating in organized youth sport. In contrast, physical activity of beginners increased when they participated in organized youth sport.

The longitudinal design and 28-year follow-up time are strengths of this study. In addition, organized sport participation was assessed at two time points in youth, which gives a better representation of sport participation behavior than data from just one time point. This is particularly important for adolescents, as physical activity has been shown to decrease among this age group. There are many factors, which may act as facilitators or barriers for influencing health behaviors in adulthood, and may have occurred in the participants lives between the 1980s and 2011. These include education, occupation, living environment, marital status, having children, social support, resources and economical costs, knowledge and attitudes<sup>31</sup>. In our study we were able to adjust for a variety of covariates (childhood SES, participants' education and occupation, marital and parental status and status of disabilities/chronic diseases) but it is possible that some residual confounding remains, as there are many factors that shape lifestyle habits.

### **Perspectives**

Participation in organized sport is very popular among children and youth in most western countries. Investigating the influence of youth sport participation on healthy lifestyle is an important issue as it has been suggested that youth sport clubs are an important setting for health promotion<sup>25</sup>.

This study showed that active participation in organized youth sport was associated with a higher number of adulthood healthy habits. Especially among females, those who were active in organized youth sport had over two times greater odds for having many (3–4) healthy habits in adulthood than those who were non-active. These results suggest that organized youth sport participation may be a gateway behavior to other health behaviors.

Youth sport clubs can play a significant role in promoting youth physical activity, however, more work is needed to enable sport clubs to provide an effective setting for health promotion in a holistic way<sup>25,40</sup>. For example, providing coaches with more effective education on health-related matters may be needed. The results of this study should be considered from the perspectives of individual well-being and public health and this information could be valuable for policy makers, officials, sport clubs, coaches and parents.

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Table 1. Number of participants in different sport participation groups and their mean ages in 1983 (range 9–15-years).

	Participation in organized youth sport in 1983 and 1986						Age in 1983	
	All		Females		Males		Females	Males
	n	%	n	%	n	%	Mean (SD)	Mean (SD)
Actives	208	16.2	84	12.6	124	20.1	11.9 (2.3)	11.4 (2.1)
Dropouts	167	13.0	80	12.0	87	14.1	12.3 (2.0)	12.5 (2.2)
Beginners	125	9.7	65	9.7	60	9.7	10.6 (2.1)	10.3 (2.0)
Non-actives	785	61.1	440	65.8	345	56.0	12.1 (2.5)	12.1 (2.4)
Total	1285		669		616		12.0 (2.4)	11.8 (2.4)
			Sig. Chi square-test, p=0.001				Sig. ANOVA p<0.001	Sig. ANOVA p<0.001



Table 2. Percentages of participants with each healthy habit in adulthood (2011), by participation in organized youth sport (1983 – 1986).

Participation in organized youth sport	Healthy habits in adulthood			
	No regular smoking %	Infrequent heavy drinking %	Recommended fruit & vegetable consumption %	Recommended physical activity level %
All				
Actives (n= 103–124 )	91.9	83.7	37.9	30.6
Dropouts (n= 86–96)	82.3	82.1	29.1	16.8
Beginners (n= 59–78)	82.1	73.1	25.4	17.9
Non-actives (n= 466–631)	85.4	84.3	33.2	17.6
Total	85.7	82.8	32.6	19.9
Differences between groups <sup>1)</sup>	Actives vs. Dropouts p=0.031 vs. Beginners p=0.035	Non-actives vs. Beginners p=0.015	NS <sup>2)</sup>	Actives vs. Dropouts p=0.020 vs. Beginners p=0.046 vs. Non-actives p=0.002
Females				
Actives (n= 54–61)	93.4	93.4	46.3	30.0
Dropouts (n= 47–54)	81.5	87.0	40.4	14.8
Beginners (n=38–45)	84.4	82.2	34.2	17.8
Non-actives (n=234–280)	86.1	88.5	36.3	22.9
Total	86.4	88.4	38.1	22.4
Differences between groups <sup>1)</sup>	Actives vs. Dropouts p=0.050	NS <sup>2)</sup>	NS <sup>2)</sup>	Actives vs. Dropouts p=0.054
Males				
Actives (n= 49–63)	90.5	74.2	28.6	31.1
Dropouts (n=39–42)	83.3	75.6	15.4	19.5
Beginners (n= 21–33)	78.8	60.6	9.5	18.2
Non-actives (n= 149–193)	84.5	78.2	28.2	9.9
Total	84.9	75.3	24.8	16.0
Differences between groups <sup>1)</sup>	NS <sup>2)</sup>	Non-actives vs. Beginners p=0.030	NS <sup>2)</sup>	Actives vs. Non-actives p<0.001

<sup>1)</sup> Chi square-test pairwise between groups.

