JYU DISSERTATIONS 869

Katja Rinta-Antila

Sports Club Participation Patterns from Adolescence to Emerging Adulthood

Their Determinants and Relationships with Lifestyle Habits and Life Status

UNIVERSITY OF JYVÄSKYLÄ
FACULTY OF SPORT AND
HEALTH SCIENCES

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Editors
Harri Piitulainen
Faculty of Sport and Health Sciences, University of Jyväskylä
Timo Hautala
Open Science Centre, University of Jyväskylä

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ABSTRACT

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Sports club participation patterns from adolescence to emerging adulthood: Their determinants and relationships with lifestyle habits and life status
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Sports club participation is popular as an organized leisure activity among young people in many European countries. Physical activity has health benefits, and sports club participants are more physically active than nonparticipants. However, sports club participation decreases as adolescents grow up. Among emerging adults, research focusing on changes in sports club participation and related factors has been scarce. Such research can assist in developing longer sports club participation in this transitional age.

This cohort study explored sports club participation patterns and their determinants, plus associated lifestyle habits and life status indicators. It formed part of the Finnish Health Promoting Sports Club (FHPSC) study. Overall, 619 adolescents (of whom 72% were sports club participants at baseline) answered a health behaviour questionnaire at age 15 (years 2013–14) and at age 19 (years 2017–18). Chi-square tests and logistic regression analyses were carried out.

The most prevalent pattern was dropout (41.0%), followed by maintainers (30.9%), nonparticipants (27.6%), and joiners (0.5%). Males were more likely than females to maintain their participation. Both maintainers and dropouts were more likely than nonparticipants to have an academic orientation. Starting the main sport by school age, competing nationally at top level, and aiming at competition in adulthood were more likely to lead to maintained participation than to dropping out. Among males, a coach who was active in health promotion was more related to maintained participation than to dropping out. Among females, maintainers had perceived continuous support for physical activity and sport from parents, while dropouts had perceived a decrease in such support. Furthermore, female and male maintainers were more likely to have healthy lifestyle habits (for example related to physical activity levels) than dropouts and nonparticipants.

Currently, sports clubs tend to support participation especially among males and those who want to compete. Maintained sports club participation and healthy lifestyle habits in emerging adulthood could be advanced by more flexible options in combining sport and education, continuous parental support for sporting activities, and investing in coaches' health promotion activity.

Keywords: organized sports, young people, emerging adults, multilevel factors, health behaviour, longitudinal study

TIIVISTELMÄ (ABSTRACT IN FINNISH)

Rinta-Antila, Katja
Liikuntaseuraosallistumisen muutosryhmät nuoruudesta varhaisaikuisuuteen: niiden selittäjät ja yhteydet elämäntapoihin ja elämäntilanteeseen
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Liikuntaseuratoimintaan osallistuminen on suosittu organisoitu lasten ja nuorten vapaa-ajan harrastus monissa Euroopan maissa. Liikunnasta saa terveyshyötyjä, ja liikuntaseuratoimintaan osallistujien tiedetään liikkuvan enemmän verrattuna osallistumattomiin. Liikuntaseurojen toimintaan osallistuminen kuitenkin vähenee teinivuosina. Varhaisaikuisten ikäryhmässä tutkimusta on tehty vähän liikuntaseuratoimintaan osallistumisen muutoksista ja niihin yhteydessä olevista tekijöistä. Tutkimustietoa tarvitaan liikuntaseuratoiminnan kehittämiseen, että osallistuminen voisi jatkua pidempään tässä siirtymäiässä.

Tässä kohorttitutkimuksessa tyypiteltiin liikuntaseuraosallistumisen muutoksia, niitä selittäviä tekijöitä ja niihin liittyviä elintapoja osana Terveyttä edistävä liikuntaseura (TELS) –tutkimusta. Yhteensä 619 nuorta (72 % seuraosallistujia alkumittauksessa) vastasi terveystottumuskyselyyn 15–vuotiaana (vuosina 2013–14) ja uudelleen 19–vuotiaana (2017–18). Analysoinnissa käytettiin Khiin neliötestiä ja logistista regressioanalyysia.

Yleisin muutosryhmä oli lopettajat (41,0 %), jota seurasivat jatkajat (30,9 %), osallistumattomat (27,6 %) ja liittyjät (0,5 %). Miehet jatkoivat liikuntaseurassa todennäköisemmin kuin naiset. Akateeminen suuntautuminen oli tyypillisempää jatkajilla ja lopettajilla kuin osallistumattomilla. Liikuntaseurassa aloittaminen kouluikään mennessä, kilpaileminen kansallisella huipputasolla, ja aikomus kilpailla aikuisena johtivat todennäköisemmin liikuntaseurassa jatkamiseen kuin lopettamiseen. Miehillä kokemus valmentajan aktiivisesta terveyden edistämisestä oli todennäköisemmin yhteydessä liikuntaseurassa jatkamiseen kuin lopettamiseen. Naisista jatkajat olivat kokeneet vanhempien jatkuvaa tukea liikuntaan ja urheiluun, kun taas lopettajat olivat kokeneet tuen vähenemistä. Naisista ja miehistä jatkajat elivät todennäköisemmin terveellisesti liittyen esimerkiksi liikunnan määrään kuin lopettajat ja osallistumattomat.

Nykyiset liikuntaseurat tukevat etenkin miesten ja kilpailemisesta kiinnostuneiden nuorten osallistumista. Joustavammat mahdollisuudet yhdistää seuraosallistuminen ja opiskelu, jatkuva vanhempien tuki liikuntaan ja panostaminen valmentajan terveyden edistämistoimintaan voivat lisätä seuraosallistumista ja tukea terveitä elämäntapoja varhaisaikuisuudessa.

Avainsanat: organisoitu liikunta, nuoret, varhaisaikuiset, monitasoiset tekijät, terveyskäyttäytyminen, pitkittäistutkimus

Author

Katja Rinta-Antila, MSc
Research Centre for Health Promotion
Faculty of Sport and Health Sciences
University of Jyväskylä
Finland
katja.t.rinta-antila@jyu.fi
ORCID: 0000-0002-1346-212X

Supervisors

Professor Sami Kokko, PhD
Research Centre for Health Promotion
Faculty of Sport and Health Sciences
University of Jyväskylä
Finland

Professor Pasi Koski, PhD
Department of Teacher Education
University of Turku
Finland

Reviewers

Professor Eivind Å. Skille, PhD
Section for Sports and Physical Education
Faculty of Social and Health Sciences
Inland Norway University of Applied Sciences
Elverum, Norway

Senior Lecturer and Researcher Meghan Casey, PhD
Institute of Health and Wellbeing (IHW)
Federation University
Ballarat, Australia

Opponent

Professor Niamh Murphy, PhD
Centre for Health Behaviour Research
Department of Sport and Exercise Science
School of Health Sciences
South East Technological University
Waterford, Ireland

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During my master's studies, my interest in researching physical activity behaviour and health promotion strengthened. This led to two immediate options: to continue with the topic of my master's thesis—studying the meanings that adolescents attribute to physical activity using cross-sectional data—or to examine changes in adolescents' sports club participation and the factors explaining them, using longitudinal data. Both topics still interest me, but in my doctoral research I was particularly drawn to a longitudinal study design and the kind of analysis that would stem from it.

I would like to express my deepest gratitude to everyone who has supported me during my PhD journey. First and foremost, I am profoundly grateful to my supervisors, Professor Sami Kokko and Professor Pasi Koski. Sami, thank you for inquiring about my interest in pursuing doctoral research towards the end of my master's studies. You trusted me and threw me straight into the deep end by giving me the opportunity to present research in a Health Enhancing Physical Activity (HEPA) Conference in Nice, France. In that way, I immediately got to know international researchers working in the health promoting sports club field. I appreciate the numerous opportunities you gave me to have long and detailed discussions on the topic of my dissertation. Pasi, I thank you for your dedication in commenting on my manuscripts and for the opportunity to discuss research with you, and with your other supervisees, in your postgraduate seminars in Educarium, at the University of Turku. To you, my supervisors, I can say that your expertise in health promotion, sport sociology, sports clubs, conducting research, writing manuscripts, and the entire process has been dazzling. Your guidance has been invaluable and encouraging, and your insights have been crucial in shaping this research.

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Jyväskylä 22.11.2024
Katja Rinta-Antila

ORIGINAL PUBLICATIONS AND AUTHOR CONTRIBUTION

This study is based on the following three original peer-reviewed scientific publications, referred to by their Roman numerals. It includes also previously unpublished analyses and the results of these.

I Rinta-Antila, K., Koski, P., Heinonen, O. J., Korpelainen, R., Parkkari, J., Savonen, K., Toivo, K., Uusitalo, A., Valtonen, M., Vasankari, T., Villberg, J. & Kokko, S. (2022). Educational and family-related determinants of organized sports participation patterns from adolescence to emerging adulthood: A four-year follow-up study. *International Journal of Health Promotion and Education*, *61*(6), 317–331. https://doi.org/10.1080/14635240.2022.2116943

II Rinta-Antila, K., Koski, P., Aira, T., Heinonen, O. J., Korpelainen, R., Parkkari, J., Savonen, K., Toivo, K., Uusitalo, A., Valtonen, M., Vasankari, T., Villberg, J., & Kokko, S. (2023). Sports-related factors predicting maintained participation and dropout in organized sports in emerging adulthood: A four-year follow-up study. *Scandinavian Journal of Medicine and Science in Sports*, *34*(1): e14523. https://doi.org/10.1111/sms.14523

III Rinta-Antila, K., Koski, P., Aira, T., Heinonen, O. J., Korpelainen, R., Parkkari, J., Savonen, K., Toivo, K., Uusitalo, A., Valtonen, M., Vasankari, T., Villberg, J. & Kokko, S. (2024). Perceived coaches' health promotion activity, maintenance of participation in sports, and lifestyle habits among emerging adults: a four-year follow-up study. *Annals of Medicine*, *56*(1), 2321327. https://doi.org/10.1080/07853890.2024.2321327

As the first author of the original research articles, I had primary responsibility for planning the study, the study questions, preparing the data for statistical analysis, and performing the analyses, independently or with the aid of a statistician. Furthermore, I had primary responsibility for drafting the manuscripts, considering the comments from co-authors, and making final decisions. I was privileged to use previously existing data from the Finnish Health Promoting Sports Club (FHPSC) study.

FIGURES

TABLES

ABBREVIATIONS

CI	Confidence interval
FAS	Family Affluence Scale
FHPSC	Finnish Health Promoting Sports Club
F-SPA	Finnish School-aged Physical Activity
HBSC	Health Behaviour in School-aged Children
HPSC	Health-Promoting Sports Club
OR	Odds ratio
QRA	the Questionnaire of Reasons for Attrition
TAFISA	The Association for International Sport for All
WHO	World Health Organization

CONTENTS

1 INTRODUCTION

Sports club participation is the predominant organized leisure activity among children and adolescents in many European countries (Kokko et al., 2019; Mathisen et al., 2019). It is generally considered to be beneficial for both the individual and society as it provides education for young people, with advantages in terms of friends, the community, and sport and life skills. It also promotes socialization for physical activity, competition, and society, and forms part of an overall healthy lifestyle (see also Koski, 1999, pp. 293–316; Koski 2005b, pp. 295–337; Mossman et al., 2021). Furthermore, previous research has shown its physical health benefits (Oja et al., 2015, 2024; Telford et al., 2016), and psychological and social health benefits (Eime et al., 2013). However, sports club participation tends to decrease as adolescents grow up (Kemp et al., 2019). In Finland, participation in sports clubs peaks at the age of 10 to 12 years (Blomqvist et al., 2019, pp. 47–56; Blomqvist et al., 2023, pp. 82–92; Lämsä, 2009, pp. 15–42), and thereafter, participation starts to decrease. This tendency occurs earlier than, for example, in Norway where participation in sports clubs peaks at age 16–19 (Green et al., 2019, pp. 173–204; Seippel & Skille, 2019, pp. 108–135).

Beyond the overall decreasing trend in sports club participation (Kemp et al., 2019), many international longitudinal studies focusing mainly on adolescents have identified different *patterns* or trajectories of participation; the patterns include *consistent sport participators, sport dropouts, sport nonparticipators,* and *sport joiners* (Agans et al., 2017; Agans & Geldhof, 2012; Desroches et al., 2022; Howie et al., 2016; Kwon et al., 2015; Manz et al., 2016). However, relatively few studies have examined the changes in sports club participation from adolescence to emerging adulthood (Agans et al., 2017; Howie et al., 2016; Kwon et al., 2015; Lounassalo et al., 2019).

The phase of life from adolescence to emerging adulthood is characterized by changes, transitions, life events, increasing independence, and heterogeneity, related to, for example, education and changes in one's living status (Arnett, 2000, 2014). These (e.g. Van Houten et al., 2019) and many other *factors* may affect adolescents' sports club participation. In systematic reviews (Balish et al., 2014; Crane & Temple, 2015) and in studies exploring patterns of organized sports participation (Desroches et al., 2022; Manz et al., 2016), various adaptations of *ecological models* have been used as frameworks for identifying the factors

influencing participation, viewed as existing on different levels. In addition, a *life-course approach* involving temporal and societal perspectives has been suggested as a means of exploring how life events determine physical activity behaviours such as sports club participation (Hirvensalo & Lintunen, 2011; Van Houten et al., 2019; World Health Organization, 2018). However, research on factors related to organized sports participation has mainly been cross-sectional, retrospective, or extended only to adolescence; nor, on the whole, has it addressed, for example, sports club and coach-related factors among emerging adults.

Sports club settings, which are characterized by informal education and voluntary participation, comprise potential health-promoting settings (Kokko et al., 2009; Kokko & Baybutt, 2022; Van Hoye, Geidne, et al., 2022, pp. 189–200). It is often thought that, by nature, sports clubs are health promoting since they provide physical activities. However, there is reason to claim that a health-promoting sports club could do more than merely promote participants' physical activity via sports activities. To date, this broader function of sports clubs has not been widely acknowledged in practice. For example, there is evidence that *health topics* such as sleep and rest may be *discussed by coaches*, but also that—as perceived by many adolescents—coaches rarely discuss any health topics at all (Kokko, Villberg, et al., 2015). Furthermore, there is a lack of longitudinal research on the age range in question.

Studies have produced evidence for lifestyle recommendations related to, for example, physical activity, sleep, nutrition, and alcohol use (Anderson et al., 2023; Hirshkowitz et al., 2015; World Health Organization, 2010a, 2020). It is known that adolescent sports club participants tend to have *healthier lifestyle habits* than nonparticipants, for example, with regard to physical activity (Mäkelä et al., 2016; Mononen et al., 2021, pp. 36–45; Toivo et al., 2023; Torstveit et al., 2018) sleep (Mäkelä et al., 2016; Torstveit et al., 2018), and nutrition (Heikkilä et al., 2021; Torstveit et al., 2018). However, at the same time, sports club participants may have unhealthy lifestyle habits related to these same factors (Heikkilä et al., 2021; Mäkelä et al., 2016) and to alcohol use (Koski, 2005a; Veliz et al., 2017). Additionally, there have been few longitudinal studies on how lifestyle habits vary according to patterns of sports club participation in emerging adulthood.

This study comprises three previously published sub-studies. Using prospective cohort data with two measurement points—i.e. data provided by the Finnish Health Promoting Sports Club (FHPSC) study—this overall study explored changes in sports club participation, encompassing sports club participation patterns from adolescence (age 15) to emerging adulthood (age 19). The study applied ecological models and a life-course approach in order to describe (i) the individual, social, and organizational-level determinants of the patterns, (ii) how the patterns are related to lifestyle habits, (iii) how the patterns are related to the participants' *main commitment* and *residential status* in emerging adulthood. The overall aim of the study was to produce knowledge that would benefit stakeholders such as sports clubs, coaches, parents, and decision-makers, as part of efforts to increase continuous sports club participation and healthy lifestyle habits during the transition from adolescence to emerging adulthood.

2 LITERATURE REVIEW AND THEORETICAL BACKGROUND

This section of the study describes the phase of life from adolescence to emerging adulthood, including transitions and changes. It then characterizes the sports club as a context of the study, and adolescents' sports club participation and related patterns. It describes the concept of a health-promoting sports club and related research and presents evidence on lifestyle recommendations and lifestyle habits pertaining to adolescents' sports club participation. Finally, ecological models and a life-course approach are presented, since these have been used in exploring sports club participation and related factors, and were applied in this study.

2.1 The transition from adolescence to emerging adulthood

This longitudinal cohort study presented here focuses on young people from age 15 to 19, and their participation in sports clubs. According to the World Health Organization (WHO), this age range belongs to adolescence, viewed as extending from age 10 to 19, and as the phase of life between childhood and adulthood (World Health Organization, 2024). On the other hand, Arnett (2000, 2014) suggests that in industrial and post-industrial societies, there is a phase of life between adolescence and adulthood extending from age 18 to age 29; this is the phase of *emerging adulthood*. It is characterized by *change* and exploration of possible life directions, and by *heterogeneity,* related, for example, to one's educational, working, or residential status.

At age 15, adolescents commonly live with their parents. The typical life event at age 15–16 is a transition from comprehensive school to *upper secondary education*. In 2013–2018 which is when the FHPSC data used in this study were collected, applying for upper secondary education was voluntary in Finland. However, education is generally considered to be extremely important, bearing in mind that most adolescents (98.5% in 2013) apply for further education when

finishing compulsory school. Out of these adolescents, 55% were found to aim at upper secondary school while 45% aimed at vocational education (Statistics Finland, 2022).

Typically, at the age of 18 to 19, a transition from upper secondary education to *tertiary education* or *working life* occurs, reflecting the heterogeneity in this phase of life. For example, out of Finnish persons aged 18–24 in 2016, 48% were employed while 32% were students (Statistics Finland, 2018). Furthermore, another indication of the heterogeneity related to this phase of life exists in different *forms of housing*. For example, in 2022, out of Finnish 19-year-old females, 48% lived in their parental home, 40% lived independently, and 11% lived with a partner, while the corresponding proportions among males were 67%, 26%, and 6% (Statistics Finland, 2023). Studies have shown that *academic success* (Jakobsson et al., 2012; Koski, 2005a; Owen et al., 2024; Paakkari et al., 2017; Wattie et al., 2014) and *transitions related to education, working life, and residential status* (Hilger-Kolb et al., 2020; Van Houten et al., 2019; Van Houten et al., 2017) are related to sports club participation.

Furthermore, in this transitional phase, studying may become more time-consuming, and there may also be other time-consuming activities or commitments. For example, the *training volume* in sports clubs appears to rise at the age of 15 (Blomqvist et al., 2015, pp. 73–82; Blomqvist et al., 2019, pp. 47–56; Blomqvist et al., 2023, pp. 82–92). On the other hand, at age 18 there are changes in the broader *lifestyle recommendations*. For example, the recommended minimum amount of physical activity (World Health Organization, 2010a) or sleep (Hirshkowitz et al., 2015) is lower for adults (persons aged 18 to 64) than for adolescents (persons aged under 18). In addition, in Finland, the purchase of low-strength alcohol beverages (up to 22% by volume) (Alkoholilaki 1102/2017) and tobacco (Tupakkalaki 549/2016) is legal at the age of 18, and this tends to affect the use of these substances.

In this emerging-adulthood phase of life, changes occur also in *social relationships*. Previous research has shown that in addition to *family affluence,* sports club participation may be affected by *parental support for physical activity and sport* (Jakobsson et al., 2012; Koski, 2005a; Paakkari et al., 2017; Vanttaja et al., 2017). Family support (including encouragement and financial support for physical activity) decreases when young people start on their studies at university but it still influences the physical activity levels of students (Scarapicchia et al., 2017). Furthermore, within sports clubs, peers rather than parents or coaches have been shown to have the strongest positive influence on the development of life skills such as teamwork, social skills, and decision making among adolescents (here, persons aged 11 to 21) (Mossman et al., 2021).

As described by the World Health Organization (2024), physical, cognitive, and psychosocial growth in adolescence affects feelings, thinking, decision making, and interacting with the world. Furthermore, adolescents choose lifestyle habits that can either protect or risk their health, and in order to maintain good health, adolescents need safe and supportive environments, in addition to opportunities to develop their life skills (World Health Organization, 2024).

Because of the features of heterogeneity, transition, and change associated with the life stage of persons aged 15 to 19, this age stage is defined in the present study as extending *from adolescence to emerging adulthood*. However, when referring to other studies, the concepts used for the age stages in those studies are used (e.g. young adult).

2.2 Characteristics of sports clubs and sports club participation

2.2.1 The sports club context

The main context in this study is the *sports club* (in Finnish as *liikuntaseura*). *Sport* is viewed as one category of physical activity, while *physical activity* refers to 'any bodily movement that is produced by skeletal muscles resulting in energy expenditure' (Caspersen et al., 1985). Sport can be done to improve or maintain physical fitness (Caspersen et al., 1985). It can be done individually or in team, and it has rules as well as a defined goal (Khan et al., 2012). Moreover, various sport disciplines have their own specific characteristics. In Finnish, the word for sport is *urheilu* which, according to Koski (1999, pp. 293-316)—referring to Heinilä (1989, pp. 225–248)—means competitive activities. It thus excludes non-competitive activities. The corresponding concept for physical activity, movement, and motion is *liikunta*, as defined in 1967 (see Kärkkäinen, 1986, pp. 27–41; Koski, 1999, pp. 293–316). Liikunta encompasses top-level sport, competitive sport, and sport for everyone, including outdoor activities and recreation (Koski, 1999, pp. 293–316).

Four main periods have been identified in the Finnish sports club system from the 20th century onwards (Itkonen, 1996, pp. 215–230). During the *age of organization culture* (1900–1930s), sport was practised in various ideological organizations such as the workers' movement, the women's movement, the temperance movement, and the volunteer fire brigade institutions. Thence during the *age of hobby competition* (1930–1960s), it moved to specialized sports organizations, i.e. sports clubs (Itkonen, 1996, pp. 215–230). During the *age of intense competition* (1960–1980s), hobby-like competition developed into something more intense, and scientific knowledge was increasingly used in training and coaching. During the *age of divergent activity* (from the 1980s onwards), sports and the goals of sport became more diverse. It increasingly became necessary to distinguish between top-class professional sports and volunteer-based civic sports, and between competitive sports and non-competitive fitness sports (Itkonen, 1996, pp. 215–230).

According to the Sport Act, municipalities organise most sports facilities while sports clubs are responsible for organising activities such as competitive sport, sport for all, youth and adult sport, and outdoor recreation (Koski, 1999, pp. 293–316; Liikuntalaki 390/2015). Koski (2009b, 24–32)—referring to Pestoff (1992)—describes sports clubs as civic organizations within the third sector, having a formal, private, and non-profit orientation. Furthermore, sports clubs

have often specialized in a single sport. They may (for the most part) operate on a voluntary basis, and may use mostly voluntary but also paid coaches or other professionals. They provide sports activities for voluntary participants; they may use the sport facilities of the municipality, but some may have their own facilities. They obtain money through for example membership fees, participation fees, collections, entertainment, and advertising, and may possibly receive subsidies from the state and the municipality (Koski, 1999, pp. 293–316; Koski 2009b, pp. 24–32; Koski et al., 2015, pp. 147–160). In Finland, it has been estimated that there are about 10 000 registered and actively operating sports clubs (Koski, 2013, pp. 18–42; Koski & Mäenpää, 2018, pp. 29–65). The number of coaches or instructors has been estimated at about 14 000, and the number of memberships over 2.5 million, bearing in mind that an individual may be a member of several sports clubs (Koski & Mäenpää, 2018, pp. 29–65). During the time of the FHPSC study follow-up data collection in 2018, the population of Finland was 5.5 million (Statistics Finland, 2019).

The situation in the other Nordic countries—and in many other European countries such as Belgium and Ireland (Breuer et al., 2015; Kokko et al., 2016; Koski, 2009b, pp. 24–32), plus Australia (e.g., Casey et al., 2012) and Canada (e.g., Wolman & Fraser-Thomas, 2017)—is similar to that in Finland, since sports clubs are based on voluntary civic activity and community organization outside the school (Kokko et al., 2016). By comparison, in the United States the prevalent manner of organizing youth sports involves school-based sports at high school and college (Kwon et al., 2015; Lim et al., 2011).

In many international studies, the concept of *organized sports* is used. This refers, for example, to school-based sports teams and sports clubs in the United States (Kwon et al., 2015). In Canada, organized sports refers to sport with a coach, rules, and voluntary as well as regular participation (Desroches et al., 2022). In Australia, it is taken to refer to organized sports outside of school hours (Howie et al., 2016), while in Germany, it is characterized as sports activities in sports clubs outside of physical education in school (Manz et al., 2016). In the present study, for the sake of simplicity, the term *sports club* is used (i) in referring to studies with a sports club context comparable to that in Finland, and also (ii) in referring to extracurricular school-based sports teams or sports clubs. Note that in the original sub-studies within the current study, the concept of 'organized sports' was used instead of sports club.

2.2.2 Sports club participation and related patterns

In this study, as in many other studies, s*ports club participation* means participation in physical activities such as training in a sports club and taking part in competitions. It is prevalent organized leisure activity among children and adolescents in many European countries, and also in Finland (Kokko et al., 2019; Mathisen et al., 2019). Nowadays, children *start* participating in sports clubs at an early age; for example in Denmark and Iceland they may start at age 3 or 4 (Green et al., 2019, pp. 173–204). In Finland, the average onset age has decreased over the decades, and currently (in the 21st century) it stands at seven years

(Koski, 2009a, p. 56; Koski & Mäenpää, 2018, pp. 29–65). Furthermore, according to the Finnish School-aged Physical Activity (F-SPA) study in 2020, the average onset age was recorded retrospectively (by upper secondary school adolescents' and emerging adults' aged 16–20) as 7 years (Mononen et al., 2021, pp. 36–45). In many sports, participation often ends after one to two years from starting, and this has been suggested to be due to the fact that many sports organize testing that creates a throw-in and a throw-out spike (Lehtonen et al., 2018, pp. 13–17).

According to a systematic review, after an increase in participation in organized sports during childhood (age 5–12), the rate of participation decreases or does not change during adolescence (age 13–18), and this corresponds to the broader physical activity trend (Kemp et al., 2019). In Finland, too, sports club participation reaches a peak in childhood (Blomqvist et al., 2019, pp. 47–56; Blomqvist et al., 2023, pp. 82–92), as is the case also in Denmark (Pilgaard, 2019, pp. 16–39) and Iceland (Halldórsson, 2019, pp. 87–107). In Finland, according to the F-SPA study focusing on persons aged 9–15, participation peaks at age 11 (Blomqvist et al., 2019, pp. 47–56; Blomqvist et al., 2023, pp. 82–92); however, this may depend on the sport discipline, as indicated by a study on persons aged 3–18 showing the peak as occurring at age 10–12 (Lämsä, 2009, pp. 15–42). Overall, 69–71% of Finnish children aged 11 participate in sports clubs (Blomqvist et al., 2019, pp. 47–56; Blomqvist et al. 2023, pp. 82–92). Participation decreases in adolescence and further in emerging adulthood since 42–44% of persons aged 15 (Blomqvist et al., 2019, pp. 47–56; Blomqvist et al., 2023, pp. 82–92), and 30% of persons aged 18–20 (Mononen et al., 2021, pp. 36–45) participate in sports clubs. Moreover, participation starts to decrease at an earlier age in Finland as compared to, for example, Norway, where peak participation occurs at age 16–19 (Green et al., 2019, pp. 173–204; Seippel & Skille, 2019, pp. 108–135).

In addition to the overall declining trend in sports club participation among adolescents, international longitudinal studies using a range of methods have identified various *organized sports participation patterns, trajectories, or profiles* (Agans et al., 2017; Agans & Geldhof, 2012; Desroches et al., 2022; Findlay et al., 2009; Gallant et al., 2022; Howie et al., 2016; Kwon et al., 2015; Manz et al., 2016; Rodriguez, 2004). For instance, in a study covering childhood to emerging adulthood (from age 5 to age 19), Kwon et al. (2019) found trajectories of *consistent sports participation* (46.2%), *dropout from sports participation* (40.2%), and *no sport participation* (13.6%) among females and males, while in a study focusing on persons aged 5–17, Howie et al. (2016) found somewhat differing trajectories for females vs. males. Hence, for *females*, the figures obtained were *consistent sport participators* (47.5%), *sport dropouts* (34.3%), and *sport nonparticipators* (18.1%). For *males*, the figures obtained were *consistent sport participators* (55.2%), *sport dropouts* (36.9%), and *sport joiners* (8.1%).

Gould (1987, pp. 61–85) has determined *dropout* in organized sports on a continuum from activity-specific to domain-general hence, ranging from dropping out of one sport to dropping out of all sports permanently. Systematic reviews exploring factors related to dropout showed that half of the original studies gave an operational definition for dropout based on information on

registration for the subsequent season (Crane & Temple, 2015); alternatively, the original studies focused on prolonged withdrawal from one sport but not all sports (Balish et al., 2014). The latter corresponds to activity-specific dropout according to Gould (1987, pp. 61–85), but has been defined as *drop off* by Fraser-Thomas et al. (2016).

Previous research has included only a limited number of longitudinal studies on sports club participation during the transition from adolescence to adulthood (Balish et al., 2014; Crane & Temple, 2015; Howie et al., 2016; Lounassalo et al., 2019). The lack of research in this field provided the rationale for the present longitudinal cohort study, which used the FHPSC study data on sports club participation patterns from adolescence to emerging adulthood.

2.2.3 Sports, training volumes, and competing

In 2020, among the Finnish upper secondary school adolescents and emerging adults (persons aged 16–20) who participated in club sports, the *most popular sport* was *football* followed by *dancing, horse riding, ice hockey,* and *floorball* (Mononen et al., 2021, pp. 36–45). The *training volumes* in sports clubs appear to show a rise by the age of 15, given that the proportion of Finnish sports participants reporting a minimum of four times per week of coach-led training increases from 29–32% at age 11 to 39–42% at age 15 (Blomqvist et al., 2015, pp. 73–82; Blomqvist et al., 2019, pp. 47–56; Blomqvist et al., 2023, pp. 82–92). Finnish upper secondary school-aged sports club participants have an average of three 90-minute coach-led main sport training sessions and one to two 75-minute self-directed main sport training sessions per week (Mononen et al., 2021, pp. 36–45).

The majority of sports-club adolescents (73%) participate in *competitions*, and over half of sports-club participants (57%) are *competitively oriented;* however, 43% of the sports-club adolescents participate in sports clubs without a desire to compete (Mononen et al., 2021, pp. 36–45). Furthermore, more males than females desire to compete (Mononen et al., 2021, pp. 36–45). In a previous Finnish study, male sports participants perceived themselves as competitive and goal-oriented to a greater extent than was the case among male sports nonparticipants (Koski, 2005a).

International studies have shown that those adolescents who maintain their sports club participation have started participation at an earlier age (Jakobsson, 2014), have trained longer, have higher training volumes (Baron-Thiene & Alfermann, 2015), and are willing to compete (Baron-Thiene & Alfermann, 2015; Jakobsson, 2014) compared to dropouts. On the other hand, a high training volume together with negative feelings related to physical factors, emotional factors, scheduling difficulties, and performance factors (Larson, McHough, et al., 2019), and a low competitive level (Moulds et al., 2020) may lead to dropout. There is also variation between sport disciplines regarding when participation starts to decrease (Brooke et al., 2014; Lehtonen et al., 2018, pp. 13–17), with adolescent *team*-sport participants being more likely to maintain their participation than adolescent *individual*-sport participants (Baron-Thiene & Alfermann, 2015; Lehtonen et al., 2018, pp. 13–17). However, there exists overall

a lack of longitudinal research focusing on recreational reasons for sports club participation (Moulds et al., 2020; Wattie et al., 2014). Nor has there been research within Finland on other sports-related factors related to maintenance of sports club participation.

2.2.4 The health-promoting sports club

In 2021, the Health Promotion Glossary of the WHO defined *health* in terms of the Constitution of the WHO in 1948. Hence, health is 'a state of complete physical, social and mental well-being, and not merely the absence of disease or infirmity'(World Health Organization, 2021). *Health promotion*, for its part, is the 'process of enabling people to increase control over, and to improve their health' (World Health Organization, 1986). Dooris, Kokko, and Baybutt (2022, pp. 23–44) refer to Wenzel (1997), who defined *settings* as 'the spatial, temporal, and cultural domains of face-to-face interaction in everyday life'. In line with this, the *settings-based approach* in health promotion is based on the notion that settings can influence well-being, and that health is integrated within the culture and core business of the setting in question (Dooris, Kokko, & de Leeuw, 2022, pp. 3–22). The settings-based approach can be described in terms of five characteristics: (i) creating health (salutogenic orientation); (ii) adopting a multi-level ecological model in determining health; (iii) settings as dynamic systems; (iv) using whole-system thinking for holistic change; and (v) impacting on the core business of a setting (Dooris, Kokko, & Baybutt, 2022, pp. 23–44).

Starting from the 1980s, this approach was originally developed in settings such as cities, schools, hospitals, workplaces, prisons, and universities (Dooris, Kokko, & de Leeuw, 2022, pp. 3–22). Later on, sports clubs were acknowledged as possible health-promoting settings (Kokko et al., 2014; Van Hoye, Geidne, et al., 2022, pp. 189–200) on the grounds that they reach a large number of voluntary participants, and promote participants' physical (Oja et al., 2015, 2024; Rhodes et al., 2017), psychological, and social (Eime et al., 2013) health, while providing also informal education (Kokko, 2014; Van Hoye, Geidne, et al., 2022, pp. 198–200). It has also been argued that when receiving financial support from the state and municipality, sports clubs are under an obligation to promote public health, and that coaches like all adults have a duty of health promotion among adolescents (Kokko, 2014). Ideally, health promotion in a sports club will also support the core business of the sports club, viewed as organizing sports activities and competitions together with the development and performance of participants, maintenance of participation in sports, and hence public health (Kokko et al., 2009). In this setting, it may include, for example, promoting a healthy and welcoming sporting environment (Eime et al., 2008) or discussion on health topics within sporting activities (Kokko et al., 2008). Hence, health promotion in sports clubs can consist of more than efforts to increase participants' physical activity via the sporting activities provided.

Finnish research on the health-promoting sports club

Since the start of the 21st century, various studies related to the notion of a health-promoting sports club have been conducted in Finland. In 2003, as a part of research conducted in the University of Turku, Koski (2005b, pp. 295–337) adopted a sport sociology perspective to explore whether participation in a sports club leads to health. The research examined the meanings attached by adolescents to health, alcohol, sport, and physical activities. In so doing, it considered whether participation in a sports club is associated with the meanings attached to various health dimensions such as a healthy lifestyle among persons aged 13–17 in the city of Turku. As noted by Koski (2005b, pp. 295–337), meanings underlie behavioural choices.

In 2000, Kannas working in the domain of health education in the University of Jyväskylä created preliminary criteria for a health-promoting sports club. The criteria were based on the five strategic areas for health promotion as set out in the Ottawa Charter i.e., building healthy public policy, creating supportive environments, strengthening community activities, developing personal skills, and reorienting health services (World Health Organization, 1986). The criteria were further based on the principles of a health-promoting school, various lines of research, and practical sports club experiences (Kannas, 2000; Kokko et al., 2006). In 2004, the concept of the *health-promoting sports club (HPSC)* was established in the University of Jyväskylä. This was based, among other things, on the criteria of Kannas (Kannas, 2000; Kokko et al., 2008). Kokko et al. (2006) also developed standards for health-promoting sports clubs, based mainly on the Ottawa Charter (World Health Organization, 1986) but also on the criteria set out by Kannas (2000). They subsequently developed an *HPSC Index* measurement tool based on the standards previously identified (Kokko et al., 2008), and set out theoretical grounds for the settings-based approach (Kokko, 2014; Kokko et al., 2008, 2014).

In 2013, the *FHPSC consortium study* was initiated (Kokko, Selänne, et al., 2015); see Section 4.1). So far, cohort data have been collected on three occasions, on study participants at the ages of 15 (2013–2014), 19 (2017–2018), and 23 (2021). Within this study, Mäkelä et al. (2016) explored physical activity, screen time and sleep, while Ng et al. (2017) explored substance use together with coaches' health promotion activity, considering sports club participants and nonparticipants aged 14–16. Furthermore, Toivo (2021) examined physical activity and health among adolescent sports club participants aged 14–17, while Heikkilä (2024) focused on dietary habits, competitive goals, and body image among adolescents aged 14–16. In addition, Aira (2024) identified physical activity patterns from age 15 to 19, plus their correlates and determinants, together with how these patterns are related to cardiometabolic health. (See Section 2.3) The current study focused on sports club participation patterns, their determinants, and their association with lifestyle habits and life status; it also forms a part of the FHPSC study.

International health-promoting sports club research

In Australia from the 1990s onwards, health promotion and related research in sport settings has focused, for example, on prohibiting tobacco sponsorship and advertising, with a view to replacing harmful products with healthy products and services (Corti et al., 1995; Giles-Corti et al., 2001). Efforts have also been directed towards an alcohol-use prevention programme in sports clubs (Eime et al., 2008; Rowland et al., 2012a, 2012b), with further efforts aimed at sports participation and physical activity (Eime et al., 2008), nutrition (Kelly et al., 2008, 2011), sports organizations' capacity-building strategies (Casey, Harvey, et al., 2012; Casey et al., 2009; Casey, Payne, & Eime, 2012), and sports injury prevention (Donaldson et al., 2004, 2013).

In the international workshop organized by The Association for International Sport for All (TAFISA) in Helsinki in 2008, guidelines and a framework for sports club health programmes were created, with a view to promoting health-enhancing sports and physical activity for various age groups (Kokko et al., 2009).

Health promotion in sports clubs has also been studied in various European countries. In Sweden, efforts have been made towards an alcohol policy for sports clubs (Geidne et al., 2013a) and collaboration between sports clubs and stakeholders (Geidne et al., 2013b). In Belgium, studies have been conducted on sports clubs' motives and barriers to health promotion (Meganck et al., 2016). In France, attention has been given to coaches' health-promotion activities (Van Hoye et al., 2015, 2016, 2018, 2020; 2022), while in Ireland, there has been discussion of a Healthy Club concept (Lane et al., 2017, 2020).

Evolution of the Health Promoting Sports Club (HPSC)

Research has shown the developmental stages of a sports club on the journey to becoming a health-promoting sports club. The *stages* range from a passive education model with external experts targeting a specific health behaviour and set of club members towards modifying the norms and culture of a club setting in the direction of health promotion (Kokko et al., 2014; Van Hoye, Geidne, et al., 2022). According to the settings-based approach by which the whole system is addressed, within a health-promoting sports club, health promotion activities will focus on the *macro* level i.e., club policies and regulations, the *meso* level i.e., club officials' and management's guidance and support for coaches, and the *micro* level i.e., coaches' individual health-promotion activities and support for participants (Johnson et al., 2020). For each of these levels, definitions have been formulated to cover social, cultural or organizational, environmental, and economic *health determinants* (Johnson et al., 2020). Additionally, the health-promotion *resources* of a sports club involving for example, time, money, people, and policies require the support of the community, public authorities, and health and sport organizations (Geidne et al., 2013b). Finally, in health-promoting sports clubs, the health promotion *actions* (i) apply to all club actions, (ii) involve participants, parents, coaches, management, and volunteers (Van Hoye et al.,

2021), (iii) involve external partners and the broader community, (iv) are seen as a continuous process, and (v) are based on the needs of the club (Van Hoye et al., 2021). It has been suggested that research and practice are slowly moving from narrow notions of health promotion within sports clubs towards the broader notion of a holistic health-promoting sports club (Geidne et al., 2019; Kokko et al., 2016; Van Hoye, Geidne, et al., 2022, 189–200).

Health promotion activity in current sports clubs, and participants' health

Previous cross-sectional studies using the HPSC Index measurement tool have shown that sports clubs have a positive orientation towards health promotion (Kokko et al., 2008; Van Hoye et al., 2015), but sports clubs do not guide their coaches actively towards health promotion (Kokko et al., 2011). Coaches appear to perceive their health promotion efforts as more active compared to the perception of sports participants (Kokko, Villberg, et al., 2015; Koski, 2007, pp. 299–319). However, reports by both coaches and sports participants indicate that in relation to various health topics, coaches more frequently discuss sleep, injury prevention, and training when one is ill (Kokko, Villberg, et al., 2015). Studies have also shown that coaches' health-promotion activity in relation to healthy lifestyle habits and fair play is associated with (i) participants' enjoyment in sport (Van Hoye et al., 2016, 2020), and (ii) better perceived health (Van Hoye et al., 2020). The latter is also associated with a decreased intention to drop out of sports (Van Hoye et al., 2016). However, studies also suggest a possible need to promote health-promotion competence among coaches (Kokko & Kannas, 2004; Lane et al., 2017).

Research has shown that female sports club participants are more likely to rate various health dimensions (e.g. a healthy lifestyle) as very important than is the case among nonparticipants. By contrast, among males, it is harder to detect differences between participants and nonparticipants (Koski, 2005b, pp. 295–337). Furthermore, sports club participants have better physical fitness and health (Oja et al., 2015, 2024; Telford et al., 2016) and self-esteem, and fewer depressive symptoms (Eime et al., 2013) than are found among nonparticipants. Life skills—such as social and emotional skills, problem solving, decision making, and time management—can be learned in sports club activities (Mossman et al., 2021). However, sports club participation has also disadvantages, notably possible acute injuries, or injuries deriving from over use; for example, 44% of sports club participants aged 14 to 16 (Ristolainen et al., 2019) and 33% of sports club participants aged 16 to 20 (Parkkari & Leppänen, 2021, pp. 90–94) have reported at least one acute injury in the course of a year. Furthermore, perceived competence and social pressure may operate as negative factors in sports participation (Crane & Temple, 2015). It should also be noted that though adolescent sports club participants may tend overall to have healthier lifestyle habits than nonparticipants, at the same time, many sports club participants do engage in unhealthy lifestyle habits (Heikkilä et al., 2021; Mäkelä et al., 2016; Ng et al., 2017) (see Section 2.3).

Despite fairly abundant theoretical background studies on the health-promoting sports club, longitudinal research on the health-promoting sports club and on *coaches' health promotion activity* has been scarce (Casey et al., 2017). The current study, which takes into account the theoretical background, focuses on micro level factor i.e., coaches' health promotion activities and their support for participants, economic health determinant i.e., resources of time and knowhow (Johnson et al., 2020) and second indicator i.e., involve coaches (Van Hoye et al., 2021) of the health-promoting sports club. This aspect is explored by investigating coaches' health promotion activity as perceived by adolescents, which is seen as one potential determinant of maintained sports club participation.

2.3 Lifestyle recommendations and lifestyle habits

Based on research evidence, *lifestyle recommendations* have been provided for promoting health at different ages. For adolescents under 18, the recommended minimum level of physical activity is 60 minutes of moderate to vigorous physical activity per day. For adults from age 18 to age 64, the recommendation (World Health Organization, 2010a) is a minimum of 150 min per week of moderate physical activity or a minimum of 75 min per week of vigorous physical activity or an equivalent combination of these. The recommended amount of sleep is 8 to 10 hours per night for teenagers aged 14 to 17 and 7 to 9 hours per night for young adults aged 18 to 25 (Hirshkowitz et al., 2015). The recommended intake of fruit and vegetables is at least five portions (400g) per day (World Health Organization, 2020).

With regard to substance use, in the Finnish nutritional recommendations (Valtion ravitsemusneuvottelukunta, 2014) and current care guidelines (Duodecim, 2015), as of 2014, the low-risk level of alcohol consumption is 10 grams (one serving) per day for women and 20 grams (two servings) per day for men. However, these limits should not be interpreted as 'safe' limits. According to the latest research and to a statement of the World Health Organization, a light drinking level is less than 10 grams per day, but a safe level of alcohol consumption for health including cancer cannot be established (Anderson et al., 2023; Rovira & Rehm, 2021). Tobacco use—whether smoking or smokeless—impacts negatively on health and is a cause of death and disease (World Health Organization, 2010b).

A *habit* can be described as an automatic, less aware, repeated, and routine action (Hirvensalo & Lintunen, 2011; Verplanken & Melkevik, 2008). Studies in Norway and Finland have shown that adolescent sports club participants are more likely to have *healthy lifestyle habits* (with respect to e.g. physical activity, nutrition, and substance use) than non-participants (Mononen et al., 2021, pp. 36–45; Ng et al., 2017; Toivo et al., 2023; Torstveit et al., 2018). Additionally, research in Finland has shown that adolescent sports club participants as compared to adolescent nonparticipants are more likely to have healthy lifestyle habits related

to physical activity, smoking, alcohol use, and fruit and vegetable consumption when they reach adulthood (Palomäki et al., 2018).

A systematic review has shown a positive association between sports participation in childhood and adolescence and physical activity in adulthood (Batista et al., 2019). A recent longitudinal FHPSC study found that sports club participation from age 15 to age 19 was associated with an objectively measured maintained or increased physical activity level at age 19 (Aira et al., 2021), and a Brazilian study found a positive connection between the organized sports participation of females aged 7 to 17 and their objectively measured vigorous physical activity at age 18 to 25 (Batista et al., 2024).

At the same time, unhealthy lifestyle habits are by no means uncommon among sports club participants. For example, according to the FHPSC baseline study, about 80% of female and 70% of male sports club participants aged 15 did not meet the recommended daily levels of physical activity (Mäkelä et al., 2016; World Health Organization, 2010a), or of sleep on schooldays (at least 9 hours/night) (Hirshkowitz et al., 2015; Mäkelä et al., 2016). Furthermore, 40–53% of female and 66–75% of male sports club participants reported not eating vegetables and fruits daily (Heikkilä et al., 2021). In addition, in the F-SPA study, 74% of active sports club participants aged 16–20 did not meet the physical activity recommendation of 60 minutes of moderate to vigorous physical activity per day (Mononen et al., 2021, pp. 36–45). Furthermore, a previous Finnish study has shown that among boys aged 13–18, active sports club participants were more likely to use alcohol than those who had never participated in a sports club. The use was more common among those who competed below the top level and those who played ice hockey (Koski, 2005a). According to the longitudinal American study, binge-drinking at age 19–22 was more likely among those who had participated in organized sports at age 18 compared to those who had not participated at the same age (Veliz et al., 2017).

To date, studies on various lifestyle habits among adolescent sports club participants have mainly been cross-sectional. Hence, this study on how changes in sports club participation are related to lifestyle habits in emerging adulthood followed a longitudinal approach.

2.4 Theories in exploring sports club participation

2.4.1 Ecological models

A settings-based approach—and hence a focus on the health-promoting sports club—is based on whole-system thinking encompassing an *ecological model* (Dooris, Kokko, & Baybutt, 2022, pp. 23–44; Van Hoye, Geidne, et al., 2022, pp. 189–200), as described in Section 2.2.4. It should be noted that some systematic reviews and several other studies exploring factors related to participation or dropout in sports clubs have also applied ecological models or similar models for the purposes of categorization (Balish et al., 2014; Crane & Temple, 2015;

Desroches et al., 2022; Hopkins et al., 2022; Manz et al., 2016; Vanttaja et al., 2017) (see Section 2.4.3).

The biological concept of *ecology* refers to interactions between organisms and their environment (Campbell et al., 2014, p. 1204). In line with this, ecological models in health promotion focus on transactions between individuals and their environmental settings (Stokols, 1992). Hence, they focus on the *environmental* levels of influence i.e, community, organizational, and policy influences, and *individual* characteristics and skills, in addition to proximal *social* influences i.e., family and friends (Sallis et al., 2008, pp. 466–485).

The various ecological models in health promotion are based on a conceptual tradition within the behavioural and social sciences (Sallis et al., 2008, pp. 466-485). Sallis et al. (2008, pp. 466–485) place ecological models within several categories. Thus, there are those that are designed to help *explain behaviour* such as systems theory as set out by Bronfenbrenner in 1979, those that *guide behavioural intervention* such as the Ecological Model of Health Behaviour presented by McLeroy et al. (1988), and the Social Ecology Model for Health Promotion delineated by Stokols (1992) and by Stokols et al. (2003).

The categories and hierarchies of behavioural influences vary. For example, Bronfenbrenner (1979) named the levels as belonging to the micro, meso, exo, and macro environment, while McLeroy et al. (1988) categorized the levels as belonging to domains which they named as intrapersonal, interpersonal, institutional, community, and public policy. Furthermore, Stokols (1992) suggested that individuals are influenced by physical environments including geography, architecture, and technology, social environments including culture, economics, and politics, and personal attributes including one's genetic heritage, plus relevant psychological dispositions and behavioural patterns.

Sallis et al. (2008, pp. 466–485) propose four principles for ecological models: (i) the models influencing health behaviours are composed of multiple levels of factors (intrapersonal, interpersonal, organizational, community, and public policy levels); (ii) the factors interact across the different levels; (iii) the models should be behaviour-specific; and (iv) multilevel interventions should be comprehensive if they are to exert maximal power in changing behaviour.

Ecological models are used for guiding public health programmes, in the case (for example) of the document setting out the WHO's global strategy for diet, physical activity, and obesity (Sallis et al., 2008, pp. 466–485; World Health Organization, 2004). Sallis et al. (2006; 2008, pp. 466–485) synthesized the findings and concepts from various fields (health, behavioural science, transportation and city planning, policy studies and economics, and leisure sciences) to create an ecological model covering four domains of active living (*active recreation, active transport, household activities,* and *occupational activities*). The model, with its layered structure, encompasses social and cultural environments operating at many levels. Sallis et al. (2008, pp. 466–485) suggested that general ecological models can be used as the basis of a behaviour-specific model, and that other ecological models can be developed for specific physical activity behaviours and population subgroups.

In addition to the benefits of ecological models, Sallis et al. (2008, pp. 466–485) indicated challenges in the models, including the identification of environmental and policy variables related to specific behaviours. Furthermore, due to the multiple levels of influence and multiple variables at each level, identification of the most important interactions across levels may involve challenges in the use of such models (Sallis et al., 2008, pp. 466–485). Another challenge is that general ecological models of health behaviour do not specify the most important factors influencing behaviour. Despite this, one can suggest that studies along ecological lines are needed if one is to obtain knowledge for effective multi-level interventions (Sallis et al., 2008, pp. 466–485).

2.4.2 The life-course approach

The *life-course approach* provides an especially suitable framework for longitudinal cohort studies in which one is seeking to explore how behaviours are influenced by the historical context, earlier phases of life, social relationships, and individual choices. It may thus provide indications on causality, going beyond the correlations identified in cross-sectional studies (see also Hirvensalo & Lintunen, 2011; Vanttaja et al., 2017).

Mitchell (2003, pp. 1051–1055) refers to Giele and Elder (1998) and Elder (1985) in defining the life course as 'a sequence of socially defined events, i.e. transitions and roles that the individual enacts over time'. Note here that *transition* refers to an event within a trajectory, while *trajectory* refers to long-term patterns of stability and change. Life course theory comprises several principles. These encompass aspects such as historical time and geographical place, the timing of lives, heterogeneity, linked lives, human agency, and the life-span development, with the past shaping the future (Elder et al., 2003; Mitchell, 2003, pp. 1051–1055). Hence (as in ecological models), within life course theory one can find environmental, social, and individual dimensions, in addition to a *temporal* perspective.

According to the Minsk Declaration on the Life Course Approach in the Context of Health, 2020, actions must be taken in early life and in transition periods and together as a society, to ensure the best start in life, to protect and promote health, and to create healthy environments (World Health Organization, 2018).

2.4.3 Multi-level factors related to sports club participation

Sallis et al. (2008, pp. 466–485) use the terms *influence* and *factor* when expressing how factors influence health behaviour. According to Bauman et al. (2002), a *correlate* refers to the association or correlation of one factor with physical activity, without proven causality, while a *determinant* refers to a causal factor and a cause-and-effect relationship; hence, variation in a determinant is followed by variation in physical activity behaviour. The strongest evidence on causal relationships can be provided by randomized controlled trials. Somewhat weaker evidence is

proved by interventions, and then by cohort studies, while the weakest evidence is provided by cross-sectional survey studies (Bauman et al., 2002).

Some systematic reviews (Balish et al., 2014; Crane & Temple, 2015; Hopkins et al., 2022) and longitudinal cohort studies (Desroches et al., 2022; Manz et al., 2016; Vanttaja et al., 2017) have applied ecological models in exploring organized sports participation (patterns) and related factors. They have named the levels of factors in various ways, for example *intrapersonal, interpersonal,* and *structural* levels (Crane & Temple, 2015). The reviews have shown that earlier studies have been, for the most part, cross-sectional, retrospective studies. In terms of frequency, the studies have largely examined intrapersonal factors (Balish et al., 2014; Crane & Temple, 2015; Hopkins et al., 2022) and interpersonal factors (Balish et al., 2014; Crane & Temple, 2015). They have shown that, for example, perceived competence, competing priorities, and enjoyment are associated with sports club participation.

Longitudinal cohort studies adhering to ecological models have identified relationships between various factors and sports club participation, including gender, age, parents, friends, and residential area (Desroches et al., 2022; Manz et al., 2016; Vanttaja et al., 2017). These studies have focused on younger age groups (Desroches et al., 2022; Manz et al., 2016), or have not explored sports club participation patterns (Vanttaja et al., 2017).

As in the studies above, researchers have found relationships pertaining to *gender* (Howie et al., 2016) and *family* (Jakobsson et al., 2012; Koski, 2005a; Paakkari et al., 2017). Also related to sports club participation are adolescents' *academic achievement* (Jakobsson et al., 2012; Koski, 2005a; Owen et al., 2024; Paakkari et al., 2017; Wattie et al., 2014), *age* when started in sports, *type of sport* or *sport discipline, and competitive level,* (Baron-Thiene & Alfermann, 2015; Brooke et al., 2014; Hardie Murphy et al., 2017; Jakobsson, 2014; Koski, 2005a; Lehtonen et al., 2018, 13–17; Moulds et al., 2020), *coaches' health promotion activity* (Van Hoye et al., 2016), and *life events in the transition to adulthood* (Hilger-Kolb et al., 2020; Van Houten et al., 2019; Van Houten et al., 2017). These studies have mainly been cross-sectional or longitudinal and have not explored the differences between various sports club participation patterns.

As noted in previous studies, there has been a lack of research on factors existing across various levels, and especially on lower- and higher-level factors at biological, institutional, community, and policy levels (Balish et al., 2014; Howie et al., 2016; Lounassalo et al., 2019). Nor has much attention been paid to the interrelationships between factors or the underlying dimensions of factors (Crane & Temple, 2015). These considerations suggest a need for studies with theory-driven (Hopkins et al., 2022) and mixed-method designs; also for studies with prospective designs (Crane & Temple, 2015; Hopkins et al., 2022), and studies that explore the relationships of factors within sports club participation patterns in the age bracket from adolescence to emerging adulthood (Howie et al., 2016; Lounassalo et al., 2019). With this in view, the present prospective cohort study aimed to fill a knowledge gap by exploring how factors on individual, social, and organizational levels i.e., factors related to gender,

education, family, sports, the coach's health promotion activity, participants' life status and participants' lifestyle habits are related to sports club participation patterns from adolescence to emerging adulthood.

2.4.4 Applying an ecological model and life-course approach to sports club participation

In this longitudinal cohort study, it seemed appropriate to apply a multi-level ecological model (Sallis et al., 2008, pp. 466–485) and life-course dimension (see Elder et al., 2003; Giele & Elder, 1998; Hirvensalo & Lintunen, 2011; Mitchell, 2003, pp. 1051–1055; Vanttaja et al., 2017) as presented in Figure 1. It took Finnish sports clubs from the beginning of the 21st century as the main context. It focused on (i) the transitional phase from adolescence to emerging adulthood, (ii) stability and changes in sports club participation as specific physical activity behaviours, (iii) multi-level factors from early life to emerging adulthood. Based on previous research on sports club participation and on factors available in the current study data, the model was seen as comprising *individual*, *social*, and *organizational factors*, in conjunction with *change factors* related to parental support and to the main sport. These were seen as factors that could influence stability and changes in sports club participation, involving the patterns of *maintainers, dropouts, nonparticipants, and joiners*. Furthermore, *lifestyle habits* and *life status* in emerging adulthood which could vary according to one's sports club participation pattern were explored and included in the model. Hence, the model—which extends from childhood via adolescence to emerging adulthood—encompasses the time points when the variables were measured. This was also done retrospectively (onset age of participation in main sport). Overall, the model shows the study design and includes some factors that could explain sports club participation—factors that need to be influenced if one is to promote maintained sports club participation and healthy lifestyle habits.

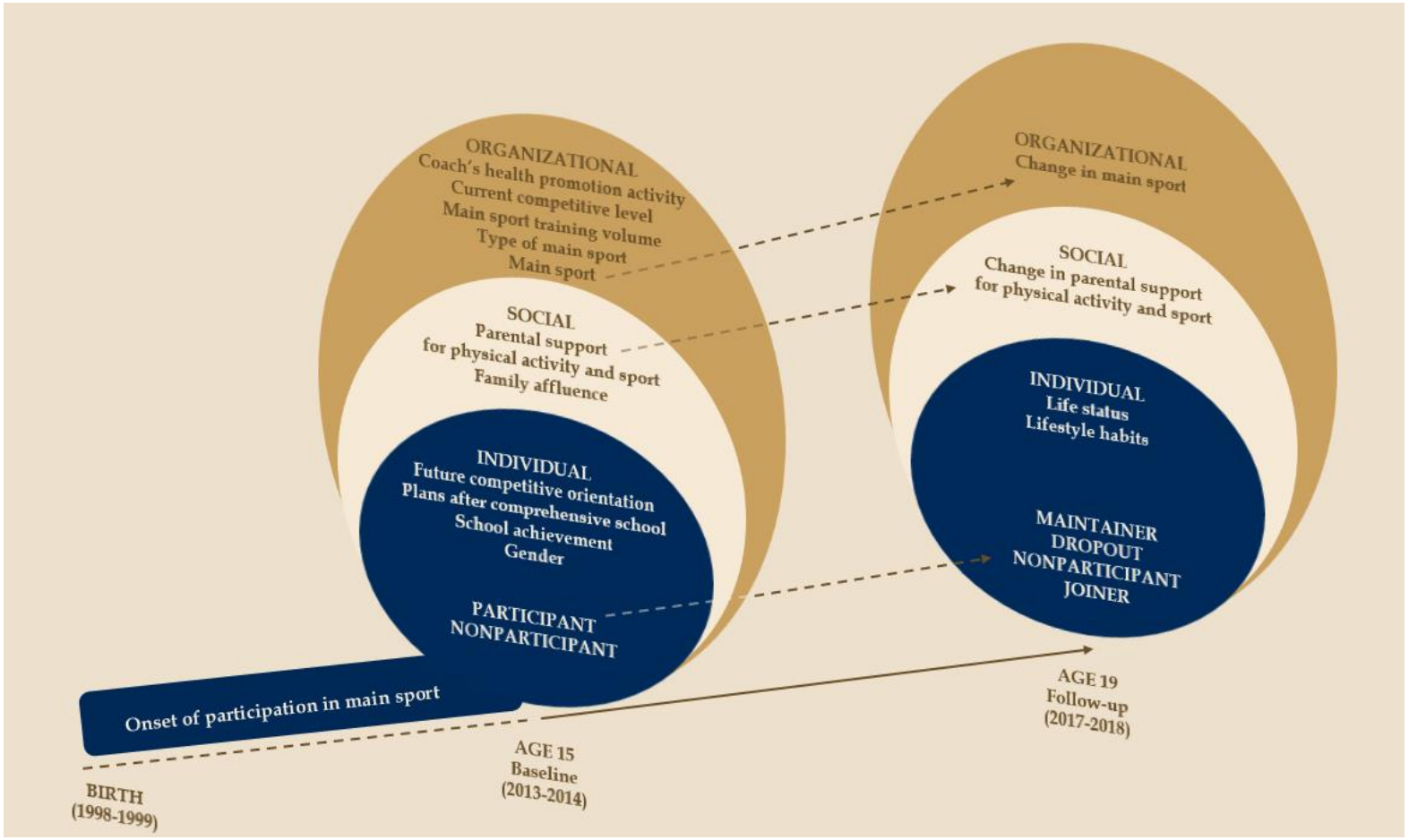

FIGURE 1 Ecological model with a life-course dimension, encompassing multi-level factors and change factors related to stability, and to changes in sports club participation

3 AIMS OF THE STUDY

This cohort study explored how sports club participation changes from adolescence (age 15) to emerging adulthood (age 19), and how factors related to gender, education, family, sports, and coaches' health promotion activity are related to changes in sports club participation. In addition, the study examined how changes in sports club participation are related to various lifestyle habits and to life status comprising main commitment and residential status. To achieve these goals, this study conducted three sub-studies, and thereafter additional analyses related to residential status. The research questions were as follows:

I Which sports club participation patterns can be identified from adolescence to emerging adulthood? What is the prevalence of the patterns?