<sup>2)</sup> No significant differences between groups.

Table 3. Odds ratios (OR) and 95% confidence intervals (CI) for having many (3-4) versus less (0-2) healthy habits in adulthood (2011), by participation in organized youth sport.

Participation in organized youth sport	Many vs. less healthy habits					
	All <sup>1)</sup> (n= 657)		Females <sup>2)</sup> (n= 374)		Males <sup>2)</sup> (n= 283)	
	OR	95% CI	OR	95% CI	OR	95% CI
Non-actives	1.0		1.0		1.0	
Actives	<b>1.75</b>	<b>1.11–2.76</b>	<b>2.13</b>	<b>1.13–3.99</b>	1.27	0.63–2.58
Dropouts	0.90	0.53–1.54	1.00	0.51–1.95	0.77	0.31–1.97
Beginners	0.83	0.45–1.53	1.19	0.56–2.51	0.38	0.12–1.25

1) The models were adjusted for sex, age, childhood SES (mother's education), participants' SES (education and occupation), marital and parental status and status of disabilities/chronic diseases.

2) The models were adjusted for the covariates above, excluding sex.

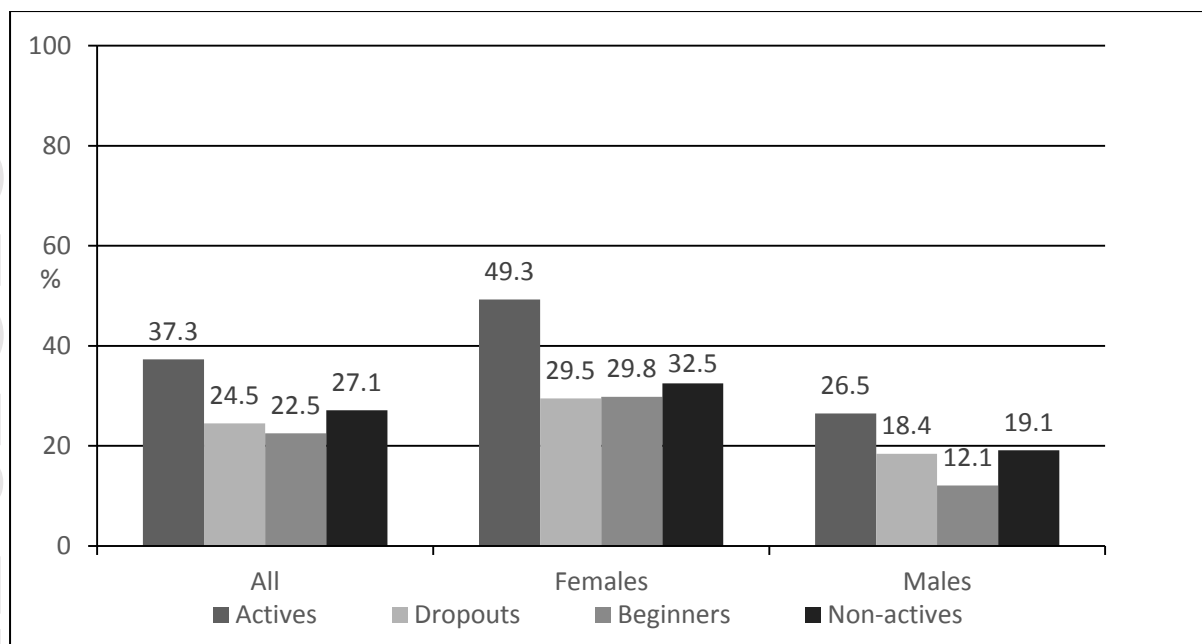


Figure 1. Percentages of participants, who had three or four adult healthy habits in 2011 by participation in organized youth sport (1983 – 1986). Significant differences between sport participation groups among all participants and females ( $p < 0.05$ ).