How are educational and family-related factors related to the sports club participation patterns?

II How are sports-related factors related to adolescents' continued participation in sports clubs, and to dropout from the clubs?

III How is coaches' health promotion activity related to adolescents' continued participation in sports clubs, and to dropout from the clubs?

How are sports club participation patterns related to lifestyle habits and to life status in emerging adulthood?

4 METHODS

A prospective cohort study data from age 15 to age 19 made it possible to examine *changes* and *stability* in sports club participation. Furthermore, the study design made it possible to investigate the *factors* that may influence sports club participation over time, together with the *lifestyle habits* and *life status* related to participation.

4.1 Data

This study used online health behaviour questionnaire data from the FHPSC consortium study to follow the study participants from age 15 to age 19. The FHPSC study which is on-going is conducted in cooperation with the University of Jyväskylä, the UKK Institute, and six national Centres of Excellence in Sports and Exercise Medicine, located in Helsinki, Jyväskylä, Kuopio, Tampere, Turku, and Oulu (Kokko, Selänne, et al., 2015). The aim of the original FHPSC study was to explore the health promotion activities of youth sports clubs and coaches, plus the health behaviours and health status of sports participants as compared to nonparticipants. The participants were recruited from sports clubs and schools in the districts of the six Centres of Excellence in Sports and Exercise Medicine.

The *baseline* data were collected in the middle of the competition season, i.e. from January to May (2013) for winter sports, and from August to December (2013) for summer sports. To achieve a nationally representative sample of the most popular winter and summer sports in Finland, including both individual and team youth sports, the researchers targeted 240 sports clubs from ten sport disciplines, hence 24 sports clubs from each discipline. The winter sport disciplines were basketball, cross-country skiing, floorball, ice hockey, and skating, and the summer sport disciplines were football, gymnastics, orienteering, swimming, and track and field. Discretionary sampling of sports clubs was carried out to ensure an objective and representative sample of larger and smaller sports clubs from the cities and the countryside, and of those having or not

having certification by the Young Finland Association. Figure 2 shows that overall, 175 sports clubs (91 winter sports clubs and 84 summer sports clubs) were reached. Out of these, 154 sports clubs (64%; 84 winter and 70 summer sports clubs) participated in the FHPSC study.

Adolescents aged 15 (9th graders) were targeted, and those aged 14–16 were accepted for the study. As regards the sports participants, the aim was to have a minimum of three adolescents per gender (female and male) per club. For team sports, one team per club was randomly selected, but if there was only one team, that team was automatically selected. The clubs were asked for a list of participants in the team, and the researchers selected individuals randomly. For individual sports, a list of all the young people from the targeted age bracket was asked for. From this list, individuals were randomly selected. Overall, 1889 sports participants were invited to answer the questionnaire and 759 (40%) completed it.

For the school-based data, the researchers targeted ten secondary schools from each district surrounding the Centres of Excellence in Sports and Exercise Medicine amounting to six districts in all. This took place after the data collection stages for the sports clubs. To obtain a representative sample, the aim was to have equal proportions of large and small schools from the cities and the countryside. Adjustments were made according to the city size and willingness to participate in the study. In Kuopio and Jyväskylä, there were not enough countryside schools, or else the schools refused participation. Overall, 65 schools in the summer of 2013 and 79 schools in the autumn of 2013 were reached. Out of these, respectively 46 (71%) and 48 (61%) participated in the study. In early 2014, additional non-sports participants were needed for pre-participation screening data. Hence another 15 schools were contacted, of which six participated in the study. One randomly selected class of 9th graders was recruited from each school. Of the total of 2074 9th graders, 1650 (80%) completed the questionnaire (see also the protocol article, Kokko, Selänne, et al. 2015). The study participants from the schools included both sports participants and nonparticipants.

At baseline, the total n for the number of questionnaire responses received was 2409 (759 + 1650). However, the questionnaires included some 'double responses', i.e. persons who were recruited via both the sports club and the school (n = 260). In these cases, the relevant responses were combined in such a way that the total n for the number of participants in the baseline study was 2149.

For the *follow-up* data collection, all the baseline study participants (n = 2149) were contacted by mail when they were 19 years old (i.e. in years 2017–2018). Out of these, 619 persons (29%) took part in the follow-up study and reported participation in a sports club at both time points. At baseline, their mean age was 15.5 years (SD 0.6), and 72% of them were sports club participants.

The participants (n = 619) reported gender and educational and family-related factors (Study I). These were studied from the baseline and follow-up data. Furthermore, the participants reported their life status (Study I and the current study) and lifestyle habits (Study III), which were explored from the follow-up data. Overall, 354 sports club participants recruited from sports clubs and schools

reported their main sport (Study II), which was explored from the baseline and follow-up data. Those participants who were recruited from sports clubs (n = 323) also reported other factors related to their main sport (Study II), plus their perceptions of coaches' health promotion activity in different health topics (Study III). These were explored from the baseline data. Those who dropped out from sports clubs reported their dropout age (n = 177) and reasons for dropout (n = 201) at follow up (Study I).

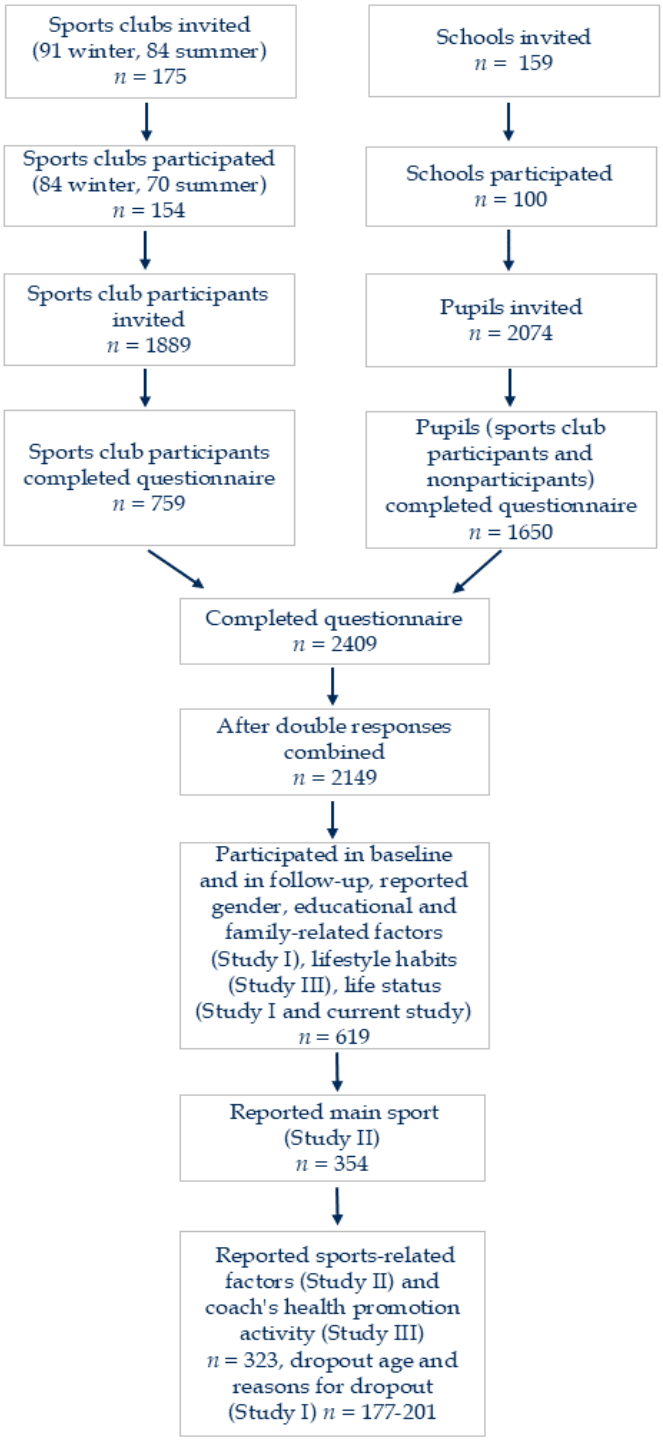

FIGURE 2 Participant recruitment, response rate, and measures in sub-studies

4.2 Measures

The researchers applied measures of factors which were available from the data, and which in previous studies have been associated with organized sports participation. In addition, this study explored dropout reasons, lifestyle habits, and life status. The FHPSC health behaviour questionnaire included validated measures from the previous Health Behaviour in School-aged Children (HBSC) study (Currie et al., 2014; Kokko, Selänne, et al., 2015), the aim being to explore individual and family-related factors, plus lifestyle habits. Parental support for physical activity and sport has been validated in a previous study (Sallis et al., 2002). Similar sports-related measures have been used as survey items in other studies (Guedes & Netto, 2013; Kokko, 2010; Kokko, Selänne, et al., 2015; Kokko & Hämylä, 2015). The health topics for the question battery on coaches' health promotion activities were selected from a previous study (Kokko et al., 2011). The dropout reasons were modified from previous research using the Questionnaire of Reasons for Attrition (QRA) (Rottensteiner et al., 2013). The measures are mainly presented in chronological order according to the published articles, except for the dropout age and reasons, and life status (i.e. main commitment, educational institution, and residential status; see Sections 4.2.7–4.2.8), as these were reported in the follow-up study at age 19.

4.2.1 Sports club participation patterns

The adolescents recruited from schools were asked about sports club participation, i.e. if they were members of a sports club, and if they took part in training at baseline when they were 15-year-olds, and again at follow-up when they were 19-year-olds. The status of the adolescents recruited from sports clubs was asked in the follow-up study. Note that the adolescents could be participating in one or more sports, but the sports-related questions in the questionnaires focused on their main sport. With this information, the variable *sports club participation patterns* was formed. Persons who participated in training in sports clubs at both time points were called *maintainers*, those who left training in sports clubs were called *dropouts*, those who started participation in sports club training were called *joiners*, and those who did not participate in sports club training at either time point were called *nonparticipants*. Hence, in this study, dropout meant dropping out from all club sports between the two measurement points (age 15 and age 19) i.e. at least in the course of the study (cf. the dropout continuum discussed by Gould, 1987, 61–85).

The *sports club participation pattern* was used as the *dependent* variable when the independent variables comprised individual, family-related, and sports-related factors, plus the coach's general health promotion activity. The sports club participation pattern was used as the *independent* variable when lifestyle habits, the main commitment, the educational institution, and the residential status were used as the dependent variables.

4.2.2 Gender and educational factors

At baseline, study participants reported their *gender* as *female* or *male*. Furthermore, the participants indicated their *school achievement* on a response scale from <6.5 to 10.0 (the Finnish comprehensive school grading scale consists of the following grades: 4 = fail; 5 = sufficient; 6 = satisfactory; 7 = good; 8 = very good, 9 and 10 = excellent). The responses were then grouped into *low or medium* (<6.5–8.9) and *high* (9.0–10.0) categories.

At baseline, the participants were asked about their *plans after comprehensive school*. The options were: upper secondary school; vocational education; apprenticeship training; a double degree (upper secondary school and vocational education); go to work; be unemployed; I don't know. The participants were then grouped into two categories: *upper secondary school* and *other than upper secondary school*. During the baseline data collection time in 2013, 98.5% of the Finnish ninth-graders who finished compulsory education applied for further education, with 55% choosing upper secondary school and 45% choosing vocational education (Statistics Finland, 2022). Compulsory education did not apply to upper secondary education during the data collection period, unlike the situation now.

4.2.3 Family-related factors

The family affluence scale (FAS II) was used to measure *family affluence*, which was explored from the baseline data in the current study. Sum scores (0–9) were calculated as suggested by Currie et al. (2014, 140–148) based on number of computers (0, 1, 2, >2); cars (0, 1, ≥2); holiday trips during the last year (0, 1, 2, >2); participants having their own bedroom (no, yes). The scores were then split into categories: *low* (0–5), *medium* (6–7), and *high* (8–9) family affluence groups (cf. Currie et al., 2014, 140–148; Paakkari et al., 2017).

The following questions were used to assess *parental support for physical activity and sport* (cf. Sallis et al., 2002) at baseline and at follow-up: During a typical week: how often does your mother (stepmother) or father (stepfather) (asked separately) (i) encourage you to do physical activity or sport? (ii) take you to the physical activity or sports venue or to your sports activities? (iii) do physical activity or sport with you? A 6-point scale was used for the responses: I don't have or meet her or him; never; rarely; sometimes; often; very often. The sum scores (0–30) were calculated at both time points. At baseline, the scores were divided into tertiles: *low* (0–14), *medium* (15–19), and *high* (20–30) levels of parental support for physical activity and sport. The *changes* were obtained by subtracting the baseline score from the follow-up score. These were then divided into tertiles *weak decrease, no change or increase* (from 7 to 4); *decrease* (from 3 to -1); and *strong decrease* (from -2 to -21) in parental support for physical activity and sport.

The measure for the residential area at baseline correlated strongly with plans after comprehensive school. Hence, it was excluded from the analyses.

4.2.4 Sports-related factors

Participants reported their *main sport* (i.e. that in which they participated to the greatest extent). This was explored via the baseline and follow-up data in the current study, with a view also to seeing possible *changes* in it. Main sports were coded according to the ten most popular winter and summer sport disciplines focused on in the original study (see Section 4.1: Data). The variable *type of main sport* was divided simply into *individual* and *team* categories on the grounds that some sports had very few participants.

Other sports-related questions were asked in relation to the main sport, and these were explored via the baseline data. Hence, the participants were asked about their age of *onset of participation in their main sport*. The answers were divided into ≤ 7, 8–10, and 11–15 years (the mean age being 8.2 years), since this categorization appeared likely to reveal differences between maintainers and dropouts.

The adolescents reported the typical number of coach-led main sport training sessions per week, the self-directed main sport training sessions per week, and the training minutes per session for these two modes. This gave rise to the variable *main sport training volume (hours/typical week)*. It was categorized into ≤*9 hours per week* (0 to 9 hours) and >*9 hours per week* (9.2 to 33.0 hours), since the average training volume per week was 8.9 hours.

The *current competitive level* was measured with the following choices: top national level; other national level (such as 1st division); regional level; local level; I or we do not compete. These choices were grouped into *top national level* and *lower than top national level* (comprising all the other options), since the number of participants at other competitive levels and at the non-competitive level was small.

The participants indicated their *future competitive orientation* as an athlete (the highest goal) by selecting from the following alternatives: I have no competitive orientation, I play sports for recreation; I have no competitive orientation, I play sports for physical development; success at junior regional- or local-level competitions; success in junior national-level competitions (top national level or similar); success in junior international-level competitions; success in adult national-level competitions (top national level); success in adult international-level competitions (European or World Championship or professional). These alternatives were then grouped into *no competitive orientation, success in junior-level competitions*, and *success in adult-level competitions* categories. This was done to see whether non-competitive reasons or success in adulthood are related to dropping out or to continuous participation.

Since there was interaction between the latter two variables above (current competitive level and future competitive orientation), and this affected the interpretability, the variable *current competitive level and future competitive orientation* was created by combining the two recategorized competitive level categories and the three recategorized competitive orientation categories. This resulted in six categories altogether: (i) *top national level and success in adult level competitions;* (ii) *top national level and success in junior level competitions;* (iii) *top*

national level and no competitive orientation; (iv) *lower than top national level and success in adult level competitions;* (v) *lower than top national level and success in junior level competitions;* (vi) *lower than top national level and no competitive orientation* (Study II) (Tables 5 and 6).

4.2.5 Perceived coach's health promotion activity

A question battery related to the perceived *coach's health promotion activity on health topics* was presented in the questionnaires. In the current study, the baseline data were used. The adolescents were asked: How often during the past six months has your coach discussed the following health topics with you? (*injury prevention, sleep/rest, training when ill, a physically active lifestyle, nutrition, hygiene, cigarettes, doping substances, alcohol, snuff, violence related to sport, drugs, and sexual issues*; see Table 9). The adolescents responded on a 4-point scale: very often, often, rarely, never. These responses were then split into *frequent* (very often or often) and *infrequent* (rarely or never). Internal consistency for the question battery was examined by factor analysis, and Cronbach's alpha was found to be 0.92. A sum variable i.e., index for the coach's general health promotion activity was created from the health topics using 33% splitting. This resulted in *frequent, medium,* and *infrequent* categories. The similar creation of a health topics sum variable via splitting into thirds has been described in previous studies (Kokko et al., 2011; Kokko, Villberg, et al., 2015).

4.2.6 Lifestyle habits

Lifestyle habits were explored from the follow-up data, i.e. at age 19. The questions were the same at both measurement points; hence, they were based on the recommendation of moderate to vigorous physical activity for adolescents aged ≤18 years (60 minutes/day) (World Health Organization, 2010a) the participants were asked about their *physical activity* via the following item: During the past seven days, how often have you done physical activity for at least 60 minutes? The participants indicated their answers as days (i.e. 0, 1, 2, 3, 4, 5, 6, 7 days). The answers were then classified into *7 days/week* and *<7 days/week* to examine whether the participants followed the recommendation.

The participants were asked about their *sleep* by using the following items: (i) When do you usually go to bed on weekdays? The response options were: *no later than* 21:00, 21:30, …, 02:00 or later (ii) When do you usually wake up on weekdays? The response options were *no later than* 5:00, 5:30, …, 8:00 or later. The recommended sleep duration for young adults (age 18 onwards) is 7 to 9 hours (Hirshkowitz et al., 2015). Hence, sleep duration was computed, and the variable was classified into: *≥8 hours* (average recommendation met) and *<8 hours* (not met).

The participants indicated their *use of salad, fruits, and vegetables* by responding to the question: How often do you eat the following food items? The items were: salad; fruits; and vegetables. The response options for each item were: never; less than once a week; once a week; 2–4 days a week; 5–6 days a

week; once a day, every day; more than once a day every day. Internal consistency for these three items was examined by factor analysis, and Cronbach's alpha was found to be 0.82. A sum variable was formed and divided into (i) *at least one of these (salad, fruits, or vegetables) more than once a day every day* and (ii) *less*, since the recommendation is five portions per day (World Health Organization, 2020).

The participants were asked about their *cigarette, snuff, and alcohol use* via the question: How often do you use cigarettes; snuff; alcohol at present? The response options for cigarette and snuff use were daily; every week, but not every day; less than once a week; I don't use them. For alcohol use the options were: once a week or more often; a couple of times per month; about once a month; less frequently; I don't use alcohol. The variables were divided into *no use* and *use* the latter covering all the other options; this was the case also for alcohol use, since no safe amount for health can be established (Anderson et al., 2023) (Study III).

4.2.7 Dropout age and reasons for dropout

At follow-up, the sports club dropouts indicated their *dropout age*. They also indicated the extent to which various *reasons for dropping out* affected their choice to quit sports club participation. The reasons (comprising 23 items in total) included e.g. 'a desire to concentrate on studies' (Figure 3). Participants responded on a 5-point scale from 'not at all' to 'very much'. The responses were then divided into *no* (= not at all) and *yes* (= all the other options).

4.2.8 Life status

At follow-up, the participants were asked about their *main commitment* (corresponding to life status in Study I). The response options were study; work/entrepreneur; temporary lay-off/unemployed; military/civilian service; maternity/parental leave; other. If they indicated 'study', they were also asked which *educational institution* they were attending (upper secondary school; vocational school; university of applied sciences; university; job training; apprenticeship training; open university/open university of applied science; other). These options were then grouped into *upper secondary school or university; vocational school or university of applied sciences;* and *all other options*.

For the supplementary analyses conducted after the three sub-studies were published, a measure of *residential status* based on the follow-up data was used. This was asked via the question 'How do you currently live?', and the response options were: *alone; with my parent(s); with my roommate/in a student apartment; with a married or cohabiting partner; with a married or cohabiting partner and a common child or children; as a single parent with a child or children*.

4.3 Statistical analysis

IBM SPSS Statistic Versions 26 and 28 were used to perform the analyses. The results were considered to be statistically significant if p was less than 0.05.

Calculation was made of *mean age with standard deviation* in dropout, and *distributions* of dropout by age (Study I). *Cross-tabulation* and *Chi-square tests* are suitable for categorical variables. These were conducted to explore the prevalence of longitudinal sports club participation patterns (maintainers, dropouts, nonparticipants, and joiners) by gender, and how educational and family-related factors were related to the patterns (excluding joiners due to the small number of these) (Study I).

The same analyses were used to explore differences in the proportions of maintainers and dropouts in main sport disciplines, by gender; also to compare the main sport training hours and the future competitive orientation. Comparisons were further conducted on the following: (i) sports-related factors between maintainers and dropouts, (ii) individual and team sports maintainers, (iii) individual and team sports dropouts (Study II).

These analyses were further used to compare perceived coaches' health promotion activity in health topics by gender, and perceived coaches' general health promotion activity between maintainers and dropouts; also, differences in lifestyle habits between the three sports club participation patterns (Study III).

In addition, cross-tabulation was used to explore the maintenance of the main sport from age 15 to age 19 (Study II), and cross-tabulation and Chi-square tests were used to compare main commitment and educational institution between the three sports club participation patterns at age 19 (Study I). This was supplemented after the three sub-studies via a new analysis conducted for this study. The new analysis covered residential status at age 19 by gender between the three sports club participation patterns. Note that for the present overall study, most of the cross-tabulations were conducted using column percentages, rather than the row percentages included in the articles published for Studies I and II. This was done on the grounds that this made it easier to interpret the differences between the sports club participation patterns.

The *effect size* from Chi-square tests, indicating the strength of the relationships between the patterns and the main sport disciplines, sports-related factors (Study II), the coaches' (general) health promotion activity, and lifestyle habits (Study III) was estimated using Cramer's V, as suggested by an article reviewer. However, the interpretation is based on reliable odds ratios (OR), as calculated in the regression analyses described below.

Fisher's exact test was used to explore differences in the main sport between maintainers and dropouts, analysed separately by gender (Study II); it was also used to compare perceived coaches' health promotion activity in 13 health topics by gender (Study III), due to the small number of cases in some cells.

The *Z-test* was used to show statistically significant differences between maintainers, dropouts (and nonparticipants) with regard to categories of sports-

related factors (Study II), perceived coaches' general health promotion activity, and lifestyle habits (Study III); also for this study, statistically significant differences between maintainers, dropouts (and nonparticipants) with regard to categories of the educational and family-related factors, the main commitment, the educational institution, and the residential status.

Binary logistic regression analysis is suitable for studying how various categorical variables predict another two-class variable simultaneously, while multinomial logistic regression analysis is suitable for predicting a multi-class variable. *Mixed multinomial logistic regression analysis* was conducted to explore how the patterns of maintainers, dropouts, and nonparticipants may have been determined by factors including one *change* factor showing statistically significant differences between sports club participation patterns in the bivariate analyses (educational factors and change from baseline to follow-up in parental support for physical activity and sport). Given the interactions between gender and the factors in question, separate analyses were also performed for females and males (Study I).

Binary logistic regression analysis was conducted to examine how sports-related factors showing statistically significant differences between maintainers and dropouts in the bivariate analyses (onset of participation in main sport, the combination of competitive level and orientation) determined the patterns. This was done separately by gender. The combined variable of the current competitive level and the future competitive orientation was used because of the interactions between the separate variables, and because this made it easier to interpret the results (Study II).

Binary logistic regression analysis adjusted for gender was also used to explore how coaches' general health promotion activity was related to maintained participation and dropout in sports clubs (Study III). The same analysis was conducted to examine how the three sports club participation patterns were related to lifestyle habits, i.e. recommendations being met or not met. These models, too, were adjusted for gender (Study III).

4.4 Ethics

The FHPSC baseline and follow-up studies were carried out in accordance with the Declaration of Helsinki and received ethical approval from the Ethics Committee of the Healthcare District of Central Finland (record number 23U/2012&2016). Informed written consent was collected from the participants. When a participant was aged under 18, written consent from a guardian was also required with regard to participation in the objective measurement of physical activity and pre-participation screening. The permission notification included detailed information on the study, and notification that participants had the right to refuse and to withdraw their consent without giving a reason. Guidelines for conducting research with children and young individuals were adhered to, in

accordance with both national and international standards and recommendations.

The privacy of the study participants has been protected. Pseudonymized data i.e., data with code numbers instead of names or other identification data have been used. The data have been stored securely and used on a computer requiring sign-up and authentication.

5 RESULTS

This study explored sports club participation patterns and showed their prevalences (Study I). In addition, gender, educational factors, family-related factors (Study I), sports-related factors (Study II), and coaches' health promotion activity (Study III) influencing sports club participation over time were identified. Furthermore, this study provided findings on lifestyle habits (Study III), dropout age and reasons for dropout (Study I), and life status (Study I and current study).

5.1 Sports club participation patterns

The study first explored *sports club participation patterns* and their *prevalences,* including *by* gender (Study I). Figure 3 shows that *dropouts* were identified as the most prevalent sports club participation pattern (41.0%) followed by *maintainers* (30.9%), *nonparticipants* (27.6%), and *joiners* (0.5%) (total n = 609). The most common pattern for *females* was dropouts (43.7%), while for *males* the most common patterns were those of maintainers (38.3%) and dropouts (36.6%) (p = 0.024). Due to the small number of joiners they were excluded from further analyses.

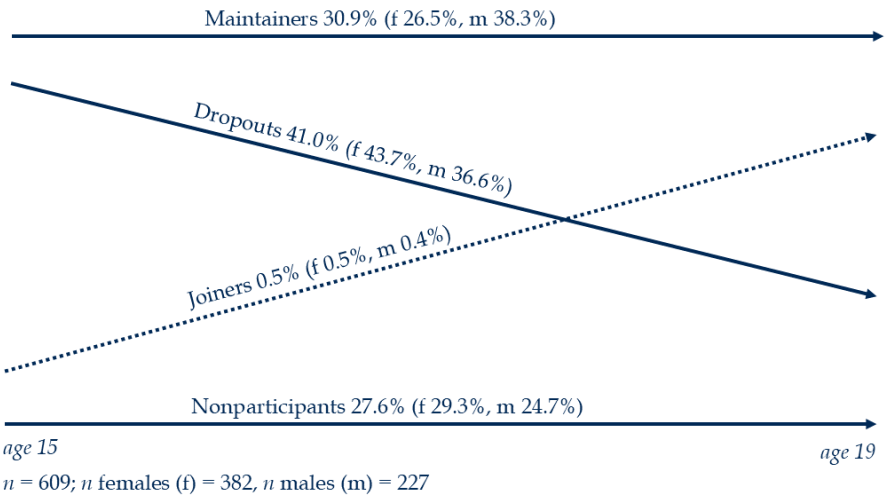

FIGURE 3 Sports club participation patterns from adolescence to emerging adulthood: total, and by gender

Mixed multinomial regression analysis (including gender, educational, and family-related factors) showed that as compared to females, *males* had greater odds of being a maintainer than of being a nonparticipant (OR 2.04, CI 1.29–3.24, p = .002) or a dropout (OR 1.74, CI 1.15–2.62, p = .008). (See also supplementary file for Study I, Table S1).

5.2 Educational and family-related determinants

Secondly, this study explored the relationships of various factors with sports club participation patterns. Table 1 reveals that *educational factors* and *parental support for physical activity and sport,* as well as *changes in parental support for physical activity and sport* were related to the sports club participation patterns (Study I). Those who had high achievement at school, had aimed at upper secondary school, and had high parental support for physical activity and sport were likely to be maintainers or dropouts rather than nonparticipants (maintainers 40.4–81.4% and dropouts 44.8–84.4% vs. nonparticipants 15.5–64.9%; p < .001). Furthermore, those who perceived a strong decrease in parental support for physical activity and sport were likely to be dropouts rather than nonparticipants (39.9% vs. 23.4%; p = .004).

TABLE 1 Educational and family-related factors by sports club participation patterns in Study I

Educational and family-related factors	Total *n* = 601–606	Sports club participation patterns %			
		Maintainers *n* = 186–188	**Dropouts** *n* = 248–250	**Nonpartici-pants** *n* = 167–168	*p*
School achievement					< .001
High (9.0–10.0)	38.0	40.4[a]	44.8[a]	25.0[b]	
Low or medium (<6.5–8.9)	62.0	59.6[a]	55.2[a]	75.0[b]	
Plans after comprehensive school					< .001
Upper secondary school	78.1	81.4[a]	84.4[a]	64.9[b]	
Other than upper secondary school	21.9	18.6[a]	15.6[a]	35.1[b]	
Family affluence					.98
High	29.5	29.8[a]	30.0[a]	28.6[a]	
Medium	46.0	47.3[a]	45.2[a]	45.8[a]	
Low	24.4	22.9[a]	24.8[a]	25.6[a]	
Parental support for PA and sport					< .001
High	40.1	50.5[a]	48.8[a]	15.5[b]	
Medium	35.0	35.6[a]	34.4[a]	35.1[a]	
Low	24.9	13.8[a]	16.8[a]	49.4[b]	
Change in parental support for PA and sport					.004
Strong decrease	32.6	31.2[a, b]	39.9[a]	23.4[b]	
Decrease	36.9	38.2[a]	35.5[a]	37.7[a]	
Weak decrease/no change/increase	30.4	30.6[a, b]	24.6[a]	38.9[b]	

p-values from Chi-square test, [a,b] = differences according to z-tests

In table 2, mixed multinomial regression analysis conducted separately by gender shows that females with high achievement at school (OR 1.96, CI 1.07–3.59, $p = .029$) and aspirations towards upper secondary school (OR 2.28, CI 1.04–4.97, $p = .039$) had higher odds of being a maintainer as compared to a nonparticipant. In addition, there were differences between dropouts and nonparticipants. Having high achievement at school (OR 2.50, CI 1.43–4.39, $p = .001$) and perceiving a strong decrease (OR 3.79, CI 1.97–7.30, $p < .001$) or decrease (OR 1.94, CI 1.07–3.50, $p = .029$) in parental support increased the odds of being a dropout rather than a nonparticipant. There were differences also between maintainers and dropouts. Females perceiving a strong decrease in parental support (OR 0.45, CI 0.24–0.86, $p = .016$) had lower odds of being a maintainer as compared to a dropout. Among *males*, maintainers and dropouts differed from nonparticipants. Males with aspirations towards upper secondary

school had higher odds of being a maintainer (OR 2.13, CI 1.01–4.51, p = .048) or a dropout (OR 3.99, CI 1.79–8.88, p = .001) as compared to a nonparticipant.

TABLE 2 Educational and family-related factors related to sports club participation patterns; separately by gender in Study I

	Females	**Nonparticipants** (*n* = 111) **vs.**					
		Maintainers (*n* = 101)		**Dropouts** (*n* = 165)		**Dropouts vs. Maintainers**	
Educational and family-related factors	*n*	OR (95 % CI)	*p*	OR (95 % CI)	*p*	OR (95 % CI)	*p*
School achievement							
High	177	1.96 (1.07–3.59)	.029	2.50 (1.43–4.39)	.001	0.78 (0.46–1.34)	.370
Low or medium	200	1		1		1	
Plans after comprehensive school							
Upper secondary school	310	2.28 (1.04–4.97)	.039	1.77 (0.90–3.47)	.10	1.29 (0.58–2.88)	.540
Other than upper secondary school	67	1		1		1	
Change in parental support for PA and sport							
Strong decrease	109	1.71 (0.82–3.57)	.150	3.79 (1.97–7.30)	< .001	0.45 (0.24–0.86)	.016
Decrease	138	1.59 (0.85–2.97)	.150	1.94 (1.07–3.50)	.029	0.82 (0.45–1.49)	.510
Weak decrease/no change/increase	130	1		1		1	

R^2=.10 (Cox & Snell), .12 (Nagelkerke). Model $\chi^2(8) = 41.28$
PA=physical activity, OR=odds ratio, CI=confidence interval

TABLE 2 continued

	Males	**Nonparticipants** (*n* = 56) **vs.**					
		Maintainers (*n* = 85)		**Dropouts** (*n* = 83)		**Dropouts vs. Maintainers**	
Educational and family-related factors	*n*	OR (95 % CI)	*p*	OR (95 % CI)	*p*	OR (95 % CI)	*p*
School achievement							
High	52	1.85 (0.73–4.70)	.200	1.29 (0.50–3.34)	.600	1.44 (0.70–2.95)	.320
Low or medium	172	1		1		1	
Plans after comprehensive school							
Upper secondary school	159	2.13 (1.01–4.51)	.048	3.99 (1.79–8.88)	.001	0.53 (0.25–1.15)	.110
Other than upper secondary school	65	1		1		1	
Change in parental support for PA and sport							
Strong decrease	87	1.44 (0.58–3.58)	.440	1.80 (0.71–4.58)	.220	0.80 (0.36–1.76)	.580
Decrease	84	0.86 (0.36–2.08)	.740	1.02 (0.41–2.55)	.960	0.84 (0.37–1.91)	.680
Weak decrease/no change/increase	53	1		1		1	

R^2=.08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(8) = 19.12$
PA=physical activity, OR=odds ratio, CI=confidence interval

5.3 Sports-related determinants

Study II focused on the relationships between *sports-related factors* and maintainers and dropouts. Table 3 shows that the percentage of emerging adults who maintained participation or dropped out of the *main sport* by age 19 varied by sport discipline and by gender. Football had more maintainers than dropouts (58.6% vs. 41.4%, p = .028). For *females* only, skating had more maintainers than dropouts (60.7% vs. 39.3%, p = .019), while swimming had more dropouts than maintainers (80.0% vs. 20.0%, p = .049). When males were explored separately, there was no statistically significant difference in any of the main sports.

TABLE 3 Main sport discipline at age 15 by maintainers and dropouts all participants, then separately by gender in Study II

	All participants						
	Maintainers n = 161		**Dropouts** n = 193		$\chi 2$		effect size
Main sport discipline at age 15	n		%	value	df	p	Cramer's V
Skating	30	60.0	40.0	2.79	1	.095	0.09
vs. other sports	*324*	*44.1*	*55.9*				
Football	58	58.6	41.4	4.83	1	.028	0.12
vs. other sports	*296*	*42.9*	*57.1*				
Floorball	36	47.2	52.8	0.05	1	.825	0.01
vs. other sports	*318*	*45.3*	*54.7*				
Cross-country skiing	34	47.1	52.9	0.04	1	.846	0.01
vs. other sports	*320*	*45.3*	*54.7*				
Orienteering	30	46.7	53.3	0.02	1	.891	0.00
vs. other sports	*324*	*45.4*	*54.6*				
Ice hockey	31	45.2	54.8	0.00	1	.970	0.00
vs. other sports	*323*	*45.5*	*54.5*				
Basketball	33	42.4	57.6	0.14	1	.711	0.02
vs. other sports	*321*	*45.8*	*54.2*				
Track and field	42	35.7	64.3	1.83	1	.176	0.07
vs. other sports	*312*	*46.8*	*53.2*				
Gymnastics	30	33.3	66.7	1.95	1	.163	0.07
vs. other sports	*324*	*46.6*	*53.4*				
Swimming	30	30.0	70.0	3.17	1	.075	0.10
vs. other sports	*324*	*46.9*	*53.1*				

TABLE 3 continued

	Females						
	Maintainers *n* = 81		**Dropouts** *n* = 119		$\chi 2$		effect size
Main sport discipline at age 15	*n*		%	value	df	*p*	Cramer's V
Skating	28	60.7	39.3	5.52	1	.019	0.17
vs. other sports	172	37.2	62.8				
Football	23	52.2	47.8	1.47	1	.225	0.09
vs. other sports	*177*	*39.0*	*61.0*				
Floorball	13	53.8	46.2	1.03	1	.311	0.07
vs. other sports	*187*	*39.6*	*60.4*				
Cross-country skiing	18	38.9	61.1	0.02	1	.884	0.01
vs. other sports	*182*	*40.7*	*59.3*				
Orienteering	22	54.5	45.5	2.02	1	.155	0.10
vs. other sports	*178*	*38.8*	*61.2*				
Ice hockey	3	0.0	100.0	2.07	1	.273[F]	0.10
vs. other sports	*197*	*41.1*	*58.9*				
Basketball	18	33.3	66.7	0.42	1	.516	0.05
vs. other sports	*182*	*41.2*	*58.8*				
Track and field	27	25.9	74.1	2.75	1	.097	0.12
vs. other sports	*173*	*42.8*	*57.2*				
Gymnastics	28	32.1	67.9	0.94	1	.331	0.07
vs. other sports	*172*	*41.9*	*58.1*				
Swimming	20	20.0	80.0	3.88	1	.049	0.14
vs. other sports	*180*	*42.8*	*57.2*				

[F] = *Fisher's exact test*

TABLE 3 continued

	Males						
	Maintainers *n* = 80		**Dropouts** *n* = 73		$\chi 2$		effect size
Main sport discipline at age 15	*n*	%		value	df	*p*	Cramer's V
Skating	2	50.0	50.0	0.00	1	1.000[F]	0.01
vs. other sports	*151*	*52.3*	*47.7*				
Football	35	62.9	37.1	2.03	1	.154	0.12
vs. other sports	*118*	*49.2*	*50.8*				
Floorball	23	43.5	56.5	0.84	1	.359	0.07
vs. other sports	*130*	*53.8*	*46.2*				
Cross-country skiing	16	56.3	43.8	0.11	1	.737	0.03
vs. other sports	*137*	*51.8*	*48.2*				
Orienteering	8	25.0	75.0	2.52	1	.152[F]	0.13
vs. other sports	*145*	*53.8*	*46.2*				
Ice hockey	28	50.0	50.0	0.07	1	.789	0.02
vs. other sports	*125*	*52.8*	*47.2*				
Basketball	15	53.3	46.7	0.01	1	.932	0.01
vs. other sports	*138*	*52.2*	*47.8*				
Track and field	15	53.3	46.7	0.01	1	.932	0.01
vs. other sports	*138*	*52.2*	*47.8*				
Gymnastics	2	50.0	50.0	0.00	1	1.000[F]	0.01
vs. other sports	*151*	*52.3*	*47.7*				
Swimming	9	55.6	44.4	0.04	1	1.000[F]	0.02
vs. other sports	*144*	*52.1*	*47.9*				

[F] = *Fisher's exact test*

With regard to *changes in the main sport*, for those who reported football, floorball, orienteering, or track and field (n = 14–31) as their main sport at age 15, the same sport remained their main sport at age 19. Among those who reported other main sports (n = 9–16), only a few participants had changed their main sport by age 19.

Table 4 shows that *onset of participation in the main sport, training volume, competitive level,* and *competitive orientation* were related to sports club participation at age 19. Those who had started their main sport by age seven, trained more than nine hours per week, competed at top national level, and had success at adult level as an orientation, were more likely to be maintainers than dropouts (44.3–61.7% vs. 29.3–47.1%).

TABLE 4 Sports-related factors at age 15 by maintainers and dropouts in Study II

Sports-related factors at age 15	**Maintainers** *n* = 149	**Dropouts** *n* = 174	$\chi 2$			effect size
	%		value	df	*p*	Cramer's V
Type of main sport						
Team	57.0[a]	48.3[a]	2.48	1	.116	0.09
Individual	43.0[a]	51.7[a]				
Onset of participation in main sport						
≤ 7 yr.	55.7[a]	34.5[b]	17.81	2	< .001	0.24
8–10 yr.	29.5[a]	34.5[a]				
11–15 yr.	14.8[a]	31.0[b]				
Main sport training volume (hours/typical week)						
> 9	44.3[a]	31.0[b]	6.05	1	.014	0.14
≤ 9	55.7[a]	69.0[b]				
Current competitive level						
Top national level	61.7[a]	47.1[b]	6.90	1	.009	0.15
Lower than top national level	38.3[a]	52.9[b]				
Future competitive orientation						
Success in adult-level competitions	51.7[a]	29.3[b]	19.80	2	< .001	0.25
Success in junior-level competitions	35.6[a]	43.1[a]				
No competitive orientation	12.8[a]	27.6[b]				
Current competitive level & future competitive orientation						
Top national level & success in adult-level competitions	39.6[a]	21.3[b]	21.94	5	.001	0.26
Lower than top national level & success in adult-level competitions	12.1[a]	8.0[a]				
Top national level & success in junior-level competitions	20.1[a]	19.5[a]				
Lower than top national level & success in junior-level competitions	15.4[a]	23.6[a]				
Lower than top national level & no competitive orientation	10.7[a]	21.3[b]				
Top national level & no competitive orientation	2.0[a]	6.3[a]				

[a, b] = *differences according to z-test*

Training volume was related to the *competitive orientation*. Adolescents who trained in their main sport for over nine hours per week at age 15 (n = 120) were more likely to have an orientation towards success in adult-level competitions (60.0%) than success in junior-level competitions (31.7%), or to have no competitive orientation (8.3%; $p < .001$). On the other hand, those who trained in their main sport for a maximum of nine hours per week (n = 203) were more likely to have an orientation towards success in junior-level competitions (44.3%) than success in adult-level competitions (28%), or to have no competitive orientation (27.6%).

When the variables were explored simultaneously, maintenance of sports club participation was predicted by onset of the main sport, the current competitive level, and the future competitive orientation (Table 5). Thus, there were greater odds of being a maintainer than a dropout among (i) those who had started the main sport by age seven, as compared to by age 11 or later (females 3.05, CI 1.34–6.98, p = 0.008; males 3.97, CI 1.48–10.64, p = 0.006), (ii) those who had competed at top national level with the aim of success in adult-level competitions as an orientation, as compared to a lower or non-competitive level with a non-competitive orientation (females 3.42, CI 1.16–10.09, p = 0.026; males 3.58, CI 1.12–11.41, p = 0.031). In addition, *females* who had competed at top national level with the aim of success in junior-level competitions as an orientation had greater odds of being a maintainer than of being a dropout (3.42, CI 1.20–9.78, p = 0.022).

TABLE 5 Sports-related factors at age 15 related to maintained participation, as compared to dropping out: separately by gender in Study II

	Females			**Males**		
Sports-related factors at age 15	*n* = 184	OR (95 % CI)	*p*	*n* = 139	OR (95 % CI)	*p*
Onset of participation in main sport						
≤ 7 yr.	73	3.05 (1.34–6.98)	.008	70	3.97 (1.48–10.64)	.006
8–10 yr.	64	1.69 (0.71–4.02)	.233	40	1.72 (0.59–5.03)	.320
11–15 yr.	47	1		29	1	
Main sport training volume (hours/typical week)						
> 9	60	0.75 (0.37–1.53)	.434	60	1.79 (0.81–3.99)	.153
≤ 9	124	1		79	1	
Current competitive level & future competitive orientation						
Top national level & success in adult-level competitions	44	3.42 (1.16–10.09)	.026	52	3.58 (1.12–11.41)	.031
Top national level & success in junior-level competitions	45	3.42 (1.20–9.78)	.022	19	0.94 (0.25–3.64)	.933
National top level & no competitive orientation	9	0.94 (0.16–5.66)	.945	5	0.29 (0.03–3.36)	.321
Lower than top national level & success in adult-level competitions	11	3.39 (0.72–15.97)	.122	21	2.98 (0.80–11.15)	.104
Lower than top national level & success in junior-level competitions	43	1.89 (0.66–5.41)	.233	21	1.01 (0.28–3.70)	.990
Lower than top national level & no competitive orientation	32	1		21	1	

Females: R^2 = .09 (Cox & Snell), .12 (Nagelkerke). Model $\chi 2(8) = 17.28$; Males: R^2 = .18 (Cox & Snell), .24 (Nagelkerke). Model $\chi 2(8) = 27.79$
OR = odds ratio, CI = confidence interval

Table 6 shows that those who at age 15 had competed at top national level were more likely at age 19 to be *individual* than *team sport maintainers* (75.0% vs. 51.8%, $p = .004$).

TABLE 6 Sports-related factors at age 15 by individual and team sport maintainers in Study II

	Maintainers (n=149)					
	Individual	**Team**		$\chi 2$		effect size
Sports-related factors at age 15	%		value	df	*p*	Cramer's V
Onset of participation in main sport						
≤ 7 yr.	53.1[a]	57.6[a]	0.58	2	.748	0.06
8–10 yr.	32.8[a]	27.1[a]				
11–15 yr.	14.1[a]	15.3[a]				
Main sport training volume (hours/typical week)						
>9	35.9[a]	50.6[a]	3.18	1	.075	0.15
≤9	64.1[a]	49.4[a]				
Current competitive level						
Top national level	75.0[a]	51.8[b]	8.35	1	.004	0.24
Lower than top national level	25.0[a]	48.2[b]				
Future competitive orientation						
Success in adult-level competitions	54.7[a]	49.4[a]	1.20	2	.548	0.09
Success in junior-level competitions	35.9[a]	35.3[a]				
No competitive orientation	9.4[a]	15.3[a]				

[a,b] = *differences according to z-test*

Table 7 shows that those who had trained for over nine hours per week and competed at top national level were more likely to be *individual sport dropouts* than *team sport dropouts* (37.8% vs. 23.8%, $p = .047$; 57.8% vs. 35.7%, $p = .004$). Those who had aimed at success in junior-level competitions were more likely to be *team sport dropouts* than *individual sport dropouts* (52.4% vs. 34.4%, $p = .047$).

TABLE 7 Sports-related factors at age 15 by individual and team sport dropouts in Study II

	Dropouts (n=174)					
	Indivi-dual	**Team**		$\chi 2$		effect size
Sports-related factors at age 15	%		value	df	*p*	Cramer's V
Onset of participation in main sport						
≤ 7 yr.	34.4[a]	34.5[a]	0.53	2	.765	0.06
8–10 yr.	36.7[a]	32.1[a]				
11–15 yr.	28.9[a]	33.3[a]				
Main sport training volume (hours/typical week)						
>9	37.8[a]	23.8[b]	3.96	1	.047	0.15
≤9	62.2[a]	76.2[b]				
Current competitive level						
Top national level	57.8[a]	35.7[b]	8.49	1	.004	0.22
Lower than top national level	42.2[a]	64.3[b]				
Future competitive orientation						
Success in adult-level competitions	35.6[a]	22.6[a]	6.12	2	.047	0.19
Success in junior-level competitions	34.4[a]	52.4[b]				
No competitive orientation	30.0[a]	25.0[a]				

a,b = differences according to z-test

5.4 Perceived coach's health promotion activity as a determinant

Study III first explored the relationship between the *perceived coach's health promotion activity,* as recorded at age 15, and maintenance of sports club participation. Table 8 presents the percentage breakdown of female and male sports club participants aged 15, based on their perception of the *coaches' health promotion activity across 13 health topics*. The majority of both female (59.2–69.6%) and male (51.8–64.0%) sports club participants reported that coaches frequently addressed health topics related to sleep and rest, injury prevention, and training while ill. Other topics were rarely discussed (females 54.3–98.4%; males 51.8–95.7%).

TABLE 8 At age 15: perceived coaches' health promotion activity in different health topics; by sports participants, and separately by gender in Study III

	Total (*n* = 323)		**Females** (*n* = 184)		**Males** (*n* = 139)		$\chi 2$			effect size
Health topics	Frequent	Infrequent	Frequent	Infrequent	Frequent	Infrequent	value	df	*p*	Cramer's V
	%		%		%					
Injury prevention	67.2	32.8	69.6	30.4	64.0	36.0	1.10	1	.294	0.06
Sleep/rest	65.3	34.7	66.3	33.7	64.0	36.0	0.18	1	.671	0.02
Training when ill	56.0	44.0	59.2	40.8	51.8	48.2	1.78	1	.182	0.07
Physically active lifestyle	46.7	53.3	45.7	54.3	48.2	51.8	0.21	1	.649	0.03
Nutrition	46.1	53.9	45.7	54.3	46.8	53.2	0.04	1	.843	0.01
Hygiene	27.6	72.4	29.3	70.7	25.2	74.8	0.69	1	.406	0.05
Cigarettes	10.8	89.2	9.2	90.8	12.9	87.1	1.13	1	.288	0.06
Doping substances	10.2	89.9	11.4	88.6	8.6	91.4	0.67	1	.414	0.05
Alcohol	9.6	90.4	8.7	91.3	10.8	89.2	0.40	1	.527	0.04
Snuff	8.7	91.3	6.0	94.0	12.2	87.8	3.91	1	.048	0.11
Violence related to sport	8.4	91.6	7.1	92.9	10.1	89.9	0.93	1	.334	0.05
Drugs	6.8	93.2	5.4	94.6	8.6	91.4	1.28	1	.259	0.06
Sexual issues	2.8	97.2	1.6	98.4	4.3	95.7	2.11	1	.181[F]	0.08

[F] = *Fisher's exact test, differences ($\chi 2$) between females and males*

The sum variable of the coaches' health promotion activity on 13 health topics was used to explore the association between the *coach's general health promotion activity* and maintenance of sports club participation. The perceived general health promotion activity of coaches was related to changes in sports club participation among *males*. Table 9 shows that *males* who perceived coaches' health promotion efforts as frequent were likely to be maintainers rather than dropouts (48.6% vs. 20.0%, p = .002). There was no discernible difference among *females* in this regard. Furthermore, in Table 10, a regression analysis reveals that perceiving a coach's health promotion activity as frequent increased the odds of being a maintainer rather than a dropout (OR = 1.78, 95% CI 1.03–3.07, p = .038).

TABLE 9 Perceived coach's general health promotion activity at age 15; by maintainers and dropouts, separately by gender in Study III

	Females (*n* = 184)						**Males** (*n* = 139)					
Coach's general health promotion activity	**Maintainers**	**Dropouts**		χ^2		effect size	**Maintainers**	**Dropouts**		χ^2		effect size
	%		value	df	*p*	Cramer's V	%		value	df	*p*	Cramer's V
Frequent	32.0[a]	28.4[a]	0.37	2	.829	0.05	48.6[a]	20.0[b]	12.89	2	.002	0.30
Medium	32.0[a]	35.8[a]					23.0[a]	41.5[b]				
Infrequent	36.0[a]	35.8[a]					28.4[a]	38.5[a]				

[a, b] = *differences according to z-test*

TABLE 10 Association between coach's general health promotion activity at age 15 and maintained participation as compared to dropping out in Study III

Coach's general health promotion activity	*n*	OR (95 % CI)	*p*
Frequent	104	1.78 (1.03–3.07)	.038
Medium	107	0.83 (0.48–1.42)	.48
Infrequent	112	1	

OR = odds ratio, CI = confidence interval

The model was adjusted for gender.

5.5 Sports club participation patterns and lifestyle habits in emerging adulthood

The second phase of Study III explored the association between sports club participation patterns and *lifestyle habits* in emerging adulthood. Table 11 presents the percentage breakdown of maintainers, dropouts, and nonparticipants based on lifestyle habits as reported at age 19. Overall, maintainers tended to exhibit healthy lifestyle habits more frequently than, respectively, nonparticipants and dropouts (22.3–93.7% vs. respectively 6.0–74.1% and 6.7–85.9%, $p < .001$–$.014$). However, there was an exception regarding alcohol use: it was more common for maintainers and dropouts to use alcohol as compared to nonparticipants (89.5% and 90.6% vs. 80.6%), ($p = .006$). It was also notable that many maintainers had unhealthy lifestyle habits related to physical activity (77.7%), sleep (27.2%), and salad, fruit, and vegetable consumption (60.2%).

TABLE 11 At age 19: maintainers, dropouts and nonparticipants by lifestyle habits in Study III

Lifestyle habits	**Total** *n* = 609–616	**Maintainers** *n* = 188–191	**Dropouts** *n* = 253–255	**Nonpartici-pants** *n* = 168–170		$\chi 2$		effect size
Physical activity			%		value	df	*p*	Cramer's V
7 days/week	11.3	22.3[a]	6.7[b]	6.0[b]	32.88	2	< .001	0.23
< 7 days/week	88.7	77.7[a]	93.3[b]	94.0[b]				
Sleep								
≥ 8 hours	66.6	72.8[a]	69.6[a]	55.3[b]	14.05	2	< .001	0.15
< 8 hours	33.4	27.2[a]	30.4[a]	44.7[b]				
Salad, fruits, and vegetables								
At least one of these more than once a day every day	33.3	39.8[a]	33.7[a, b]	25.3[b]	8.55	2	.014	0.12
Less	66.7	60.2[a]	66.3[a, b]	74.7[b]				
Alcohol								
No use	12.5	10.5[a]	9.4[a]	19.4[b]	10.37	2	.006	0.13
Use	87.5	89.5[a]	90.6[a]	80.6[b]				
Cigarette								
No use	85.1	93.7[a]	85.9[b]	74.1[c]	27.43	2	< .001	0.21
Use	14.9	6.3[a]	14.1[b]	25.9[c]				
Snuff								
No use	89.4	90.6[a]	89.0[a]	88.8[a]	0.38	2	.828	0.03
Use	10.6	9.4[a]	11.0[a]	11.2[a]				

[a, b, c] = *differences according to z-test*

Table 12 shows that maintainers had significantly higher odds of meeting the recommended levels of physical activity (OR = 4.36, 95% CI 2.10–9.04, $p < .001$), adhering to sleep recommendations (OR = 2.48, 95% CI 1.57–3.92, $p < .001$), and consuming salads, fruits, and vegetables frequently (OR = 2.25, 95% CI 1.41–3.60, $p < .001$) compared to nonparticipants. Furthermore, maintainers had substantially higher odds of avoiding cigarettes (OR = 5.31, 95% CI 2.62–10.73, $p < .001$), but were less likely to abstain from alcohol use (OR = 0.49, 95% CI 0.27–0.90, $p = .021$). In comparing maintainers to dropouts, maintainers had higher odds of meeting physical activity recommendations (OR = 4.05, 95% CI 2.19–7.49, $p < .001$) and avoiding cigarette use (OR = 2.51, 95% CI 1.23–5.10, $p = .011$). In comparing dropouts to nonparticipants, dropouts were more likely to meet the sleep recommendations (OR = 1.83, 95% CI 1.21–2.77, $p = .004$), and avoid cigarettes (OR = 2.12, 95% CI 1.28–3.50, $p = .003$), but less likely to abstain from alcohol (OR = 0.43, 95% CI 0.25–0.77, $p = .004$).

TABLE 12 At age 19: the association of sports club participation patterns with lifestyle habits in Study III

Sports club participation patterns	Physical activity 7 d/wk			Sleep ≥ 8 h			Salad, fruits, and vegetables (at least one of these more than once a day every day)		
	OR	95 % CI	*p*	OR	95 % CI	*p*	OR	95 % CI	*p*
Maintainers vs. nonparticipants*	4.36	2.10–9.04	< .001	2.48	1.57–3.92	< .001	2.25	1.41–3.60	< .001
Maintainers vs. dropouts*	4.05	2.19–7.49	< .001	1.36	0.83–2.09	.164	1.48	0.99–2.23	.057
Dropouts vs. nonparticipants*	1.08	0.48–2.44	.860	1.83	1.21–2.77	.004	1.52	0.98–2.36	.064

Sports club participation patterns	No alcohol use			No cigarette use		
	OR	95 % CI	*p*	OR	95 % CI	*p*
Maintainers vs. nonparticipants*	0.49	0.27–0.90	.021	5.31	2.62–10.73	< .001
Maintainers vs. dropouts*	1.13	0.60–2.13	.698	2.51	1.23–5.10	.011
Dropouts vs. nonparticipants*	0.43	0.25–0.77	.004	2.12	1.28–3.50	.003

OR = odds ratio, CI = confidence interval
The models were adjusted for gender.
**Reference category*
n = 597; n maintainers = 185, n dropouts = 246, n nonparticipants = 166

5.6 Dropout age and reasons for dropout

At age 19, the study participants reported the age when they had dropped out from the sports club. Study I explored the *mean dropout age* and also the dropout proportions *per year*. Table 13 shows that the mean dropout age was 17.1 years for females and 17.0 years for males. The proportions of dropouts varied per age year (11.5–26.6%).

TABLE 13 Dropouts' mean age and percentages per year; separately by gender in Study I

	Female (*n* = 113)	**Male** (*n* = 64)
Dropout		
Mean age in years	17.1 (SD 1.3)	17.0 (SD 1.2)
By age year	%	%
age 15	11.5	12.5
age 16	23.0	23.4
age 17	25.7	26.6
age 18	22.1	25.0
age 19	17.7	12.5
Total	100.0	100.0

Furthermore, the study participants reported via a 5-point scale from *not at all* to *very much* the extent to which various dropout reasons had influenced their decision to quit sports club participation. For the analyses, their responses were reduced to *yes* or *no* indicating 'influenced' or 'not' (Study I). Figure 4 presents the reasons for dropping out. The most common reason was *a desire to concentrate on studies* (70.2% females and 68.1% males). This was followed by *it was boring* (50.8% females, 55.1% males) and *illness or injury* (52.3% females, 44.9% males).

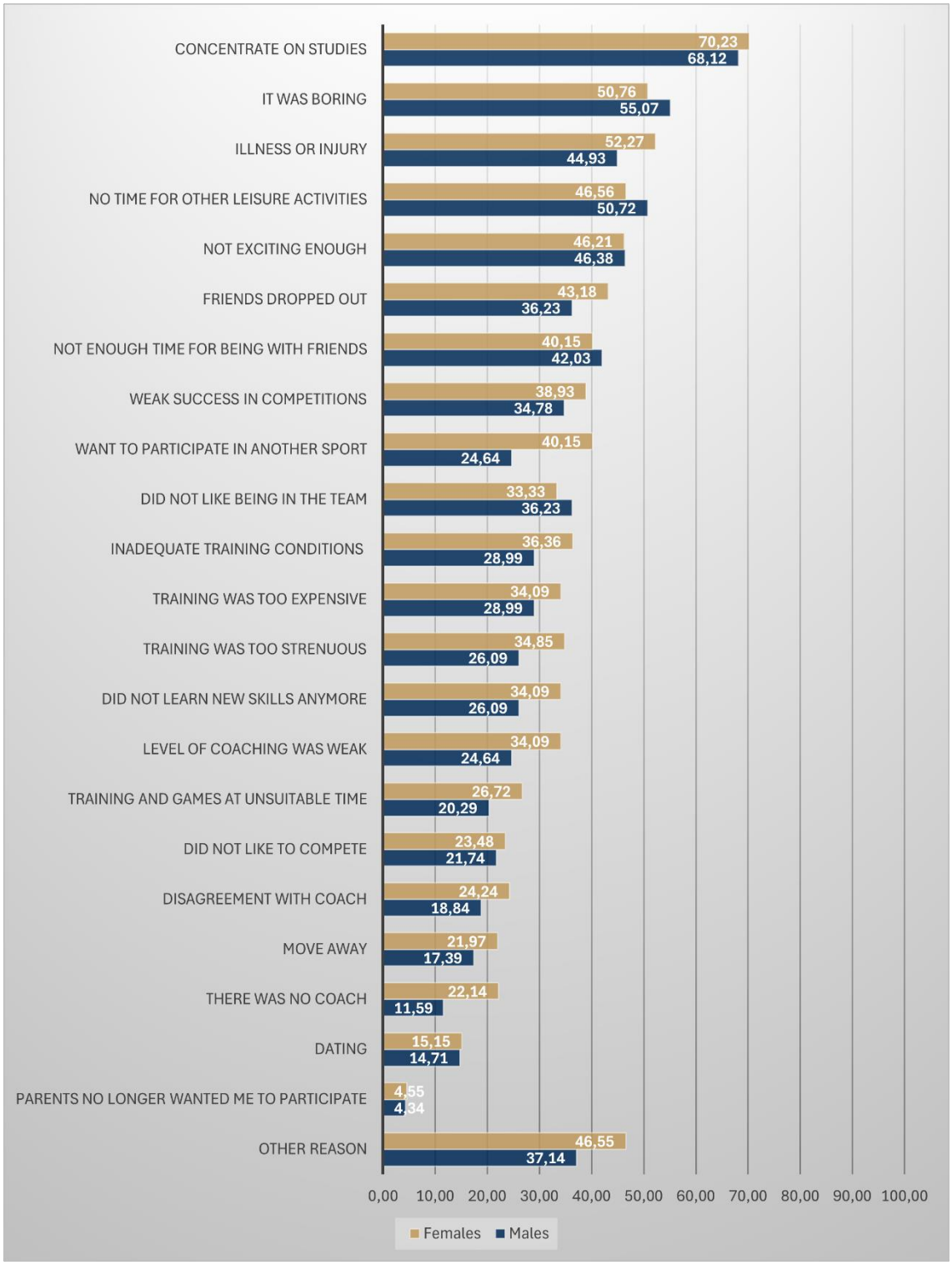

FIGURE 4 Reasons for dropping out from sports club participation: percentages (male and female) per reason given; total n females = 131–132; total n males 68–69; total n other reason = 35 (supplementary file in Study I, Figure S1)

5.7 Sports club participation patterns and life status in emerging adulthood

The study participants chose their *main commitment* from the response options (such as 'study' or 'work') at age 19 (Study I). Table 14 shows that the most common commitment for all sports club participation patterns was 'study' (females 50.0–62.4%; males 41.1–56.1%). Female maintainers and dropouts were more likely than nonparticipants to attend the educational category 'upper secondary school or university' (50.5% and 41.3% vs. 25.0%) ($p = .002$). Similarly, among *males* the proportions of maintainers and dropouts who attended upper secondary school or university were larger than the proportion of nonparticipants; however, the differences were not statistically significant (41.4% and 39.8% vs. 26.8%, $p = .475$).

The new results from the supplementary analyses conducted after the publication of Studies I–III related to *residential status*. These results showed that the majority of females (53.8%) and males (70.2%) lived with their parents at age 19 (Table 14). Furthermore, female maintainers were more likely to live with their parents than were female nonparticipants or dropouts (70.3% vs. 46.4% or 48.8%, $p < .001$). Among males, there was no statistically significant differences between the sports club participation patterns as regards living with parents (maintainers 74.7%; dropouts 65.9%; nonparticipants 69.6%).

TABLE 14 At age 19: sports club participation patterns by life status; separately by gender in Study I and the current study

	Females					
	n	**Total**	**Maintainers** *n* = 101	**Dropouts** *n* = 167	**Nonparticipants** *n* = 112	*p*
Main commitment			%			
Study	219	57.6	62.4[a]	59.9[a]	50.0[a]	0.470
Work/entrepreneur	100	26.3	25.7[a]	22.8[a]	32.1[a]	
Temporary lay-off/unemployed	25	6.6	5.9[a]	6.6[a]	7.1[a]	
Military/civil service	3	0.8	0.0[a]	1.80[a]	0.0[a]	
Maternity/paternity leave	2	0.5	0.0[a]	0.60[a]	0.9[a]	
Other	31	8.2	5.9[a]	8.4[a]	9.8[a]	
Total	380	100.0	100.0	100.0	100.0	
Educational institution						
Upper secondary school or university	148	38.9	50.5[a]	41.3[a]	25.0[b]	0.002
Vocational school or university of applied sciences	44	11.6	8.9[a]	9.6[a]	17.0[a]	
Other	188	49.5	40.6[b]	49.1[a, b]	58.0[b]	
Total	380	100.0	100.0	100.0	100.0	
Residential status						
Alone	78	20.6	22.8[a]	18.7[a]	21.4[a]	< 0.001
With parent(s)	204	53.8	70.3[a]	48.8[b]	46.4[b]	
With roommate/in a student apartment	42	11.1	4.0[a]	16.3[b]	9.8[a, b]	
With a married or cohabiting partner	53	14.0	3.0[a]	15.7[b]	21.4[b]	
With a married or cohabiting partner and a common child or children	2	0.5	0.0[a]	0.6[a]	0.9[a]	
As a single parent with a child or children	0	0.0	0.0[a]	0.0[a]	0.0[a]	
Total	379	100.0	100.0	100.0	100.0	

[a, b] = *differences according to z-test*

TABLE 14 continued

	Males					
	n	**Total**	**Maintainers** *n* = 87	**Dropouts** *n* = 82	**Nonpar-ticipants** *n* = 56	*p*
Main commitment				%		
Study	114	50.7	51.7[a]	56.1[a]	41.1[a]	0.690
Work/entrepreneur	46	20.4	18.4[a]	17.1[a]	28.6[a]	
Temporary lay-off/unemployed	20	8.9	10.3[a]	6.1[a]	10.7[a]	
Military/civil service	34	15.1	13.8[a]	15.9[a]	16.1[a]	
Maternity/paternity leave	0	0.0	0.0	0.0	0.0	
Other	11	4.9	5.8[a]	4.9[a]	3.6[a]	
Total	225	100.0	100.0	100.0	100.0	
Educational institution						
Upper secondary school or university	84	37.2	41.4[a]	39.8[a]	26.8[a]	0.475
Vocational school or university of applied sciences	22	9.7	9.2[a]	9.6[a]	10.7[a]	
Other	120	53.1	49.4[a]	50.6[a]	62.5[a]	
Total	226	100.0	100.0	100.0	100.0	
Residential status						
Alone	32	14.2	17.2[a]	9.8[a]	16.1[a]	0.031
With parent(s)	158	70.2	74.7[a]	65.9[a]	69.6[a]	
With roommate/in a student apartment	22	9.8	5.7[a]	12.2[a]	12.5[a]	
With a married or cohabiting partner	13	5.8	2.3[a]	12.2[b]	1.8[a]	
With a married or cohabiting partner and a common child or children	0	0.0	0.0[a]	0.0[a]	0.0[a]	
As a single parent with a child or children	0	0.0	0.0[a]	0.0[a]	0.0[a]	
Total	225	100.0	100.0	100.0	100.0	

[a, b] = *differences according to z-test*

6 DISCUSSION

6.1 Sports club participation patterns and their determinants

6.1.1 Patterns and gender

The study explored sports club participation patterns and their determinants from age 15 to age 19. Since the original FHPSC study focused on sports club participants, this comprised the study sample selected. Overall, at baseline (age 15), 72% of the study participants were sports club participants (Study I). The average dropout age was 17 years. For comparison, nationally representative studies have found that children and adolescents are most likely to drop out from sports clubs at age 10–12 (Blomqvist et al., 2015, pp. 73–82; Lämsä, 2009, pp. 15–42), with the proportion of sports club participants at age 15 being 42–44% (Blomqvist et al., 2019, pp. 47–56; Blomqvist et al., 2023, pp. 82–92).

Dropouts (41%) were identified as the most prevalent pattern, followed by *maintainers* (31%), *nonparticipants* (28%), and *joiners* (0.5%), with the latter category being too small for further analyses (Study I). Furthermore, among *females*, the most prevalent pattern was that of dropouts (44%), while among *males*, the most prevalent patterns were those of maintainers (38%) and dropouts (37%). Gender differences were significant, such that males were more likely than females to be maintainers rather than dropouts or nonparticipants.

Previous research in this age bracket has been scarce, but the current findings are partly consistent with the results from an American study by Kwon et al. (2015). The study concerned participation in organized sports in the age bracket 5 to 19 years, and the proportion of dropouts was about the same (40%) as in the present study. However, in the American study the proportion of maintainers was larger (46% vs. 31%) and that of nonparticipants smaller (14% vs. 28%) than in the current study. Moreover, neither joiners nor gender differences were identified. Other studies focusing on younger age groups (aged

5–17) have shown a small proportion of joiners, i.e. 8% among males (Howie et al., 2016) and 5% among females and males (Jakobsson et al., 2012).

In addition to the sample selected and the differing age ranges, the differences between the studies in the prevalences of the patterns and in respect of gender may be due to differences in the sports systems. It should be noted that the present study focused on sports clubs organized by independent associations in Finland, while, for example, Kwon et al. (2015) in Iowa, United States explored high school sports teams and sports clubs. They suggested that the lack of a difference in participation rates between females and males was due to the inclusion of school-based sports teams, which in the American context have a significant role in females' participation in organized sports.

The current study is in line with previous findings showing that dropping out from sports clubs is prevalent in adolescence, while joining is a rarer phenomenon. In addition to gender, the current study found other factors that may explain stability and change in sports club participation. These were analysed separately by gender, as discussed below.

6.1.2 Educational determinants

This study added knowledge by exploring *achievement at school* and *plans for future education* as determinants of sports club participation patterns (Study I). This was done for females and males separately. Among *females*, high achievement at school measured at age 15 was related to maintained participation, but also to dropping out of sports clubs, in comparison with nonparticipation. Among *males*, there were no differences between any patterns in this factor. Recent longitudinal research in Sweden (Jakobsson et al., 2012) and in Australia (Owen et al., 2024) has also explored how sports club participation is related to school achievement. In Sweden, it was found that maintainers are more likely than dropouts to have high achievement at school (from age 13 to 16), while in Australia, maintainers were found to be more likely than nonparticipants to be high achievers (from age 4 to 21). In addition, Finnish cross-sectional studies on adolescents aged 13–15 have shown an association between sports club participation and high achievement at school, as compared to nonparticipation (Paakkari et al., 2017). A similar result has been found among males aged 13–18 (Koski, 2005a). As regards school achievement in relation to both maintainers and dropouts, the current study contrasts to some extent with the Swedish study by Jakobsson et al. (2012). The differences may be age-related, since in the Swedish study, the change in sports club participation was measured from age 13 to 16 (with school achievement measured at age 16), while in the current study it was measured from age 15 to 19 (i.e. after school achievement was measured at age 15).

Among *females*, aspiration towards upper secondary school was related to maintained participation in sports clubs, in comparison with nonparticipants, who tended to have 'other than upper secondary school' aspirations. Among *males*, such an aspiration was related more to both maintained participation and to dropping out than was the case among nonparticipants. It was notable that

among both females and males, there was no difference between maintainers and dropouts with regard to study aspiration. This result is in line with Swedish research by Jakobsson et al. (2012), in which no association was found between maintained sports club participation and dropping out with regard to plans for future studies (academic vs. vocational program).

Overall, the current results reinforce previous findings indicating that academic success and an academic orientation are related to sports club participation. The associations may be explained by parents' educational and physical activity background, i.e. cultural capital in the family (Jakobsson et al., 2012; Koski, 2005a; Koski, 2007, pp. 299–319; Torstveit et al., 2018). Furthermore, the current results appear to indicate that some females who participate in sports clubs have succeeded at school, have had high goals for both education and a sports career, and have been able to maintain their participation in a sports club. On the other hand, some of them have performed well at school but did not aim at or could not continue in a sports career. Males participating in sports clubs may have wanted to have an academic career. Some of them have in fact continued in a sports career, while others have wished to or been obliged to give up sports.

6.1.3 Family-related determinants

Findings related to *parental support for physical activity and sport* (encouragement, transportation, doing physical activities together) in adolescence showed that maintainers and dropouts had perceived higher levels of parental support than did nonparticipants (Study I). Previous research has also shown that parental support for physical and sporting activities is an important facilitator for participation in a sports club, and is related to maintained participation among adolescents (Desroches et al., 2022; Howie et al., 2020; Jakobsson et al., 2012; Vanttaja et al., 2017). Furthermore, the current study indicated that among females, the perception of a decrease in parental support was related to dropping out, in comparison with being a maintainer or nonparticipant. As one would expect, levels of support may remain unchanged when there is no change in an adolescent's participation in a sports club. On the other hand, parents may see education as more important than sports club participation, which may explain a decrease in support for sporting activities with a resulting dropout by adolescents. However, among males, there were no differences between the patterns with regard to support. This could indicate that the male dropouts went to sports club training independently, that they were supported by friends rather than parents, or that the parents still encouraged them to be physically active. It should be noted that causality could not be confirmed in the current study since change was explored in *both* variables (i.e. parental support and participation in a sports club). A previous study (Scarapicchia et al., 2017) has shown a decrease in parental support for physical activity during adolescents' first year at university, and this may be related to growing up and becoming more independent. This would also be consistent with the findings of the current study, with the possibility that a lessening in support may precede dropout.

Nevertheless, parental support for physical activity remains important among university students (Scarapicchia et al., 2017).

With respect to *family affluence,* no difference was found between the sports club participation patterns (Study I). In previous research, measures of family affluence and related findings have varied (Jakobsson et al., 2012; Paakkari et al., 2017). Hence, family affluence does not necessarily determine sports club participation as reliably as, for example, family income, which has been used in many studies (Desroches et al., 2022; Findlay et al., 2009; Manz et al., 2016). Furthermore, the findings in the current study may be influenced by the study participants from the selected districts having equal possibilities to participate. However, about one-third of the dropouts in the current study reported that the expense of the training influenced dropping out from the sports club. Hence, there is reason to believe that overall, adolescents do not have equal possibilities to participate in sports clubs.

6.1.4 Sports-related determinants

As regards the *main sport*, the proportions of maintainers and dropouts varied in certain main sports at age 19 (Study II). Previous research has also shown variability in the proportions of maintainers, beginners, and dropouts in various sports (Brooke et al., 2014; Hardie Murphy et al., 2017; Lehtonen et al., 2018, pp. 13–17), and have suggested factors that may influence this, namely cultural contexts (Brooke et al., 2014; Hardie Murphy et al., 2017), opportunities to participate related to supply, costs, or other hobbies (Hardie Murphy et al., 2017; Koski & Hirvensalo, 2023, pp. 48–57), promotion conducted by national associations (Hardie Murphy et al., 2017), and the age of the adolescents (Brooke et al., 2014). Hence, for example, the maintained participation in football in Finland may be due to the promotion of the sport, and to the reciprocal effect of the availability of football clubs, teams of different levels, and the large number of participants. On the other hand, in the case of figure skating, maintained participation may be explained by the high investment needed and by international success.

Onset in the main sport by school age predicted maintained participation, while a later start predicted dropping out of sports clubs by emerging adulthood (Study II). These findings reinforce previous studies showing that late teenage maintainers had started participating in club sports at an early age (Jakobsson, 2014), and at a younger age than dropouts (Baron-Thiene & Alfermann, 2015). In one's early life in particular, parental support is needed. Hence, these results once again suggest that, due to the cultural capital in the family (Jakobsson et al., 2012; Koski, 2005a; Koski, 2007, pp. 299–319; Torstveit et al., 2018), maintainers have been encouraged and transported to sports club by their parents—this in addition to having wanted or having adapted to sports club participation at an early age. Furthermore, a later start may negatively affect one's perceived competence in sports, especially as compared to peers who have been training in a sport over several years. A perceived lack of competence is, in turn, related to dropout (Balish et al., 2014; Crane & Temple, 2015).

International research has shown benefits for (i) motor and cognitive development and (ii) psychosocial and cardiometabolic health, resulting from physical activity interventions (organized physical activity) and participation in organized individual or team sports at an early age with study samples stated as extending from birth to age 5 (Carson et al., 2017; Harlow et al., 2020; McNeill et al., 2020). The current study did not explore whether adolescents participated in one sports discipline only or in many sports disciplines. However, it suggests that a long training history in the main sport i.e., early engagement may not necessarily lead to becoming bored, bearing in mind that boredom emerges as one important reason for dropout in adolescence in this study, as in previous research (Blomqvist et al., 2023, pp. 82–92). Furthermore, recent studies suggest that, contrary to previous understandings, early specialization in a sport may not endanger maintained participation (Downing et al., 2022; Larson, Young, et al., 2019). Indeed, an early start in a sports club may lead to the formation of a lifestyle habit of sports club participation, with consequent maintained participation, given that—as shown by previous research—a physically active lifestyle in early life may track into later life (Telama et al., 2014). Moreover, according to Koski's (2008) theory of a physical activity relationship based on Unruh's (1979) types of participation in the social world, these maintainers can be seen as insiders in the social world of their sport; they become deeply involved in it, and its meanings influence their entire life and identity.

The finding that maintainers were more likely to *compete* at the highest level and also had had the highest future *competitive orientation* at age 15 as compared to dropouts (Study II) is in line with previous research suggesting that maintainers wish to compete, or have adapted themselves in order to compete (Baron-Thiene & Alfermann, 2015; Jakobsson, 2014; Rottensteiner et al., 2015); alternatively, that they are more ego-oriented with regard to social comparison than are dropouts (Duda et al., 1995; Nicholls et al., 1989; Rottensteiner et al., 2015), and tend more to have the role of insiders in the world of their sport (Koski, 2008; Unruh, 1979). In addition, the finding that maintainers tend to be characterized by an early onset of participation in the main sport and by competitiveness is consistent with previous research showing an association between early onset and competitive and skill development motivation (Guedes & Netto, 2013). Furthermore, competing at a low level, or not competing at all, seemed likely to propel a person towards becoming a dropout rather than a maintainer. In line with this, a previous study also showed that competing at a low level may predict dropout; however, it did not explore recreational participation (Moulds et al., 2020). Dropping out may be explained by a lack of motivation when there is no opportunity to rise to a higher competitive level; this may occur due to the competitive goals of the team or to the athlete's own competence. This study also showed that participation with a recreational or developmental orientation is related to dropout. Since maintained participation was characterized by an early start in sports clubs and by competitiveness, this would suggest that sports clubs still place an emphasis on competition rather than on recreation.

With regard to gender differences in the current study, not all the female maintainers aimed at success in adult-level competitions, i.e., they were not necessarily looking towards a long competitive sports career. This result is also consistent with the proportions of female maintainers and dropouts as compared to male maintainers and dropouts. It is also consistent with previous research suggesting that females are more likely than males to drop out from competitive sport or a sports career (Baron-Thiene & Alfermann, 2015). The latter study noted that the female dropouts had predominantly participated in individual sports, and suggested that the more competitive orientation among males might also underlie the differences in dropout rates (Baron-Thiene & Alfermann, 2015). The current study is to some degree consistent with this line of argument, insofar as females were more likely to drop out from than maintain their participation in swimming, i.e. an individual sport.

The finding that a high *training volume in the main sport* was related to maintained participation in sports clubs (Study II) is consistent with previous findings (Baron-Thiene & Alfermann, 2015). In addition, a high competitive orientation was associated with a high training volume, as found also in the previous FHPSC study (Aira et al., 2019). This result supports the previously found association between high competitive motivation and high training volume (Guedes & Netto, 2013). However, when all the sports-related factors were simultaneously added into the analysis, the evidence was insufficient to conclude that the training volume influenced maintained participation in a sports club. In any case, the results suggest that a high training volume does not necessarily lead to boredom or exhaustion and (hence) dropout; rather, dropout/maintained participation depends on other factors supporting or disturbing participation in sports club activities. Previous research suggests that (a lack of) enjoyment or autonomy within the training has stronger associations with dropout than the actual training volume (Larson et al., 2020); the point is rather that when the training volume is combined with perceived tiredness, negative relationships in the sport, scheduling problems, and non-improving performance, this may lead to dropout (Larson, McHugh, et. al., 2019; Vanttaja et al., 2017). On the other hand, the sacrifice or investment bound up with a high training volume may lead the individual to continue participation in a sport.

Regarding the *type of sport*, the current study found no statistically significant difference between dropout rates in individual and team sports, even if individual sports had more dropouts than maintainers (Study II). Previous research has shown that individual sport participants are more likely to drop out than team sport participants, and this was suggested as due to the experience of personal failure in competitions (Baron-Thiene & Alfermann, 2015). In the current study, competing at top national level was more common among individual sport maintainers and dropouts than it was among team sport maintainers and dropouts. Furthermore, a high training volume was more common among individual sport dropouts than it was among team sport dropouts. Previous research has suggested that individual sport participants have a higher competitive motivation than team sport participants (Guedes &

Netto, 2013). Thus, if individual sport participants feel they have given their all to their sport but experience personal failure, this might more easily trigger a decision to drop out.

Only a few adolescents *changed their main sport* during the phase of life from age 15 to 19 (Study II). This is in line with a previous study suggesting that there is a plateau or stable period after puberty during which changes tend not to occur (Brooke et al., 2014). This interpretation, in conjunction with other findings related to sports-related factors, is in line with a previous study by Jakobsson (2014). It may also suggest that sports clubs emphasize competitiveness and early specialization, and tend not to provide alternative (less competitive and more recreational) activities. This in turn may lead to a situation in which few adolescents participate in more than one sport. Overall, it may mean that not many individuals are able to change their main sport, and that a later start in a sport is not possible.

6.1.5 Perceived coach's health promotion activity

This study showed that, according to the perceptions of female and male sports participants at age 15, *coaches actively discussed only a few health topics*, namely sleep and rest, injury prevention, and training when ill (Study III). It would not be surprising if topics related to sports training and performance were discussed during training. Despite this, many adolescents perceived a lack of discussion of these and other health topics. These results are consistent with a previous study exploring the perceptions of males (Kokko, Villberg, et al., 2015). Coaches' overall inactivity in health promotion is supported by evidence that injuries are common among sports club participants (Parkkari & Leppänen, 2021, 90–94; Ristolainen et al., 2019), even though they could be prevented (Toivo, 2021); furthermore, as shown in this study, injuries provide one significant reason for dropout among both female and male sports participants. It is also notable that many sports participants (Heikkilä, 2024; Mäkelä et al., 2016; Ng et al., 2017) have unhealthy lifestyle habits, including—as shown in the present study—maintainers.

Many factors may explain why coaches are not active in health promotion. According to previous research, lack of time and competence may restrict coaches' health promotion activity (Kokko & Kannas, 2004; Lane et al., 2017). This may apply especially to Finnish youth sports clubs that are based on voluntary coaching (Koski et al., 2015, pp. 147–160). In addition, coaches may assume that sports participants have healthy lifestyle habits including, for example, being sufficiently physically active, or that other stakeholders such as the home and school take care of health promotion. It may also be that some topics (such as nutrition or sexual issues) are considered sensitive and for that reason are not frequently discussed.

Some further insight was added by findings on a gender difference related to discussion on health topics. More males than females perceived that snuff use was frequently discussed by coaches. This may be explained by the evidence from the same cohort, indicating that more males than females use snuff. This, in

turn, could suggest that coaches are reactive rather than proactive in their health promotion efforts (Ng et al., 2017).

Earlier longitudinal research on health promotion and sports club participation is scarce. This study showed for the first time to my knowledge that males who had *perceived coach's health promotion activity as frequent* were more likely to be maintainers than dropouts. Furthermore, no difference existed among females. According to the current study, as well as a previous international study (Baron-Thiene & Alfermann, 2015), males are more likely than females to have a strong competitive orientation. Hence, it can be suggested that males are more likely to invest in competitive sports and to participate in sports clubs in which coaches (i) have competence in health promotion, and (ii) regard it as important for athletes' success and for the sports club's core business (see also Van Hoye, Geidne, et al., 2022, pp. 189–200).

Among the cohort of the current study, in addition to injuries emerging as one significant dropout reason, it appeared that time needed for studying and also the dropping out of friends may lessen participation among females, meaning that coaches' frequent health promotion activity may not be sufficient to maintain females' participation. On the other hand, the findings showed that there were also many maintainers, both male and female, who had perceived coaches as being inactive in health promotion. There could, no doubt, be other factors maintaining their participation, such as enjoyment in the sport itself (Hopkins et al., 2022; Jakobsson, 2014), friends (Jakobsson, 2014), and competitiveness. In addition, many female and male dropouts perceived the coaches as inactive in health promotion. It appears that the coaches' inactivity may lead to adolescents dropping out, especially if other factors do not support participation.

There may also be differences in how adolescents perceive the frequency and quality of coaches' health promotion activity. Other studies have shown that coaches' behaviour and friendliness influence sports club participation (Casey et al., 2017; Rottensteiner et al., 2013). For example, the perceived tone of discussions on sensitive topics such as nutrition in aesthetic or weight-sensitive gymnastics or in figure skating, may influence the maintenance of participation.

6.2 Lifestyle habits and life status in emerging adulthood

6.2.1 Lifestyle habits

This study added knowledge by exploring *lifestyle habits* among the sports club participation patterns in emerging adulthood (Study III). Maintainers were more likely to have healthy lifestyle habits than nonparticipants or dropouts. In addition, dropouts were more likely to have healthy lifestyle habits than nonparticipants. These findings are in line with previous cross-sectional study results on the 15-year-old sports participants of the same cohort, who were found to be more likely than nonparticipants to have healthy lifestyle habits (Heikkilä

et al., 2021; Mäkelä et al., 2016; Ng et al., 2017). Furthermore, the results are in line with another Finnish study showing the relationship between sports club participation in adolescence and healthy lifestyle habits in adulthood (Palomäki et al., 2018). Maintainers' healthier lifestyle habits may be explained by the current study findings, insofar as they involve parental support, academic success, a competitive orientation, health promotion activity in sports clubs, living with parents, and parental education (cf. Torstveit et al., 2018). Hence, maintainers are exposed to support and knowledge in various environments which generate the understanding and motivation to behave healthily for success in sports and life in general.

On the other hand, the current findings showed that maintainers and dropouts at age 19 were more likely than nonparticipants of the same age to use alcohol. Furthermore, a previous Finnish study has shown the association of sports club participation with the use of alcohol among boys aged 13–18 (Koski, 2005a). The suggested explanations are that nonparticipants generally do not participate in social activities, and that sports activities are characterized by traditional Finnish masculinity and a 'Viking' culture: the reward for one's own struggle involves drinking with friends (Koski, 2005a). Furthermore, according to international findings, teen-age sport participants are more likely to binge drink in early adulthood than are teen-age sport nonparticipants (Veliz et al., 2017). Hence, traditions and social relationships may explain alcohol use. However, in a study by Ng et al. (2017), participants and nonparticipants of the same cohort as in the current study did not differ from each other in alcohol use. Alcohol use may be positively affected by the Alcohol Act prohibiting the sale and serving of alcohol to persons under the age of 18 (Alkoholilaki 1102/2017).

Moreover, the availability of longitudinal cohort data made it possible to compare previously explored lifestyle habits of sports participants at age 15 (Heikkilä et al., 2021; Mäkelä et al., 2016) with those of maintainers at age 19, as found in the current study. With regard to sleep, the majority of the sports participants at age 15 (79%) met the minimum recommendation for their age on weekdays, i.e. at least 8h/night (Mäkelä et al., 2016), while the majority of the maintainers at age 19 (73%) also slept for at least 8h/night, as recommended for their age. On the other hand, almost the same large number of sports participants at age 15 (76%) (Mäkelä et al., 2016) as maintainers at age 19 (78%) did not fulfil the recommended 60 min of physical activity daily. Furthermore, a large number of sports participants at age 15 (59%) (Heikkilä et al., 2021) and maintainers at age 19 (60%) did not eat fruit and vegetables either many times per day or daily.

The findings suggest that participating in coach-led training and time used in other commitments such as studying and working may influence adolescents in such a way that physical activity recommendations are not fulfilled. In addition, at a young age, one may not pay much attention to the possibilities of harming one's health, which could explain the low consumption of healthy food. Interestingly, the results indicating adherence to the recommendation for sleep but not those for physical activity or nutrition are in line with the results on health topics that are frequently and infrequently discussed by coaches. It also seems

that during the period of continued participation in the sports clubs, the participants' lifestyle habits did not improve.

6.2.2 Life status

Concentration on studies was the most common reason for dropout among females and males (Study I). Previous research, too, has shown schoolwork as an important reason for dropout in adolescence (Eime et al., 2010; Hardie Murphy et al., 2017; Persson et al., 2020). Furthermore, at age 19, female maintainers and dropouts were more likely to be studying at upper secondary school or in a university than were nonparticipants. Among males the difference was not statistically significant. Since male maintainers and dropouts were also more likely than nonparticipants to aim at an academic education, school performance among the former categories might potentially be more likely to endanger the academic goal. In addition, the findings may be affected by the potential sport upper secondary school pupils in the sample. It was also notable that in a German study covering persons aged 15–19, both maintainers and dropouts might attend a specifically sport-oriented school, and might thence continue to university (Baron-Thiene & Alfermann, 2015).

A further point to note is that studying may require moving to another location, in which case it may prove impossible to continue at the same sports club or in the same sport (Baron-Thiene & Alfermann, 2015; Hilger-Kolb et al., 2020). Such transitions—in addition to a lack of time or difficulties in finding a new sports club—might explain dropout (Hilger-Kolb et al., 2020).

On the other hand, another German study on persons aged 11–20 showed that both female and male maintainers were more likely than female and male dropouts to attend academic schools as opposed to vocational schools (Wattie et al., 2014). Another German and recent Australian study has shown that maintained organized sports participation during childhood and adolescence (as compared to nonparticipation) is related to realization of a higher school degree (Pfeifer & Cornelißen, 2010), and to further studying in a university or for a university degree (Owen et al., 2024; Pfeifer & Cornelißen, 2010). The various school contexts explored may explain the differences related to dropouts. Overall, the findings appear to indicate that an academic orientation is related to sports club participation as compared to nonparticipation.

The results related to *residential status* showed that female maintainers were more likely than dropouts and nonparticipants to be living with their parents; however, among males, the difference was not statistically significant (see supplementary analyses in the current study). Furthermore, a larger proportion of maintainers (70% females; 75% males) but approximately equal proportions of dropouts (49% females; 66% males) and nonparticipants (46% females; 70% males) lived with their parents, as compared to the national statistics for persons aged 19 in 2022 (48% females; 67% males) (Statistics Finland, 2023). The results suggest that maintainers are supported by their parents longer than other emerging adults, and that males become independent at a later age than females.

Maintained sports club participation may be explained by various family-related factors. These include one's parental background, which includes experiences related to physical activity and sports (and hence support for sporting activities; see also Jakobsson et al., 2012), high education, i.e. cultural capital in the family (Koski, 2005a; Koski, 2007, pp. 299–319; Manz et al., 2016; Owen et al., 2024; Torstveit et al., 2018), and high income (Desroches et al., 2022; Manz et al., 2016), which has a relationship with an early start in sports clubs, academic success, and healthy lifestyle habits among emerging adults. The influence of parents can continue to be strong when one is living with parents in emerging adulthood. Koski (2007, pp. 299–319) refers to National Physical Activity studies (Kansallinen Liikuntatutkimus, Vapaaehtoistyö, 2006; Suuri Kansallinen Liikuntatutkimus, Vapaaehtoistyö, 2002) and to Koski (2000) in suggesting that sports clubs tend to have a middle-class ethos, reach out to those whose lives are 'in order'. The findings of the current study broadly support this suggestion.

6.3 Strengths and limitations of the study

The strengths of this study include rarely used longitudinal, prospective cohort data from a rarely studied age group, namely emerging adults (Crane & Temple, 2015; Hopkins et al., 2022; Howie et al., 2016; Lounassalo et al., 2019; Van Hoye et al., 2018). It covered a geographically broad area, including both females and males, and during the data collection time it encompassed the 10 most popular winter and summer sports in Finland. By starting to follow study participants when they all attended school, it became possible to reach them more easily in a later phase of life, when they had transferred to various other educational or work settings. The longitudinal data provided an opportunity to identify sports club participation patterns and find possible indications of causalities, as compared to a cross-sectional study design (Bauman et al., 2002). It should, however, be noted that because the present study focused on ten popular sport disciplines, the results cannot be generalized to participation in other sports.

Other strengths included the fact that this study explored *factors* on various socio-ecological levels, had a time dimension, and showed gender differences that have not been encompassed in earlier research on organized sports participation patterns (Howie et al., 2016; Lounassalo et al., 2019; Van Hoye et al., 2018). An advantage of applying ecological models is that they can explain behaviour and provide knowledge for multi-level behavioural interventions (Sallis et al., 2008, pp. 466–485). The study used previously validated measures and showed that factors from individual, social, and organizational levels are related to maintained participation in a sports club, without, nevertheless, aiming to identify the most important determinants in their entirety—an aspect that has been suggested as challenging, especially when general ecological models are used (Crane & Temple, 2015; Sallis et al., 2008, pp. 466–485).

The challenges of identifying interactions across levels have been recognized (Sallis et al., 2008, pp. 466–485). This has indeed been noted as a lack in previous research, and as an aspect requiring study (Crane & Temple, 2015; Sallis et al., 2008, pp. 466–485). In the current study, such interactions were found between individual and social level factors such as gender and parental support, and also between individual and organizational level factors such as competitive orientation and competitive level, or gender and coach's health promotion activity. Furthermore, as noted by Sallis et al. (2008, pp. 466–485), it is not easy to identify environmental-level factors for specific behaviours. In the current study, the coach's health promotion activity was identified as one such factor, affecting the maintenance of sports participation. As regards the underlying dimensions of factors (Crane & Temple, 2015), this study provides some indications that family background partly explains adolescents' early start and continued participation in sports clubs, together with academic success, lifestyle habits, and living with parents. Some previous studies have used adjusted regression models including (for example) parental education (Manz et al., 2016; Owen et al., 2024; Torstveit et al., 2018); however, this was not possible in the current study, as this variable was not included.

An advantage of applying life-course approach is that it allows one to explore how an individual's earlier life (including temporal context, social relationships, and individual choices) influences behaviour; moreover it can allow one to identify causal relationships rather than mere correlations (see e.g. Hirvensalo & Lintunen, 2011). Note, however, that although this study was a prospective cohort study, the starting and end points of sports club participation were retrospectively explored, with the risk of recall bias (see also Van Houten et al., 2017). Furthermore, there may be other factors in earlier life such as parental education or participation in more than one sport that could influence sports club participation, lifestyle habits, and life status in emerging adulthood—hence, factors not addressed in the present study. Note also that over a longer period there may be more factors affecting later behaviours.

In addition to the above, unlike previous research, the present study simultaneously explored various sports-related factors while taking into account both competitive and noncompetitive or recreational participation (Moulds et al., 2020; Wattie et al., 2014). Exploring a noncompetitive orientation is important, given the evidence that many sports club participants participate in a sports club for recreational reasons (see also Mononen et al., 2021, pp. 36–45), despite the current general emphasis on competitiveness in sports clubs. A further contribution of the present research relates to the point that (at least to my knowledge) there have so far been no longitudinal studies related to coaches' health promotion activity and to sports club participants' lifestyle habits in the phase of life from adolescence to emerging adulthood.

The variable *sports club participation pattern* was used in the present study. A similar variable covering organized sports participation patterns has been used in one German study incorporating two measurement points (Manz et al., 2016). It should be noted that the FAS II categorization used in the present study was

somewhat different from that applied in research using the updated FAS III (Paakkari et al., 2017) due to the smaller study sample in the current study, taking into account also that a sufficient number of subjects were included in the categories, with both the highest and lowest category being sufficiently distinguished. However, the present study found no difference between the sports club participation patterns according to the narrow category of high family affluence. Furthermore, the measures of family affluence used may be unreliable in a Western society, in terms of showing people's financial possibilities to participate in a sports club.

Due to the aim of identifying in more detail differences between maintainers and dropouts in the onset age of the main sport, the categorization in the present study differs from that used in a previous study which, on the other hand, did not provide a rationale for the categorization (Guedes & Netto, 2013). It is also worth noting that Chi-square tests and logistic regression analyses have been commonly used in previous studies on factors related to sports club participation (see for example Manz et al., 2016; Owen et al., 2024; Torstveit et al., 2018; Wattie et al., 2014) making comparison of the findings possible. On the other hand, given that the aim of the original FHPSC study was to focus on sports club participants, these were over-represented in the study as compared to the national prevalence at age 15 (Blomqvist et al., 2019, pp. 47–56); hence, the sample could not be said to be nationally representative.

It is important to note that the age bracket applied influences the average dropout age for sports club participation. The current study focused on adolescents who were sports club participants at baseline, i.e. at age 15. This being so, in the current longitudinal sample the dropout took place *after* age 15, with the average dropout age calculated at 17 years. By contrast, in the nationally representative sample with an age bracket extending from 9 to 15 years, the average dropout age was 11 years (Blomqvist et al., 2019, pp. 47–56), while in another Finnish study with an age range from 3 to 18 years, the dropout was calculated at 10 to 12 years (Lämsä, 2009, pp. 15–42).

A number of other possible drawbacks could be identified. In the current study, the participants were more likely to have academic aspirations than those shown in national statistics (Statistics Finland, 2022). In addition, the study sample decreased over time, since the baseline data were collected via sports clubs and schools, while in the follow-up the data were collected directly from study participants. The sports club *joiners* were insufficient in number to be characterized. In addition, the participants who continued to the follow-up study included relatively more females than males, plus adolescents who had high academic success and aspirations, and who perceived high parental support for physical activity and sport. However, most of the analyses could be conducted by gender, and there were no differences in competitive levels and orientations between those who participated in the baseline study and those who continued to the follow-up study. Furthermore, the study was able to show the substantial dropout pattern, while indicating also the patterns of maintainers and nonparticipants when adolescents grow up.

This study was based on self-reported data, which may be biased due to the factor of social desirability. However, in many of the factors explored, self-reporting is the only way to obtain the data. It is also worth noting that a decrease in parental support for physical activity and sport could not be shown as a *cause* of dropping out, given that both parental support and sports club participation were explored as changes over time. Moreover, changes over time in training volumes, competitive level, and competitive orientation may influence the maintenance of sports club participation; however, such changes were not explored in this study. It should also be noted that the questionnaire items on sports focused only on the main sport—even if the maintainers could have participated in more than one sport and quit some sports over time—and further, that variations in how adolescents perceived the quantity and quality of coaches' health promotion activities may have affected the reporting.

Caution is necessary regarding the findings obtained via the measures of lifestyle habits. In seeking to elicit a trend in a cohort study, the questionnaire for emerging adults used a physical activity recommendation for adolescents, hence, not the recommendation for adults (World Health Organization, 2010a). There might have been a larger number of emerging adults who would have met the less time-demanding recommendation for adults. In addition, dichotomization of the responses regarding lifestyle habits could have hidden interesting variations among the sports club participation patterns. It was nevertheless possible to explore whether lifestyle recommendations were followed.

6.4 Practical implications

It seems that current sports clubs tend to emphasize competition. They further seem, primarily, to support the participation of those adolescents who find their own sport at an early age, and those who want to compete and invest in sports. However, since (i) this study revealed large number of dropouts, especially among females, only a small number of joiners, and large numbers of nonparticipants, and since (ii) sports club participation has various benefits. It is therefore important to develop strategies to promote maintained participation, especially among females, and further, to develop not only joining strategies but also *rejoining* strategies, given that many adolescents may have participated in sports clubs but dropped out before the age of 15.

Parental support for physical activity and sport is needed for early participation in a sports club. In the present study, early participation and maintained parental support were related to sports club participation in emerging adulthood, as opposed to dropping out. Furthermore, maintained sports club participation was characterized by other factors related to parental support, such as healthy lifestyle habits. Hence, one should seek *to raise parents' awareness of the importance of their support for children's and adolescents' sports club participation*.

Promotion of sports club participation could be potentially conducted together with schools (cf. Kwon et al., 2015). Many adolescent sports club participants in the current study followed an academic path into emerging adulthood and needed time for their studies. Hence, *more flexible possibilities to combine sports and education* are needed, to avoid the situation where adolescents are forced to choose between sport and studies. More specifically, for those who want a dual career (i.e. both a sports and an academic career), education should allow flexibility regarding attending classes, opportunities to complete assignments, and time to complete a degree (see also Condello et al., 2019; Gavala-González et al., 2019). Moreover, for those who want to make a larger investment in education, there is a need to develop *less competitive and less time-consuming alternatives possibly during the school day,* together with the *possibility to change one's sport later*. Moreover, *recreational alternatives* could ensure maintained participation for those who want to participate in a sports club for recreational reasons (see also *drop-through,* as suggested by Geidne & Quennerstedt, 2021, and *light activities*, as suggested by Van Houten et al., 2019).

In addition, for the sake of promoting participation, there could be more *discussion with adolescents* about the kinds of attractive sporting activities they would like to pursue paying attention also to volumes of training and competition, plus their goals, and the benefits of participation in a sports club. Many adolescents at lower competitive levels may drop out because the opportunities are not in line with their interests or competency.

It is suggested that, in the transition to university and in moving to a new location, there could be *more support from the university community* for students' everyday life and *promotion of easy access to sports clubs* (see also Hilger-Kolb et al., 2020); also readily available *options* in the sports system for participation *at all life stages* (see Lim et al., 2011).

High training volumes may be related to maintained participation, as this study showed. However, this aspect also depends on enjoyment, autonomy, tiredness, relationships in sport, scheduling commitments, and perceived sport performance (Larson et al., 2020; Larson, McHugh, et al., 2019; Vanttaja et al., 2017). Hence, in addition to flexibility in education and sport goals, there is a need to ensure *enjoyment, sufficient rest and sleep, and positive relationships in sports clubs*. In particular, individual sports participants may need *mental support for dealing with perceived failure*.

Expensive training influenced the decision to drop out of sports clubs, and the point that high participation fees risk the participation of many children and adolescents is a source of constant social debate in Finland. Decision makers thus need to take account of *levels of taxation in families, support for sports clubs in decreasing participation fees*, as well as other possibilities such as *common financial support for sports club participation*. The latter is provided, for example, in Iceland, meaning that every child and adolescent has support for participation in recreational activities such as sport (City of Reykjavik, 2024; Gísladóttir et al., 2013).

Many findings indicate that *coaches' health promotion activity* was *low and needs to be improved*. Investing in coaches' health promotion activity may also require efforts to *increase coaches' competence in health promotion* (Kokko & Kannas, 2004; Lane et al., 2017). This is especially the case in sports clubs in Finland, which are based primarily on voluntary work (Koski et al., 2015, pp. 147–160). Knowledge related to health promotion in this specific setting could reduce major reasons for dropout, i.e. reasons that are health-related, including pressure related to time use or injuries. For example, the decision to participate in a sports club may be influenced by *injury prevention strategies* in sports clubs (Casey et al., 2017) and the *coaches' behaviour and friendliness* (Casey et al., 2017; Rottensteiner et al., 2013). If an injury occurs, it could be important to ensure *involvement in the sport society with peers during rehabilitation*. In addition, the *encouragement of healthy lifestyle habits* may positively affect participants' enjoyment in sport (Van Hoye et al., 2016, 2020). These may in turn maintain participation (see also Hopkins et al., 2022; Jakobsson, 2014). In relation to alcohol use among male sports participants, one may also wish to consider *what kind of masculinity sports clubs promote* (Koski, 2005a). Furthermore, health promotion actions and competence building should be based on *the needs of the sports club in question* (Van Hoye et al., 2020).

Factors from individual, social, and organizational levels may determine participation in a sports club, as shown in the current study. Influencing a determinant on a certain level may in fact require a focus on one or more other levels. For example, to improve females' participation, it may be necessary to exert influence at the organizational and community level, which could involve, for example, promoting sports club participation in partnership with the school, with the aim of equal participation by females and males. The onset age of participation viewed as a determinant may also be influenced via a focus on social and organizational levels. This could involve, for example, stakeholders informing parents of the importance of their support, and sports clubs providing various possibilities to participate and join at a later age.

6.5 Future perspectives

Even though this study identified four patterns of sports club participation, joiners could not be characterized, due to their small number. Hence, one will need a larger number of participants to explore factors related to this pattern. However, this may continue to be a challenge, given that many sports do not focus on 'joining' a sport club as an adult. A larger sample would make it possible to explore lifestyle habits separately between females and males. In addition, it would be beneficial to extend the study sample to age groups encompassing children and adults. Early age measurements, together with various measurement points, would reveal various sports club participation paths, including whether and at what point gaps in participation and changes in main sports occur. This would increase reliability, especially with regard to more permanent changes in participation. Measurements extending to adulthood

could give information on how various sports club participation patterns are related to later life events, lifestyle habits, and life status.

Evidence on dropout, nonparticipation, and joining rates suggests the need to find ways to promote adolescents' participation in sports clubs. In addition to factors available in the original FHPSC study, various other individual, social, and organizational factors may influence maintained participation in sports clubs in emerging adulthood. In addition, this study did not include community or policy-level factors, and future studies should pay attention to these (Balish et al., 2014). Note also that in sport disciplines that were not included in the current study, different factors may apply. Hence, these other disciplines should be examined from this perspective. Furthermore, it is important to study what makes sports club activities attractive from the point of view of the adolescents and emerging adults themselves.

This study was restricted to coaches' general health promotion activity on health topics related to lifestyle habits. It will also be important to examine coaches' health promotion activities related specifically to training sessions and competitions (e.g. fair and equal treatment of participants, interaction during training; see for example Kokko, Villberg, et al., 2015), and how these activities may or may not maintain participation among adolescents. In addition, *intervention studies* in sports clubs have so far been conducted internationally (Geidne et al., 2019). Hence, interventions in, specifically, Finnish sports clubs are needed to enlarge knowledge on sports club participation and health promotion from the sport officials', coaches', and sports club participants' point of view.

Measured physical activity and training volume in relation to different kinds of training sessions would increase reliability. Measures of quality are needed with regard to perceived health promotion activity and lifestyle habits, in relation to, for example, sleep. Interviews and observations could be used to explore interesting possibilities to participate in sports clubs from the adolescents' point of view, considering the quality of health promotion activities that could support maintained participation in sports clubs and healthy lifestyle habits in adolescence.

7 MAIN FINDINGS AND CONCLUSIONS

Maintainers (31%) had *started in a sports club at an early age* and *wanted to compete in sports*. By contrast, *dropouts* were determined by a *later start in a sports club* and a *lower level of competing* or *non-competing*. This group constituted the largest pattern (41%), especially among females (44%). Furthermore, joining sports club in adolescence was a rare event (constituting only 0.5% of *joiners*), and there was a large proportion of *nonparticipants* (28%). Sports clubs seem to emphasize competing. Going beyond competitive sports, there is a need for **possibilities to participate on a less competitive basis;** also, **possibilities to change the sport and to (re)join later in adolescence.**

Parental support is needed for an *early start in a sports club*, and support plus an early start were related to *maintained sports club participation*. Furthermore, female dropouts perceived a *decrease* in parental support for physical activity and sport. There is a need to **raise parents' awareness of the importance of parental support for early and continued participation in sports** through adolescence and emerging adulthood.

Academic success was related to *maintained participation* and *dropping out*, especially among females, and *concentration on studies* was an important reason for dropout in both genders. **Flexibility** is needed **in schools and higher education** in relation to **attending classes, opportunities to complete assignments, and time to complete a degree.** Flexibility also applies to sports clubs. The **sports clubs** need to allow possibilities for **less time-consuming activities**, in order to allow possibilities for both studying and participation**.**

Family affluence may *not* constitute *a sensitive enough measure* for sports club participation; nevertheless, many dropouts reported that *expensive training* had influenced their dropping out. Participation fees cause constant debate. Decision makers need to provide **equal possibilities for children and adolescents to participate in sports clubs.**

Coaches' health promotion activity supported *maintained participation* among males but was *infrequent* in the opinion of many maintainers and dropouts. **Improvement in coaches' health promotion activity** is needed in order to maintain sports club participation and support healthy lifestyle habits among adolescents. It should be noted that an improvement and increase in sports clubs' health promotion activities can **contribute to societal needs by improving overall public health.** However, research is needed to **understand the role that coaches can play in health promotion**, and their capacity and willingness to take on such a role.

Maintainers were more likely than dropouts and nonparticipants to have healthy *lifestyle habits*. This suggests that *maintainers are exposed to support and knowledge in many environments* such as family, school, and sports clubs, and have the understanding and motivation to behave healthily for success in sports and life in general. This emphasizes the **societal importance of extending support and knowledge to promote maintained participation in sports clubs**. However, since many maintainers had *unhealthy lifestyle habits*, this provides an important justification for **targeting also this setting with health promotion activity,** seeking thus to influence lifestyle habits.

More *maintainers lived with their parents* as compared to national statistics on emerging adults. This suggests that maintainers are supported by their parents longer than is the case among other emerging adults. **Parental support needs to be secured when adolescents move to live independently.**

REFERENCES

Agans, J. P., & Geldhof, G. J. (2012). Trajectories of participation in athletics and positive youth development: The influence of sport type. *Applied Developmental Science*, *16*(3), 151–165. https://doi.org/10.1080/10888691.2012.697792

Agans, J. P., Johnson, S. K., & Lerner, R. M. (2017). Adolescent athletic participation patterns and self-perceived competence: Associations with later participation, depressive symptoms, and health. *Journal of Research on Adolescence*, *27*(3), 594–610. https://doi.org/10.1111/jora.12301

Aira, T. (2024). *Physical activity patterns from adolescence to young adulthood: Their characteristics and relationship with cardiometabolic health*. Jyväskylän yliopisto. [Doctoral dissertation, University of Jyväskylä]. https://jyx.jyu.fi/handle/123456789/94917

Aira, T., Salin, K., Vasankari, T., Korpelainen, R., Parkkari, J., Heinonen, O. J., Savonen, K., Alanko, L., Kannas, L., Selänne, H., Villberg, J., Vähä-Ypyä, H., & Kokko, S. (2019). Training volume and intensity of physical activity among young athletes: The health promoting sports club (HPSC) study. *Advances in Physical Education*, *9*(4), 270–287. https://doi.org/10.4236/ape.2019.94019

Aira, T., Vasankari, T., Heinonen, O. J., Korpelainen, R., Kotkajuuri, J., Parkkari, J., Savonen, K., Uusitalo, A., Valtonen, M., Villberg, J., Vähä-Ypyä, H., & Kokko, S. P. (2021). Physical activity from adolescence to young adulthood: Patterns of change, and their associations with activity domains and sedentary time. *International Journal of Behavioral Nutrition and Physical Activity*, *18*(1), 85. https://doi.org/10.1186/s12966-021-01130-x

Alkoholilaki 1102/2017 [Alcohol Act]. https://finlex.fi/fi/laki/ajantasa/2017/20171102

Anderson, B. O., Berdzuli, N., Ilbawi, A., Kestel, D., Kluge, H. P., Krech, R., Mikkelsen, B., Neufeld, M., Poznyak, V., Rekve, D., Slama, S., Tello, J., & Ferreira-Borges, C. (2023). Health and cancer risks associated with low levels of alcohol consumption. *The Lancet Public Health*, *8*(1), e6–e7. https://doi.org/10.1016/S2468-2667(22)00317-6

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*(5), 469–480. https://doi.org/10.1037/0003-066X.55.5.469

Arnett, J. J. (2014). *Emerging adulthood: The winding road from late teens through the twenties* (2nd ed.). Oxford University Press.

Balish, S. M., Rainham, D., & Blanchard, C. (2014). Correlates of youth sport attrition: A review and future directions. *Psychology of Sport and Exercise*, *15*(4), 429–439. http://dx.doi.org/10.1016/j.psychsport.2014.04.003

Baron-Thiene, A., & Alfermann, D. (2015). Personal characteristics as predictors for dual career dropout versus continuation – A prospective study of adolescent athletes from German elite sport schools. *Psychology of Sport and Exercise*, *21*, 42–49. https://doi.org/10.1016/j.psychsport.2015.04.006

Batista, M. B., De Freitas, M. C. M., Romanzini, C. L. P., Barbosa, C. C. L., Shigaki, G. B., Fernandes, R. A., Romanzini, M., & Ronque, E. R. V. (2024). Sports participation in childhood and adolescence and physical activity intensity in adulthood. *Plos One*, *19*(5), e0299604. https://doi.org/10.1371/journal.pone.0299604

Batista, M. B., Romanzini, C. L. P., Barbosa, C. C. L., Blasquez Shigaki, G., Romanzini, M., & Ronque, E. R. V. (2019). Participation in sports in childhood and adolescence and physical activity in adulthood: A systematic review. *Journal of Sports Sciences*, *37*(19), 2253–2262. https://doi.org/10.1080/02640414.2019.1627696

Bauman, A. E., Sallis, J. F., Dzewaltowski, D. A., & Owen, N. (2002). Toward a better understanding of the influences on physical activity. *American Journal of Preventive Medicine*, *23*(2), 5–14. https://doi.org/10.1016/S0749-3797(02)00469-5

Blomqvist, M., Mononen, K., Konttinen, N., Koski, P., & Kokko, S. (2015). Urheilu ja seuraharrastaminen. In S. Kokko & R. Hämylä (Eds.), *Lasten ja nuorten liikuntakäyttäytyminen Suomessa; LIITU-tutkimuksen tuloksia 2014 [The physical activity behaviours of children and adolescents in Finland; Results of the F-SPA study 2014]* (pp. 73–82). Valtion liikuntaneuvosto, State Sport Council Publications 2015:2. https://www.liikuntaneuvosto.fi/lausunnot-ja-julkaisut/419/

Blomqvist, M., Mononen, K., Koski, P., & Kokko, S. (2019). Urheilu ja seuraharrastaminen. In S. Kokko & L. Martin (Eds.), *Lasten ja nuorten liikuntakäyttäytyminen Suomessa; LIITU-tutkimuksen tuloksia 2018 [The physical activity behaviours of children and adolescents in Finland; Results of the F-SPA study 2018]* (pp. 47–56). Valtion liikuntaneuvosto, State Sport Council Publications 2019:1. https://www.liikuntaneuvosto.fi/wp-content/uploads/2019/09/VLN_LIITU-raportti_web-final-30.1.2019.pdf

Blomqvist, M., Mononen, K., Koski, P., & Kokko, S. (2023). Urheilu ja seuraharrastaminen. In S. Kokko & L. Martin (Eds.), *Lasten ja nuorten liikuntakäyttäytyminen Suomessa; LIITU-tutkimuksen tuloksia 2022 [The physical activity behaviours of children and adolescents in Finland; Results of the F-SPA study 2022]* (pp. 83–92). Valtion liikuntaneuvosto, State Sport Council Publications 2023:1. https://www.liikuntaneuvosto.fi/lausunnot-ja-julkaisut/liitu-2022/

Breuer, K., Hoekman, R., Nagel, S., & van der Werff, H. (2015). *Sports clubs in Europe*. Springer International Publishing.

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harward University Press.

Brooke, H. L., Corder, K., Griffin, S. J., & van Sluijs, E. M. F. (2014). Physical activity maintenance in the transition to adolescence: A longitudinal study of the roles of sport and lifestyle activities in British youth. *Plos One*, *9*(2), e89028. https://doi.org/10.1371/journal.pone.0089028

Campbell, N., Reece, J., Urry, L., Cain, M., Wasseman, S., Minorsky, P., & Jackson, R. (2014). *Biology: A global approach* (10th ed.). Pearson Education UK, p. 1204.

Carson, V., Lee, E.-Y., Hewitt, L., Jennings, C., Hunter, S., Kuzik, N., Stearns, J. A., Unrau, S. P., Poitras, V. J., Gray, C., Adamo, K. B., Janssen, I., Okely, A. D., Spence, J. C., Timmons, B. W., Sampson, M., & Tremblay, M. S. (2017). Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). *BMC Public Health*, *17*(S5), 854. https://doi.org/10.1186/s12889-017-4860-0

Casey, M., Eime, R. M., Harvey, J. T., Sawyer, N. A., Craike, M. J., Symons, C. M., & Payne, W. R. (2017). The influence of a healthy welcoming environment on participation in club sport by adolescent girls: A longitudinal study. *BMC Sports Science, Medicine and Rehabilitation*, *9*(1), 12. https://doi.org/10.1186/s13102-017-0076-y

Casey, M., Harvey, J., Eime, R., & Payne, W. (2012). Examining changes in the organisational capacity and sport-related health promotion policies and practices of State Sporting Organizations. *Annals of Leisure Research*, *15*(3), 261–276. https://doi.org/10.1080/11745398.2012.719213

Casey, M. M., Payne, W. R., & Eime, R. M. (2009). Building the health promotion capacity of sport and recreation organisations: A case study of Regional Sports Assemblies. *Managing Leisure*, *14*(2), 112–124. https://doi.org/10.1080/13606710902752588

Casey, M. M., Payne, W. R., & Eime, R. M. (2012). Organisational readiness and capacity building strategies of sporting organisations to promote health. *Sport Management Review*, *15*(1), 109–124. https://doi.org/10.1016/j.smr.2011.01.001

Caspersen, C., Powell, K., & Christenson, G. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related reseaarch. *Public Health Reports*, *100*(2), 126–131.

City of Reykjavik. (2024). *The Recreation Card*. Retrieved June 2, 2024, from https://reykjavik.is/en/recreation-card

Condello, G., Capranica, L., Doupona, M., Varga, K., & Burk, V. (2019). Dual-career through the elite university student-athletes' lenses: The international FISU-EAS survey. *Plos One*, *14*(10), e0223278. https://doi.org/10.1371/journal.pone.0223278

Corti, B., Holman, C., Donovan, R., Frizzell, S., & Carroll, A. (1995). Using sponsorship to create healthy environments for sporting organsations to promote health. *Health Promotion International*, 10(3), 185–197.

Crane, J., & Temple, V. (2015). A systematic review of dropout from organized sport among children and youth. *European Physical Education Review*, *21*(1), 114–131. https://doi.org/10.1177/1356336X14555294

Currie, C., Inchley, J., Molcho, M., Lenzi, M., Veselska, Z., & Wild, F. (2014). *Health Behaviour in School-aged Children (HBSC) study protocol: Background, methodology and mandatory items for the 2013/14 survey.* 140–148. Retrieved March 29, 2023, from https://drive.google.com/file/d/1FZ8c2Xa_FcZ5Yx5gPXkPtlbV545NKhnx/view

Desroches, G., Poulin, F., & Denault, A.-S. (2022). Sports participation patterns throughout high school and their antecedents. *Applied Developmental Science*, *26*(1), 31–42. https://doi.org/10.1080/10888691.2019.1687297

Donaldson, A., Borys, D., & Finch, C. F. (2013). Understanding safety management system applicability in community sport. *Safety Science*, *60*, 95–104. https://doi.org/10.1016/j.ssci.2013.06.007

Donaldson, A., Forero, R., Finch, C. F., & Hill, T. (2004). A comparison of the sports safety policies and practices of community sports clubs during training and competition in northern Sydney, Australia. *British Journal of Sports Medicine*, *38*(1), 60–63. https://doi.org/10.1136/bjsm.2002.003806

Dooris, M., Kokko, S., & Baybutt, M. (2022). Theoretical grounds and practical principles of the settings-based approach. In S. Kokko & M. Baybutt (Eds.), *Handbook of Settings-Based Health Promotion* (pp. 23–44). Springer Nature Switzerland AG.

Dooris, M., Kokko, S., & de Leeuw, E. (2022). Evolution of the settings-based approach. In S. Kokko & M. Baybutt (Eds.), *Handbook of Settings-Based Health Promotion* (pp. 3–22). Springer Nature Switzerland AG.

Downing, C., Redelius, K., & Nordin-Bates, S. (2022). Early specialisation among Swedish aesthetic performers: Exploring motivation and perceptions of parental influence. *International Journal of Sport and Exercise Psychology*, *20*(4), 1013–1032. https://doi.org/10.1080/1612197X.2021.1940239

Duda, J. L., Chi, L., Newton, M. L., Walling, M. D., & Catley, D. (1995). Task and ego orientation and intrinsic motivation in sport. *International Journal of Sport Psychology*, *26*, 40–63.

Duodecim. (2015). *Alkoholiongelmat, Käypä hoito -suositus.* Suomalaisen Lääkäriseuran Duodecimin ja Päihdelääketieteen yhdistyksen asettama työryhmä. Retrieved January 16, 2024, from www.kaypahoito.fi

Eime, R. M., Payne, W. R., Casey, M. M., & Harvey, J. T. (2010). Transition in participation in sport and unstructured physical activity for rural living adolescent girls. *Health Education Research*, *25*(2), 282–293. https://doi.org/10.1093/her/cyn060

Eime, R. M., Payne, W. R., & Harvey, J. T. (2008). Making sporting clubs healthy and welcoming environments: A strategy to increase participation. *Journal of Science and Medicine in Sport*, *11*(2), 146–154. https://doi.org/10.1016/j.jsams.2006.12.121

Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: Informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity*, *10*(1), 98. https://doi.org/10.1186/1479-5868-10-98

Elder, G. J. (1985). *Life course dynamics*. Cornell University Press.

Elder, G., Johnson, M., & Crosnoe, R. (2003). The emergence and development of life course theory. In J. Mortimer & M.J. Shanahan (Eds.), *Handbook of the life course* (pp. 3–22). Kluwer Academic.

Findlay, L. C., Garner, R. E., & Kohen, D. E. (2009). Children's organized physical activity patterns from childhood into adolescence. *Journal of Physical Activity & Health*, *6*, 708–715. https://doi.org/10.1123/jpah.6.6.708

Fraser-Thomas, J., Falcão, W., & Wolman, L. (2016). Understanding take-up, drop-out and drop-off in youth sport. In K. Green & A. Smith (Eds.), *The Routledge Handbook of Youth Sport* (pp. 227–242). Routledge.

Gallant, F., Murray, R. M., Sabiston, C. M., & Bélanger, M. (2022). Description of sport participation profiles and transitions across profiles during adolescence. *Journal of Sports Sciences*, *40*(16), 1824–1836. https://doi.org/10.1080/02640414.2022.2115223

Gavala-González, J., Castillo-Rodríguez, A., & Fernández-García, J. C. (2019). Dual career of the U-23 Spanish canoeing team. *Frontiers in Psychology*, *10*. APA PsycInfo. https://doi.org/10.3389/fpsyg.2019.01783

Geidne, S., Kokko, S., Lane, A., Ooms, L., Vuillemin, A., Seghers, J., Koski, P., Kudlacek, M., Johnson, S., & Van Hoye, A. (2019). Health promotion interventions in sports clubs: Can we talk about a setting-based approach? A systematic mapping review. *Health Education & Behavior*, *46*(4), 592–601. https://doi.org/10.1177/1090198119831749

Geidne, S., & Quennerstedt, M. (2021). Youth perspectives on what makes a sports club a health-promoting setting: Viewed through a salutogenic settings-based lens. *International Journal of Environmental Research and Public Health*, *18*(14), 7704. https://doi.org/10.3390/ijerph18147704

Geidne, S., Quennerstedt, M., & Eriksson, C. (2013a). The implementation process of alcohol policies in eight Swedish football clubs. *Health Education*, *113*(3), 196–215. https://doi.org/10.1108/09654281311309837

Geidne, S., Quennerstedt, M., & Eriksson, C. (2013b). The youth sports club as a health-promoting setting: An integrative review of research. *Scandinavian Journal of Public Health*, *41*(3), 269–283. https://doi.org/10.1177/1403494812473204

Giele, J., & Elder, G. J. (1998). *Methods of life course research: Qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.

Giles-Corti, B., Clarkson, J. P., Donovan, R. J., Frizzell, S. K., Carroll, A. M., Pikora, T., & Jalleh, G. (2001). Creating smoke-free environments in recreational settings. *Health Education & Behavior*, *28*(3), 341–351. https://doi.org/10.1177/109019810102800308

Gísladóttir, T. L., Matthíasdóttir, Á., & Kristjánsdóttir, H. (2013). The effect of adolescents' sports clubs participation on self-reported mental and physical conditions and future expectations. *Journal of Sports Sciences*, *31*(10), 1139–1145. https://doi.org/10.1080/02640414.2013.773402

Gould, D. (1987). Understanding attrition in children's sport. In *Behavioural issues* (Vol. 2, pp. 61–85). Human Kinetics.

Green, K., Sigurjónsson, T., & Skille, E. Å. (2019). Conclusion. In K. Green, T. Sigurjónsson & E. Å. Skille (Eds.), *Sport in Scandinavia and the Nordic Countries* (pp. 173–204). Routledge.

Guedes, D. P., & Netto, J. E. S. (2013). Sport participation motives of young Brazilian athletes. *Perceptual and Motor Skills*, *117*(3), 742–759. https://doi.org/10.2466/06.30.PMS.117x33z2

Halldórsson, V. (2019). Sports participation in Iceland. In K. Green, T. Sigurjónson & E. Å. Skille (Eds.), *Sport in Scandinavia and the Nordic countries* (pp. 87–107). Routledge.

Hardie Murphy, M., Rowe, D. A., & Woods, C. B. (2017). Impact of physical activity domains on subsequent physical activity in youth: A 5-year longitudinal study. *Journal of Sports Sciences*, *35*(3), 262–268. https://doi.org/10.1080/02640414.2016.1161219

Harlow, M., Wolman, L., & Fraser-Thomas, J. (2020). Should toddlers and preschoolers participate in organized sport? A scoping review of developmental outcomes associated with young children's sport participation. *International Review of Sport and Exercise Psychology*, *13*(1), 40–64. https://doi.org/10.1080/1750984X.2018.1550796

Heikkilä, L. (2024). *Health promotion in sports clubs – adolescents' dietary habits, competitive goals in sports, and body image*. Oulun yliopisto. [Doctoral dissertation, University of Oulu]. https://urn.fi/URN:NBN:fi:oulu-202403202337

Heikkilä, L., Korpelainen, R., Aira, T., Alanko, L., Heinonen, O. J., Kokko, S., Kujala, U., Parkkari, J., Savonen, K., Valtonen, M., Vasankari, T., Villberg, J., & Vanhala, M. (2021). The associations between adolescents' sports club participation and dietary habits. *Translational Sports Medicine*, *4*(5), 617–626. https://doi.org/10.1002/tsm2.249

Heinilä, K. (1989). The sports clubs as a social organisation in Finland. In *International review for the sociology of sport 23/3* (pp. 225–248).

Hilger-Kolb, J., Loerbroks, A., & Diehl, K. (2020). 'When I have time pressure, sport is the first thing that is cancelled': A mixed-methods study on barriers to physical activity among university students in Germany. *Journal of Sports Sciences*, *38*(21), 2479–2488. https://doi.org/10.1080/02640414.2020.1792159

Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., Hazen, N., Herman, J., Katz, E. S., Kheirandish-Gozal, L., Neubauer, D. N., O'Donnell, A. E., Ohayon, M., Peever, J., Rawding, R., Sachdeva, R. C., Setters, B., Vitiello, M. V., Ware, J. C., & Adams Hillard, P. J. (2015). National sleep foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health*, *1*(1), 40–43. https://doi.org/10.1016/j.sleh.2014.12.010

Hirvensalo, M., & Lintunen, T. (2011). Life-course perspective for physical activity and sports participation. *European Review of Aging and Physical Activity*, *8*(1), 13–22. https://doi.org/10.1007/s11556-010-0076-3

Hopkins, C. S., Hopkins, C., Kanny, S., & Watson, A. (2022). A systematic review of factors associated with sport participation among adolescent females. *International Journal of Environmental Research and Public Health*, *19*(6), 3353. https://doi.org/10.3390/ijerph19063353

Howie, E. K., Daniels, B. T., & Guagliano, J. M. (2020). Promoting physical activity through youth sports programs: It's social. *American Journal of Lifestyle Medicine*, *14*(1), 78–88. https://doi.org/10.1177/1559827618754842

Howie, E. K., Mcveigh, J. A., Smith, A. J., & Straker, L. M. (2016). Organized sport trajectories from childhood to adolescence and health associations. *Medicine & Science in Sports & Exercise*, *48*(7), 1331–1339. https://doi.org/10.1249/MSS.0000000000000894

Itkonen, H. (1996). *Kenttien kutsu: Tutkimus liikuntakulttuurin muutoksesta* (pp. 215–230). Gaudeamus. [Doctoral dissertation].

Jakobsson, B. T. (2014). What makes teenagers continue? A salutogenic approach to understanding youth participation in Swedish club sports. *Physical Education and Sport Pedagogy*, *19*(3), 239–252. https://doi.org/10.1080/17408989.2012.754003

Jakobsson, B. T., Lundvall, S., Redelius, K., & Engström, L.-M. (2012). Almost all start but who continue? A longitudinal study of youth participation in Swedish club sports. *European Physical Education Review*, *18*(1), 3–18. https://doi.org/10.1177/1356336X11430660

Johnson, S., Vuillemin, A., Geidne, S., Kokko, S., Epstein, J., & Van Hoye, A. (2020). Measuring health promotion in sports club settings: A modified Delphi study. *Health Education & Behavior*, *47*(1), 78–90. https://doi.org/10.1177/1090198119889098

Kannas, L. (2000). *Kannas, L. (2000) Terveyttä edistävän urheiluseuran kriteerejä on kehitettävä (The criteria for a health promoting sports club must be developed). Raportti Nuoret, Urheilu, Päihteet – Pienoisseminaari.* Suomen Liikunta ja Urheilu, Helsinki. pp. 19–21.

Kansallinen liikuntatutkimus. (2006). *Vapaaehtoistyö*. Helsinki: SLU.

Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2011). Food and drink sponsorship of children's sport in Australia: Who pays? *Health Promotion International*, *26*(2), 188–195. https://doi.org/10.1093/heapro/daq061

Kelly, B., Chapman, K., King, L., Hardy, L., & Farrell, L. (2008). Double standards for community sports: Promoting active lifestyles but unhealthy diets. *Health Promotion Journal of Australia*, *19*(3), 226–228. https://doi.org/10.1071/HE08226

Kemp, B. J., Cliff, D. P., Chong, K. H., & Parrish, A.-M. (2019). Longitudinal changes in domains of physical activity during childhood and adolescence: A systematic review. *Journal of Science and Medicine in Sport*, *22*(6), 695–701. https://doi.org/10.1016/j.jsams.2018.12.012

Khan, K. M., Thompson, A. M., Blair, S. N., Sallis, J. F., Powell, K. E., Bull, F. C., & Bauman, A. E. (2012). Sport and exercise as contributors to the health of nations. *The Lancet*, *380*(9836), 59–64. https://doi.org/10.1016/S0140-6736(12)60865-4

Kokko, S. (2010). *Health promoting sports club: Youth sports clubs' health promotion profiles, guidance, and associated coaching practice in Finland*. Jyväskylän yliopisto. [Doctoral dissertation, University of Jyväskylä]. https://jyx.jyu.fi/handle/123456789/22710

Kokko, S. (2014). Sports clubs as settings for health promotion: Fundamentals and an overview to research. *Scandinavian Journal of Public Health*, *42*(15_suppl), 60–65. https://doi.org/10.1177/1403494814545105

Kokko, S. & Baybutt, M. (Eds.). (2022). *Handbook of settings-based health promotion*. Springer.

Kokko, S., Donaldson, A., Geidne, S., Seghers, J., Scheerder, J., Meganck, J., Lane, A., Kelly, B., Casey, M., Eime, R., Villberg, J., & Kannas, L. (2016). Piecing the puzzle together: Case studies of international research in health-promoting sports clubs. *Global Health Promotion*, *23*(1_suppl), 75–84. https://doi.org/10.1177/1757975915601615

Kokko, S., Green, L. W., & Kannas, L. (2014). A review of settings-based health promotion with applications to sports clubs. *Health Promotion International*, *29*(3), 494–509. https://doi.org/10.1093/heapro/dat046

Kokko, S., & Hämylä, R. (Eds.). (2015). *Lasten ja nuorten liikuntakäyttäytyminen Suomessa. LIITU-tutkimuksen tuloksia 2014 [The physical activity behaviours of children and adolescents in Finland; Results of the F-SPA study 2014]*. Valtion liikuntaneuvosto, State Sport Council Publications 2015:2. https://www.liikuntaneuvosto.fi/lausunnot-ja-julkaisut/419/

Kokko, S., & Kannas, L. (2004). Terveyskasvatus Nuorten Jääkiekkovalmennuksessa [Health education in ice hockey coaching of adolescents]. *Liikunta & Tiede*, *41*, 45–48.

Kokko, S., Kannas, L., & Villberg, J. (2006). The health promoting sports club in Finland: A challenge for the settings-based approach. *Health Promotion International*, *21*(3), 219–229. https://doi.org/10.1093/heapro/dal013

Kokko, S., Kannas, L., & Villberg, J. (2008). Health promotion profile of youth sports clubs in Finland: Club officials' and coaches' perceptions. *Health Promotion International*, *24*(1), 26–35. https://doi.org/10.1093/heapro/dan040

Kokko, S., Kannas, L., Villberg, J., & Ormshaw, M. (2011). Health promotion guidance activity of youth sports clubs. *Health Education*, *111*(6), 452–463. https://doi.org/ 10.1108/09654281111180454

Kokko, S., Koski, P., Savola, J., Alen, M., & Oja, P. (2009). *The report: The guidelines for sports club for health (SCforH) programs*. http://tafisa.org/sites/default/files/pdf/TAFISAMagazine2009-SCfH.pdf

Kokko, S., Martin, L., Geidne, S., Van Hoye, A., Lane, A., Meganck, J., Scheerder, J., Seghers, J., Villberg, J., Kudlacek, M., Badura, P., Mononen, K., Blomqvist, M., De Clercq, B., & Koski, P. (2019). Does sports club participation contribute to physical activity among children and adolescents? A comparison across six European countries. *Scandinavian Journal of Public Health*, *47*(8), 851–858. https://doi.org/10.1177/1403494818786110

Kokko, S., Selänne, H., Alanko, L., Heinonen, O. J., Korpelainen, R., Savonen, K., Vasankari, T., Kannas, L., Kujala, U. M., Aira, T., Villberg, J., & Parkkari, J. (2015). Health promotion activities of sports clubs and coaches, and health and health behaviours in youth participating in sports clubs: The Health Promoting Sports Club study. *BMJ Open Sport & Exercise Medicine*, *1*(1), e000034. https://doi.org/10.1136/bmjsem-2015-000034

Kokko, S., Villberg, J., & Kannas, L. (2015). Health promotion in sport coaching: Coaches and young male athletes' evaluations on the health promotion activity of coaches. *International Journal of Sports Science & Coaching*, *10*(2–3), 339–352. https://doi.org/10.1260/1747-9541.10.2-3.339

Koski, P. (1999). Characteristics and contemporary trends of sports clubs in Finnish context. In K. Heinemann (Ed.), *Sport clubs in various European countries.* Series club of Cologne. The club of Cologne (Vol. 1, pp. 293–316). Hoffman Verlag.

Koski, P. (2000). *Maailma muuttuu, muuttuvatko seurat*. Liikunnan kehittämiskeskus 7/2000.

Koski, P. (2005a). Pojat, pallo ja pullo: Viekö seuratoiminta märkään miehuuteen? [Boys, ball and the bottle: Do sports clubs lead young men into a wet drinking cultur?]. *Yhteiskuntapolitiikka*, *70*(6), 624–638.

Koski, P. (2005b). Sport: The road to health? In T. Hoikkala, P. Hakkarainen & S. Laine (Eds.) *Beyond health literacy; Youth cultures, prevention and policy* (pp. 295–337). Finnish youth research network.

Koski, P. (2007). Liikunnan ja urheilun seuratoiminta nuorisotyönä. In T. Hoikkala & A. Sell (Eds.), *Nuorisotyötä on tehtävä: Menetelmien perusteet, rajat ja mahdollisuudet.* (pp. 299–319). Nuorisotutkimusverkosto, Nuorisotutkimusseura ry.

Koski, P. (2008). Physical Activity Relationship (PAR). *International Review for the Sociology of Sport*, *43*(2), 151–163. https://doi.org/10.1177/1012690208095374

Koski, P. (2009a). *Liikunta- ja urheiluseurat muutoksessa* (p. 56). Suomen Liikunta ja Urheilu. SLU-julkaisusarja 7/09. Helsinki: SLU.

Koski, P. (2009b). Sports clubs as civic organizations and health-enhancing physical activity. In S. Kokko, P. Koski, J. Savola, M. Alen & P. Oja (Eds.), *The report: The guidelines for sports club for health (SCforH) programs* (pp. 24–32).

Koski, P. (2013). Liikunta- ja urheiluseuroja koskeva tietopohja ja sen kehittäminen [Basic information about sports clubs and its development]. *In: Liikunnan kansalaistoiminnan tietopohja. Valtion liikuntaneuvoston julkaisuja 2013:6.* Valtion liikuntaneuvosto, Helsinki. (pp. 18–42).

Koski, P., & Hirvensalo, M. (2023). Lasten ja nuorten liikunnan merkitykset ja esteet. In S. Kokko & L. Martin (Eds.), *Lasten ja nuorten liikuntakäyttäytyminen Suomessa. LIITU-tutkimuksen tuloksia 2022. [The physical activity behaviours of children and adolescents in Finland; Results of the F-SPA study 2022]* (pp. 48–57). Valtion liikuntaneuvosto, State Sport Council Publications 2023:1. https://www.liikuntaneuvosto.fi/lausunnot-ja-julkaisut/liitu-2022/

Koski, P., Itkonen, H., Lehtonen, K., & Vehmas, H. (2015). Sports clubs in Finland. In C. Breuer, R. Hoekman, S. Nagel & H. van der Werff (Eds.) *2015. Sport clubs in Europe: A cross-national comparative perspective* (pp. 147–160). Springer International Publishing.

Koski, P., & Mäenpää, P. (2018). *Suomalaiset liikunta- ja urheiluseurat muutoksessa 1986-2016 Transition of Finnish sports clubs in 1986−2016*. (pp. 29–65). Opetus- ja kulttuuriministeriö Ministry of Education and Culture, Finland. http://urn.fi/URN:ISBN:978-952-263-575-4

Kwon, S., Janz, K. F., Letuchy, E. M., Burns, T. L., & Levy, S. M. (2015). Developmental trajectories of physical activity, sports, and television viewing during childhood to young adulthood: Iowa Bone Development study. *JAMA Pediatrics*, *169*(7), 666. https://doi.org/10.1001/jamapediatrics.2015.0327

Kärkkäinen, P. (1986). Suomalaisen liikuntakulttuurin kehityslinjoja. In P. Vuolle, R. Telama & L. Laakso (Eds.), *Näin suomalaiset liikkuvat* (pp. 27–41). Liikunnan ja kansanterveyden julkaisuja 50.

Lane, A., Murphy, N., Donohoe, A., & Regan, C. (2017). Health promotion orientation of GAA sports clubs in Ireland. *Sport in Society*, *20*(2), 235–243. https://doi.org/10.1080/17430437.2016.1173920

Lane, A., Murphy, N., Donohoe, A., & Regan, C. (2020). A healthy sports club initiative in action in Ireland. *Health Education Journal*, *79*(6), 645–657. https://doi.org/10.1177/0017896920903755

Larson, H. K., McHugh, T.-L. F., Young, B. W., & Rodgers, W. M. (2019). Pathways from youth to masters swimming: Exploring long-term influences of youth swimming experiences. *Psychology of Sport and Exercise*, *41*, 12–20. https://doi.org/10.1016/j.psychsport.2018.11.007

Larson, H. K., Young, B. W., McHugh, T.-L. F., & Rodgers, W. M. (2019). Markers of early specialization and their relationships with burnout and dropout in swimming. *Journal of Sport and Exercise Psychology*, *41*(1), 46–54. https://doi.org/10.1123/jsep.2018-0305

Larson, H., Young, B., McHugh, T.-L., & Rodgers, W. (2020). The relative importance of training volume and coach autonomy support for preventing youth swimming attrition. *Current Issues in Sport Science (CISS)*, *5*. https://doi.org/10.36950/2020ciss007

Lehtonen, K., Lämsä, J., Pesonen, P. & Hakonen, H. (2018). *Kilpailuluvasta toimijarekisteriksi: Lajiliittojen lisenssiselvitys 2017* (pp. 13–17). LIKES&KIHU. https://kihuenergia.kihu.fi/tuotostiedostot/julkinen/2017_lms_kilpailuluvasta_sel99_93448.pdf

Liikuntalaki 390/2015 [Sport Act]. https://finlex.fi/fi/laki/ajantasa/2015/20150390

Lim, S. Y., Warner, S., Dixon, M., Berg, B., Kim, C., & Newhouse-Bailey, M. (2011). Sport Participation Across National Contexts: A Multilevel investigation of individual and systemic influences on adult sport

participation. *European Sport Management Quarterly*, *11*(3), 197–224. https://doi.org/10.1080/16184742.2011.579993

Lounassalo, I., Salin, K., Kankaanpää, A., Hirvensalo, M., Palomäki, S., Tolvanen, A., Yang, X., & Tammelin, T. H. (2019). Distinct trajectories of physical activity and related factors during the life course in the general population: A systematic review. *BMC Public Health*, *19*(1), 271. https://doi.org/10.1186/s12889-019-6513-y

Lämsä, J. (2009). Lasten ja nuorten urheilu yhteiskunnassa. In H. Hakkarainen, T. Jaakkola, S. Kalaja, J. Lämsä, A. Nikander & J. Riski (Eds.) *Lasten ja nuorten urheiluvalmennuksen perusteet* (Vol. 1, pp. 15–42). VK-Kustannus Oy.

Manz, K., Krug, S., Schienkiewitz, A., & Finger, J. D. (2016). Determinants of organised sports participation patterns during the transition from childhood to adolescence in Germany: Results of a nationwide cohort study. *BMC Public Health*, *16*(1), 939. https://doi.org/10.1186/s12889-016-3615-7

Mathisen, F. K. S., Kokko, S., Tynjälä, J., Torsheim, T., & Wold, B. (2019). Leisure-time physical activity and participation in organized sports: Changes from 1985 to 2014 in Finland and Norway. *Scandinavian Journal of Medicine & Science in Sports*, *29*(8), 1232–1242. https://doi.org/10.1111/sms.13431

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, *15*(4), 351–377.

McNeill, J., Howard, S. J., Vella, S. A., & Cliff, D. P. (2020). Longitudinal associations of physical activity and modified organized sport participation with executive function and psychosocial health in preschoolers. *Journal of Sports Sciences*, *38*(24), 2858–2865. https://doi.org/10.1080/02640414.2020.1803037

Meganck, J., Seghers, J., & Scheerder, J. (2016). Exploring strategies to improve the health promotion orientation of Flemish sports clubs. *Health Promotion International*, daw004. https://doi.org/10.1093/heapro/daw004

Mitchell, B. A. (2003). Life course theory. In J. Ponzetti (Ed.), *The international encyclopedia of marriage and family relationships* (pp. 1051–1055). New York: Macmillan Reference.

Mononen, K., Blomqvist, M., Koski, P., & Kokko, S. (2021). Urheilu ja seuraharrastaminen. In S. Kokko, R. Hämylä & L. Martin (Eds.), *Nuorten Liikuntakäyttäytyminen Suomessa; LIITU-tutkimuksen tuloksia 2020 [The physical activity behaviours of adolescents in Finland; Results of the F-SPA study 2020]* (pp. 36–45). Valtion liikuntaneuvosto, State Sport Council Publications 2021:1.https://www.liikuntaneuvosto.fi/lausunnot-ja-julkaisut/liitu2020/

Mossman, G. J., Robertson, C., Williamson, B., & Cronin, L. (2021). Coaches, parents, or peers: Who has the greatest influence on sports participants' life skills development? *Journal of Sports Sciences*, *39*(21), 2475–2484. https://doi.org/10.1080/02640414.2021.1939980

Moulds, K., Abbott, S., Pion, J., Brophy-Williams, C., Heathcote, M., & Cobley, S. (2020). Sink or Swim? A survival analysis of sport dropout in Australian youth swimmers. *Scandinavian Journal of Medicine & Science in Sports*, *30*(11), 2222–2233. https://doi.org/10.1111/sms.13771

Mäkelä, K., Kokko, S., Kannas, L., Villberg, J., Vasankari, T., Heinonen, J. O., Savonen, K., Alanko, L., Korpelainen, R., Selänne, H., & Parkkari, J. (2016). Physical activity, screen time and sleep among youth participating and non-participating in organized sports: The Finnish health promoting sports club (FHPSC) study. *Advances in Physical Education*, *6*(4), 378–388. https://doi.org/10.4236/ape.2016.64038

Ng, K., Mäkelä, K., Parkkari, J., Kannas, L., Vasankari, T., Heinonen, O., Savonen, K., Alanko, L., Korpelainen, R., Selänne, H., Villberg, J., & Kokko, S. (2017). Coaches' health promotion activity and substance use in youth sports. *Societies*, *7*(2), 4. https://doi.org/10.3390/soc7020004

Nicholls, J. G., Cheung, P. C., Lauer, J., & Patashnick, M. (1989). Individual differences in academic motivation: Perceived ability, goals, beliefs, and values. *Learning and Individual Differences*, *1*(1), 63–84.

Oja, P., Memon, A. R., Titze, S., Jurakic, D., Chen, S.-T., Shrestha, N., Em, S., Matolic, T., Vasankari, T., Heinonen, A., Grgic, J., Koski, P., Kokko, S., Kelly, P., Foster, C., Podnar, H., & Pedisic, Z. (2024). Health benefits of different sports: A aystematic review and meta-analysis of longitudinal and intervention studies including 2.6 million adult participants. *Sports Medicine - Open*, *10*(1), 46. https://doi.org/10.1186/s40798-024-00692-x

Oja, P., Titze, S., Kokko, S., Kujala, U. M., Heinonen, A., Kelly, P., Koski, P., & Foster, C. (2015). Health benefits of different sport disciplines for adults: Systematic review of observational and intervention studies with meta-analysis. *British Journal of Sports Medicine*, *49*(7), 434–440. https://doi.org/10.1136/bjsports-2014-093885

Owen, K. B., Foley, B. C., Smith, B. J., Manera, K. E., Corbett, L., Lim, M., Phongsavan, P., Qualter, P., Ding, D., & Clare, P. J. (2024). Sport participation for academic success: Evidence from the longitudinal study of Australian children. *Journal of Physical Activity and Health*, *21*(3), 238–246. https://doi.org/10.1123/jpah.2023-0506

Paakkari, L., Kokko, S., Villberg, J., Paakkari, O., & Tynjälä, J. (2017). Health literacy and participation in sports club activities among adolescents. *Scandinavian Journal of Public Health*, *45*(8), 854–860. https://doi.org/10.1177/1403494817714189

Palomäki, S., Hirvensalo, M., Smith, K., Raitakari, O., Männistö, S., Hutri-Kähönen, N., & Tammelin, T. (2018). Does organized sport participation during youth predict healthy habits in adulthood? A 28-year longitudinal study. *Scandinavian Journal of Medicine & Science in Sports*, *28*(8), 1908–1915. https://doi.org/10.1111/sms.13205

Parkkari, J., & Leppänen, M. (2021). Liikuntavammat urheiluseuroissa, vapaa-ajalla ja opiskeluliikunnassa. In S. Kokko, R. Hämylä & L. Martin (Eds.), *Nuorten liikuntakäyttäytyminen Suomessa LIITU-tutkimuksen tuloksia 2020. [The physical activity behaviours of adolescents in Finland; Results of the F-SPA*

study 2020] (pp. 90–94). Valtion liikuntaneuvosto State Sport Council Publications 2021:1. https://www.liikuntaneuvosto.fi/lausunnot-ja-julkaisut/liitu2020/

Persson, M., Espedalen, L. E., Stefansen, K., & Strandbu, Å. (2020). Opting out of youth sports: How can we understand the social processes involved? *Sport, Education and Society*, *25*(7), 842–854. https://doi.org/10.1080/13573322.2019.1663811

Pestoff, V. A. (1992). Third sector and co-operative services—An alternative to privatization. *Journal of Consumer Policy*, *15*(1), 21–45. https://doi.org/10.1007/BF01016352

Pfeifer, C., & Cornelißen, T. (2010). The impact of participation in sports on educational attainment—New evidence from Germany. *Economics of Education Review*, *29*(1), 94–103. https://doi.org/10.1016/j.econedurev.2009.04.002

Pilgaard, M. (2019). Sports participation in Denmark. In K. Green, T. Sigurjónson & E. Å. Skille (Eds.) *Sport in Scandinavia and the Nordic countries* (pp. 16–39). Routledge.

Rhodes, R. E., Janssen, I., Bredin, S. S. D., Warburton, D. E. R., & Bauman, A. (2017). Physical activity: Health impact, prevalence, correlates and interventions. *Psychology & Health*, *32*(8), 942–975. https://doi.org/10.1080/08870446.2017.1325486

Ristolainen, L., Toivo, K., Parkkari, J., Kokko, S., Alanko, L., Heinonen, O. J., Korpelainen, R., Savonen, K., Selänne, H., Vasankari, T., Kannas, L., Villberg, J., & Kujala, U. M. (2019). Acute and overuse injuries among sports club members and non-members: The Finnish health promoting sports club (FHPSC) study. *BMC Musculoskeletal Disorders*, *20*(1), 32. https://doi.org/10.1186/s12891-019-2417-3

Rodriguez, D. (2004). Team sport participation and smoking: Analysis with general growth mixture modeling. *Journal of Pediatric Psychology*, *29*(4), 299–308. https://doi.org/10.1093/jpepsy/jsh031

Rottensteiner, C., Laakso, L., Pihlaja, T., & Konttinen, N. (2013). Personal reasons for withdrawal from team sports and the influence of significant others among young athletes. *International Journal of Sports Science & Coaching*, *8*(1), 19–32.

Rottensteiner, C., Tolvanen, A., Laakso, L., & Konttinen, N. (2015). Youth athletes' motivation, perceived competence, and persistence in organized team sports. *Journal of Sport Behavior*, *38*(4), 432–449.

Rovira, P., & Rehm, J. (2021). Estimation of cancers caused by light to moderate alcohol consumption in the European Union. *European Journal of Public Health*, *31*(3), 591–596. https://doi.org/10.1093/eurpub/ckaa236

Rowland, B., Allen, F., & Toumbourou, J. W. (2012a). Association of risky alcohol consumption and accreditation in the 'Good Sports' alcohol management programme. *Journal of Epidemiology and Community Health*, *66*(8), 684–690. https://doi.org/10.1136/jech-2011-200334

Rowland, B., Allen, F., & Toumbourou, J. W. (2012b). Impact of alcohol harm reduction strategies in community sports clubs: Pilot evaluation of the Good Sports program. *Health Psychology*, *31*(3), 323–333. https://doi.org/10.1037/a0026397

Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health*, *27*(1), 297–322. https://doi.org/10.1146/annurev.publhealth.27.021405.102100

Sallis, J. F., Owen, N., & Fisher, E. B. (2008). Ecological models of health behavior. In K. Glanz, B. K. Rimer & K. Vishwanath. (Eds.), *Health behavior and health education: Theory, research, and practice* (4th ed., pp. 466–485). Wiley.

Sallis, J. F., Taylor, W. C., Dowda, M., Freedson, P. S., & Pate, R. R. (2002). Correlates of vigorous physical activity for children in grades 1 through 12: Comparing parent-reported and objectively measured physical activity. *Pediatric Exercise Science*, *14*(1), 30–44. https://doi.org/10.1123/pes.14.1.30

Scarapicchia, T. M. F., Sabiston, C. M., Pila, E., Arbour-Nicitopoulos, K. P., & Faulkner, G. (2017). A longitudinal investigation of a multidimensional model of social support and physical activity over the first year of university. *Psychology of Sport and Exercise*, *31*, 11–20. https://doi.org/10.1016/j.psychsport.2017.03.011

Seippel, O., & Skille, E. Å. (2019). Sports participation in Norway. In K. Green, T. Sigurjónsson & E. Å. Skille (Eds.), *Sport in Scandinavia and the Nordic Countries* (pp. 108–135). Routledge.

Statistics Finland. (2018). *Background Information On Unemployed Persons 2016, Appendix table 1. Population aged 18 to 24 by main type of activity and by region in 2016*. Statistics Finland. Retrieved April 6, 2024, from https://www.stat.fi/til/tyokay/2016/03/tyokay_2016_03_2018-02-16_tau_001_fi.html

Statistics Finland. (2019). *Population structure*. Statistics Finland. Retrieved May 24, 2024, from https://www.stat.fi/til/vaerak/2018/vaerak_2018_2019-03-29_tie_001_fi.html

Statistics Finland. (2022). *Entrance to education. Immediate applying to further studies by those having ended 9th grade of comprehensive school in 2000 – 2018.* Statistics Finland. Retrieved December 11, 2023, from https://pxdata.stat.fi/PxWeb/pxweb/en/StatFin/StatFin__khak/statfin_khak_pxt_11g4.px

Statistics Finland. (2023). *Perheet 2022*. Statistics Finland. Retrieved April 4, 2024, from https://stat.fi/julkaisu/cl8mrv9jbzpyy0cw1h1okny7v

Stokols, D. (1992). Establishing and maintaining healthy environments: Toward a Social ecology of health promotion. *American Psychologist*, *47*(1), 6–22.

Stokols, D., Grzywacz, J. G., McMahan, S., & Phillips, K. (2003). Increasing the health promotive capacity of human environments. *American Journal of Health Promotion*, *18*(1), 4–13. https://doi.org/10.4278/0890-1171-18.1.4

Suuri kansallinen liikuntatutkimus. (2002). *Vapaaehtoistyö*. Helsinki: SLU.

Telama, R., Yang, X., Leskinen, E., Kankaanpää, A., Hirvensalo, M., Tammelin, T., Viikari, J. S. A., & Raitakari, O. T. (2014). Tracking of Physical Activity from Early Childhood through Youth into Adulthood. *Medicine & Science in Sports & Exercise*, *46*(5), 955–962. https://doi.org/10.1249/MSS.0000000000000181

Telford, R. M., Telford, R. D., Cochrane, T., Cunningham, R. B., Olive, L. S., & Davey, R. (2016). The influence of sport club participation on physical activity, fitness and body fat during childhood and adolescence: The LOOK longitudinal study. *Journal of Science and Medicine in Sport*, *19*(5), 400–406. https://doi.org/10.1016/j.jsams.2015.04.008

Toivo, K. (2021). *Periodic Health Examinations in Young Athletes: The Finnish Health Promoting Sports Club (FHPSC) Study*. Tampereen yliopisto. [Doctoral dissertation, Tampere University]. https://urn.fi/URN:ISBN:978-952-03-2115-4

Toivo, K., Vähä-Ypyä, H., Kannus, P., Tokola, K., Alanko, L., Heinonen, O. J., Korpelainen, R., Parkkari, J., Savonen, K., Selänne, H., Kokko, S., Kujala, U. M., Villberg, J., & Vasankari, T. (2023). Physical activity measured by accelerometry among adolescents participating in sports clubs and non-participating peers. *European Journal of Sport Science*, *23*(7), 1426–1434. https://doi.org/10.1080/17461391.2022.2103740

Torstveit, M. K., Johansen, B. T., Haugland, S. H., & Stea, T. H. (2018). Participation in organized sports is associated with decreased likelihood of unhealthy lifestyle habits in adolescents. *Scandinavian Journal of Medicine & Science in Sports*, *28*(11), 2384–2396. https://doi.org/10.1111/sms.13250

Tupakkalaki 549/2016 [Tobacco Act]. https://finlex.fi/fi/laki/ajantasa/2016/20160549#L7

Unruh, D. (1979). Characteristics and types of participation in social worlds. *Symbolic Interaction*, *2*, 115–129.

Valtion ravitsemusneuvottelukunta. (2014). *Terveyttä ruoasta: Suomalaiset ravitsemussuositukset 2014*. https://www.ruokavirasto.fi/globalassets/teemat/terveytta-edistava-ruokavalio/kuluttaja-ja-ammattilaismateriaali/julkaisut/ravitsemus-suositukset_2014_fi_web_versio_5.pdf

Van Houten, J., Kraaykamp, G., & Pelzer, B. (2019). The transition to adulthood: A game changer!? A longitudinal analysis of the impact of five major life events on sport participation. *European Journal for Sport and Society*, *16*(1), 44–63. https://doi.org/10.1080/16138171.2019.1603832

Van Houten, J. M., Kraaykamp, G., & Breedveld, K. (2017). When do young adults stop practising a sport? An event history analysis on the impact of four major life events. *International Review for the Sociology of Sport*, *52*(7), 858–874. https://doi.org/10.1177/1012690215619204

Van Hoye, A., Geidne, S., Seghers, J., Aoife, L., Donaldson, A., Philpott, M., & Kokko, S. (2022). Health promotion in sports settings. In S. Kokko & M. Baybutt (Eds.), *Handbook of settings-based health promotion* (pp. 189–200). Springer Nature Switzerland AG.

Van Hoye, A., Heuzé, J.-P., Meganck, J., Seghers, J., & Sarrazin, P. (2018). Coaches' and players' perceptions of health promotion activities in sport clubs. *Health Education Journal*, *77*(2), 169–178. https://doi.org/10.1177/0017896917739445

Van Hoye, A., Heuzé, J.-P., Van den Broucke, S., & Sarrazin, P. (2016). Are coaches' health promotion activities beneficial for sport participants? A multilevel analysis. *Journal of Science and Medicine in Sport*, *19*(12), 1028–1032. https://doi.org/10.1016/j.jsams.2016.03.002

Van Hoye, A., Johnson, S., Geidne, S., Donaldson, A., Rostan, F., Lemonnier, F., & Vuillemin, A. (2021). The health promoting sports club model: An intervention planning framework. *Health Promotion International*, *36*(3), 811–823. https://doi.org/10.1093/heapro/daaa093

Van Hoye, A., Johnson, S., Geidne, S., & Vuillemin, A. (2020). Relationship between coaches' health promotion activities, sports experience and health among adults. *Health Education Journal*, *79*(7), 763–774. https://doi.org/10.1177/0017896920919777

Van Hoye, A., Johnson, S., Lemonnier, F., Crochet, L., Maso, F., Lecoarer, T., Rostan, F., Tezier, B., & Vuillemin, A. (2022). Manager, coach and sports club participant perceptions of health promotion. *Health Education Journal*, *81*(6), 745–758. https://doi.org/10.1177/00178969221118669

Van Hoye, A., Sarrazin, P., Heuzé, J.-P., & Kokko, S. (2015). Coaches' perceptions of French sports clubs: Health-promotion activities, aims and coach motivation. *Health Education Journal*, *74*(2), 231–243. https://doi.org/10.1177/0017896914531510

Vanttaja, M., Tähtinen, J., Zacheus, T., & Koski, P. (2017). *Liikkumattomuuden jäljillä. Pitkittäistutkimus vähän liikuntaa harrastavien nuorten liikuntasuhteista ja liikunta-aktiivisuuden muutoksista*. Nuorisotutkimusverkosto, Nuorisotutkimusseura, Julkaisuja 194.

Veliz, P., Schulenberg, J., Patrick, M., Kloska, D., McCabe, S. E., & Zarrett, N. (2017). Competitive sports participation in high school and subsequent substance use in young adulthood: Assessing differences based on level of contact. *International Review for the Sociology of Sport*, *52*(2), 240–259. https://doi.org/10.1177/1012690215586998

Verplanken, B., & Melkevik, O. (2008). Predicting habit: The case of physical exercise. *Psychology of Sport and Exercise*, *9*(1), 15–26. https://doi.org/10.1016/j.psychsport.2007.01.002

Wattie, N., Tietjens, M., Cobley, S., Schorer, J., Baker, J., & Kurz, D. (2014). Relative age-related participation and dropout trends in German youth sports clubs. *European Journal of Sport Science*, *14*(S1). https://doi.org/10.1080/17461391.2012.681806

Wenzel, E. (1997). A comment on settings in health promotion. *Internet Journal of Health Promotion*. http://ldb.org/setting.htm

Wolman, L., & Fraser-Thomas, J. (2017). "I Am a lifer!" facilitating the transition into non-elite adult sport: A case study of rugby in Canada's largest city. *Psychology of Sport and Exercise*, *30*, 215–225. https://doi.org/10.1016/j.psychsport.2017.03.008

World Health Organization. (1986). *Ottawa Charter for Health Promotion*. World Health Organization. https://www.who.int/publications/i/item/WH-1987

World Health Organization. (2004). *Global strategy on diet, physical activity and health*. World Health Organization. https://iris.who.int/bitstream/handle/10665/43035/9241592222_eng.pdf?sequence=1

World Health Organization. (2010a). *Global recommendations on physical activity for health*. World Health Organization. https://iris.who.int/bitstream/handle/10665/44399/9789241599979_eng.pdf?sequence=1

World Health Organization. (2010b). *Tobacco*. World Health Organization. https://www.who.int/europe/news-room/fact-sheets/item/tobacco

World Health Organization. (2018). Anna Muller (Ed.) *The life-course approach: From theory to practice. Case stories from two small countries in Europe*. World Health Organization. https://iris.who.int/bitstream/handle/10665/342210/9789289053266-eng.pdf?sequence=1

World Health Organization. (2020). *Healthy diet*. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/healthy-diet

World Health Organization. (2021). *Healt Promotion Glossary of Terms 2021*. World Health Organization. https://www.who.int/publications/i/item/9789240038349

World Health Organization. (2024). *Adolescent health*. World Health Organization. https://www.who.int/health-topics/adolescent-health

ORIGINAL PUBLICATIONS

I

EDUCATIONAL AND FAMILY-RELATED DETERMINANTS OF ORGANIZED SPORTS PARTICIPATION PATTERNS FROM ADOLESCENCE TO EMERGING ADULTHOOD: A FOUR-YEAR FOLLOW-UP STUDY

by

Rinta-Antila, K., Koski, P., Heinonen, O J., Korpelainen, R., Parkkari, J., Savonen, K., Toivo, K., Uusitalo, A., Valtonen, M., Vasankari, T., Villberg, J. & Kokko, S. (2022)

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Educational and family-related determinants of organized sports participation patterns from adolescence to emerging adulthood: A four-year follow-up study

Katja Rinta-Antila[a], Pasi Koski[b], Olli J Heinonen[c], Raija Korpelainen[d,e,f], Jari Parkkari[a,g], Kai Savonen[h,i], Kerttu Toivo[g], Arja Uusitalo[j,k], Maarit Valtonen[l], Tommi Vasankari[m,n], Jari Villberg[a] and Sami Kokko[a]

[a]Faculty of Sport and Health Sciences, Research Centre for Health Promotion, University of Jyväskylä, Jyväskylä, Finland; [b]Department of Teacher Education, University of Turku, Rauma, Finland; [c]Paavo Nurmi Centre & Unit for Health and Physical Activity, University of Turku, Turku, Finland; [d]Medical Research Center (MRC), University of Oulu and University Hospital of Oulu, Oulu, Finland; [e]Oulu Deaconess Institute Foundation sr, Department of Sports and Exercise Medicine, Oulu, Finland; [f]Center for Life Course Health Research, University of Oulu, Oulu, Finland; [g]Tampere Research Center of Sports Medicine, Tampere, Finland; [h]Department of Clinical Physiology and Nuclear Medicine, Science Service Center, Kuopio University Hospital, Kuopio, Finland; [i]Kuopio Research Institute of Exercise Medicine, Kuopio, Finland; [j]Clinic for Sports and Exercise Medicine, Foundation for Sports and Exercise Medicine, Helsinki, Finland; [k]Department of Sports and Exercise Medicine, Clinicum, University of Helsinki, Helsinki, Finland; [l]Research Institute for Olympic Sports, Jyväskylä, Finland; [m]UKK Institute of Health Promotion Research, Tampere, Finland; [n]Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland

ABSTRACT

This study aimed to identify organized sports participation patterns and their prevalence from adolescence to emerging adulthood, and the educational and family-related determinants of the patterns. Adolescents in the Finnish Health Promoting Sports Club (FHPSC) study answered a health behaviour questionnaire and reported on sports club participation at ages 15 and 19 ($N = 609$). In emerging adulthood, dropouts (total 41.05%; females 43.72%; males 36.56%), maintainers (30.87; 26.44; 38.33), nonparticipants (27.59; 29.32; 24.67), and joiners (0.49; 0.52; 0.44) ($p = .024$) were identified. A mixed multinomial logistic regression analysis showed, that male gender, as compared to female gender, increased the odds of being a maintainer rather than a nonparticipant or dropout. Among females, high achievement at school and aspiration towards upper secondary school at age 15 increased the odds of being a maintainer at age 19 rather than a nonparticipant. High achievement at school and experiencing a (strong) decrease in parental support for physical activity/sport increased the odds of being a dropout rather than a nonparticipant. Having no experience of a strong decrease in parental support increased the odds of being a maintainer rather than a dropout. Among males, aspiration towards upper secondary school increased the odds of being a maintainer or dropout rather than a nonparticipant. The most common reason for dropping out was study, which was also the most prevalent life status at age 19. The findings highlight a need for more flexible possibilities to combine organized sports participation and school studies, and the importance of parental support for physical activity/sport.

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CONTACT Katja Rinta-Antila katja.t.rinta-antila@jyu.fi Faculty of Sport and Health Sciences, University of Jyväskylä, PO Box 35, Jyväskylä FI-40014, Finland

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Introduction

Organized sports (OS) constitutes a popular leisure activity among young people (Kokko et al. 2019; Mathisen et al. 2019). OS participation among adolescents supports physical activity (PA) in adolescence (Basterfield et al. 2015; Telford et al. 2016), emerging adulthood (Aira et al. 2021; Arnett 2000), and adulthood (Batista et al. 2019). Moreover, it has many physical (Telford et al. 2016), psychological, and social (Eime et al. 2013) benefits despite some disadvantages, including possible injuries (Mattila et al. 2009) and binge drinking (Wichstrøm and Wichstrøm 2008). OS can also be viewed as an informal education setting where, in addition to physical skills, transferable life skills are developed (Mossman et al. 2021). However, after an increase in OS participation during childhood, the participation rate tends not to change, or else to decrease during adolescence, in line with the overall PA trend (Kemp et al. 2019). In Finland too, OS participation reaches its peak among 11-year-olds (71%), but decreases into adolescence (44% at age 15) (Blomqvist et al. 2019) and into emerging adulthood (30% at age 18–20; Mononen et al. 2021).

Beyond the overall change in OS participation, many longitudinal studies have identified a range of OS participation patterns (e.g. Desroches, Poulin, and Denault 2019; Howie et al. 2016; Kwon et al. 2015; Manz et al. 2016). For example, one study extending to emerging adulthood has shown patterns of consistent sports participation (46.2%), dropout from sports participation (40.2%), and no sport participation (13.6%) (Kwon et al. 2015). However, longitudinal studies on the transition to adulthood are lacking (Howie et al. 2016; Lounassalo et al. 2019).

Systematic reviews – mainly based on cross-sectional, retrospective studies – have shown that various intrapersonal, interpersonal, and structural factors may affect adolescents' OS participation and dropout status (Balish et al. 2014; Crane and Temple 2015; Hopkins et al. 2022). The main factors in dropout include competing priorities (Crane and Temple 2015) or (partially school-related) time-use factors (Deelen, Ettema, and Kamphuis 2018; Hardie Murphy, Rowe, and Woods 2017; Persson et al. 2020). Educational factors such as high achievement at school (Jakobsson et al. 2012; Paakkari et al. 2017) have also shown an association with OS participation. Wattie et al. (2014) found an association between OS participation and the choice of academic (post-compulsory) education as opposed to vocational education, but a study by Jakobsson et al. (2012) found no significant association. Family-related encouragement towards sporting activities (Desroches, Poulin, and Denault 2019; Jakobsson et al. 2012) seem to predict adolescents' OS participation. However, the findings concerning family affluence (Jakobsson et al. 2012; Paakkari et al. 2017) are inconsistent. Some findings have suggested that more males than females participate in OS (Desroches, Poulin, and Denault 2019; Howie et al. 2016; Manz et al. 2016), but Kwon et al. (2015) found that both participate equally.

Educational factors, family affluence and parental support for PA/sport have not been explored with regard to specific OS participation patterns; nor have they been followed to emerging adulthood. With the overall aim of promoting OS participation, this study aimed to identify OS participation patterns from age 15 to 19, the prevalence of each pattern, and the educational and family-related factors associated with the different patterns.

Materials and methods

Data

The study was based on longitudinal online health behaviour questionnaire data from the Finnish Health Promoting Sports Club (FHPSC) Consortium study (Kokko et al. 2015). At baseline (years 2013–14), the study participants (aged 15) were recruited from civic sports clubs (SCs) and from schools. The SC participants were approached through SCs encompassing the ten most popular sport disciplines in the six districts of the Centres of Excellence in Sports and Exercise Medicine in Finland. The school participants were approached through schools in the same districts, and they included both SC participants and nonparticipants. A detailed description is provided in the protocol article (Kokko et al. 2015). Follow-up data collection was carried out when the study participants were at age 19 (years 2017–18) the approach being made via mail. Overall, 2149 adolescents took part in the baseline study. Of these, 651 (30%) participated in the follow-up study, and out of these, 609 (29%) reported OS participation at both time points.

Informed written consent was collected from the participants, and from their guardians when the participants were aged under 18. Ethical approval was granted by the Ethics Committee of the Healthcare District of Central Finland for both time points (record number 23 U/2012&2016).The study was carried out in accordance with the Declaration of Helsinki.

Measures and variables

The questions were compiled from questionnaires validated in other studies (Currie et al. 2008; Kannas 2004; Kokko et al. 2015). We explored educational and family-related factors that have shown an association with adolescents' OS participation, and were available from the data. The residential area correlated strongly with plans after comprehensive school, and was therefore excluded from the study.

At baseline, the variable *organized sports participation* was formed. The adolescents approached through SCs were added to the category of participants. Adolescents approached through schools reported their membership in a sports club within three categories (*no; yes, and I participate in training; yes, but I don't participate in training*). The respondents were categorized as *participants* and *nonparticipants* according to the participation in training. In the follow-up, *all* the study participants reported their membership of a sports club as follows: (i) *no*; (ii) *yes, and I participate in training*; (iii) *yes, but I don't participate in training*; (iv) *yes, I act as a coach or other club official*; and (v) *yes, and I participate in training and act as a coach or other club official*. Follow-up respondents were categorized as *participants* and *nonparticipants*, as at baseline. Thereafter, the variable *longitudinal OS participation patterns* was constructed by combining the information from the two time points into four categories: *maintainers* (i.e. those who maintained participation), *dropouts*, *nonparticipants*, and *joiners*.

Gender (baseline data) was asked (*female* or *male)*. The participants reported their *school achievement* at baseline (the response scale being from <6.5 to 10.0, with the grading scale in Finnish comprehensive school ranging from 4=fail to 10=excellent). Responses were re-categorized as *low or medium* (<6.5–8.9) and *high* (9.0–10.0).

Plans after comprehensive school (i.e. compulsory education) were assessed (baseline data) (upper secondary school; vocational education; apprenticeship training; a double degree (upper secondary school and vocational education); go to work; be unemployed; I don't know). The respondents were re-categorized into *upper secondary school* and *other than upper secondary school*. In 2013, 98.5% of the Finnish ninth-graders at the end of the compulsory education applied for upper secondary education, and of these 55% applied for upper secondary school and 45% for vocational school (StatFin. 2022).

Family affluence (baseline) was assessed using the family affluence scale (FAS II). Sum scores (0–9) were obtained for *number of computers (*0, 1, 2, >2); *cars* (0, 1, ≥2); *holiday trips during the last year* (0, 1, 2,>2); *participants having their own bedroom* (no, yes). Scores were re-categorized into *low* (0–5), *medium* (6–7), and *high* (8–9) *family affluence*.

Parental support for PA and sport (baseline and follow-up data) was assessed by the following questions: *During a typical week: how often does your mother (stepmother)/ father (stepfather)* (asked separately) (i) *encourage you to do PA or sport?* (ii) *take you to the PA/sports venue or your sports activities?* (iii) *do PA or sport with you?* A 6-point response scale was used: *I don't have/meet her/him*; *never*; *rarely*; *sometimes*; *often*; *very often*. At both time points, sum scores were calculated (0–30). At baseline, scores were re-categorized into *low* (0–14), *medium* (15–19), and *high* (20–30) *parental support for PA/ sport*. Changes were calculated by subtracting the sum score at baseline from the sum score at follow-up, and re-categorized into *weak decrease/no change/increase* (from 7 to 4), *decrease* (from 3 to −1), and *strong decrease* (from −2 to −21) in parental support for PA/sport.

At follow-up, OS dropouts were asked to report the *age* they had *dropped out*. In addition, they were asked to report to what degree various *reasons for dropping* out had affected their decision to quit the SC participation. The items (23) included e.g. 'a desire to concentrate on studies' (see Supplementary file, Figure S1). A 5-point scale was used from not at all to very much. Responses were re-categorized as *no* (= not at all) and *yes* (= all the other options).

At follow-up, the participants reported their *life status* (study; work/entrepreneur; temporary lay-off/unemployed; military/civilian service; maternity/parental leave; other). If the participants reported 'study', they were asked the *educational institution* (upper secondary school; vocational school; university of applied sciences; university; job training; apprenticeship training; open university/open university of applied science; other). These options were re-categorized into *upper secondary school/university*, *vocational school/university of applied sciences*, *all other options*.

Statistical analyses

The analyses were conducted using SPSS Version 26, with the statistical significance set at $p < 0.05$. *Frequency analyses* were conducted by gender on both baseline and follow-up data regarding OS participation and nonparticipation, with analysis also of longitudinal OS participation patterns. The educational and family-related factors relating to the patterns were compared using *Chi-square tests*. *A mixed multinomial logistic regression analysis* was used to test how the statistically significant factors identified in the bivariate

analyses were associated with patterns. As there were interactions between gender and the factors, the analyses were conducted separately for females and males.

Descriptive analyses were conducted on dropout from OS. *Chi-square tests* were used to compare the life status and the current study institution in relation to OS participation patterns by gender.

Results

The patterns of dropouts (41.05%), maintainers (30.87%), nonparticipants (27.59%), and joiners (0.49%) (insufficient for further analyses) were identified ($N = 609$). The most prevalent patterns among males were maintainers (38.33%) and dropouts (36.56%) but among females the most prevalent pattern was that of dropouts (43.72%) ($p = .024$), see Table 1.

The distributions of educational and family-related factors in the OS participation patterns are shown in Table 2.

Being male as opposed to female increased the odds of being a maintainer rather than a nonparticipant (OR 2.04, CI 1.29 to 3.24, $p = .002$) or a dropout (OR 1.74, CI 1.15 to 2.62, $p = .008$) (see Supplementary file, Table S1). Among *females*, having high achievement at school (OR 1.96, CI 1.07 to 3.59, $p = .029$) and aspirations towards upper secondary school (OR 2.28, CI 1.04 to 4.97, $p = .039$) increased the odds of being a maintainer rather than a nonparticipant. Having high achievement at school (OR 2.5, CI 1.43 to 4.39, $p = .001$) and experiencing a *strong decrease* (OR 3.79, CI 1.97 to 7.30, $p < .001$) or *decrease* (OR 1.94, CI 1.07 to 3.50, $p = .029$) in parental support for PA/sport increased the odds of being a dropout rather than a nonparticipant. Not experiencing a strong decrease in parental support increased the odds of being a maintainer (OR 0.45, CI 0.24 to 0.86, $p = .016$) rather than a dropout. Among *males*, having aspirations towards upper secondary school increased the odds of being a maintainer (OR 2.13, CI 1.01 to 4.51, $p = .048$) or a dropout (OR 3.99, CI 1.79 to 8.88, $p = .001$) rather than a nonparticipant (Table 3).

The dropout proportions varied per year the mean dropout age being 17.12 years among females and 17.02 among males (Table 4). The most common reason for dropping out was 'a desire to concentrate on studies' (70.23% females, 68.12% males) (see Supplementary file, Figure S1). In every OS participation pattern, the most prevalent life status at age 19 was 'study' (females 50.00–62.38%; males 41.07–56.10%). Among females, those who studied at upper secondary school or in a university were more typically dropouts (46.62%) or maintainers (34.46%) than nonparticipants (18.92%) ($p = .002$). This was also the case among males, but lacked statistical significance (Table 4).

Discussion

The study explored OS participation patterns from adolescence to emerging adulthood, as evidence was lacking on this age cohort (Howie et al. 2016; Lounassalo et al. 2019). Moreover, it explored educational and family-related factors as these aspects have not previously been studied with regard to specific OS participation patterns and have not been followed to emerging adulthood (Desroches, Poulin, and Denault 2019; Jakobsson

Table 1. Distributions of organized sports participation at T1, T2, and of longitudinal organized sports participation patterns by gender (%).

T1	Female n=382	Male n=227	Total n=609	T2*	Female n=382	Male n=227	Total n=609	OS participation patterns*	Female n=382	Male n=227	Total n=609
								Maintainers	26.44	38.33	30.87
Participants	70.16	74.89	71.92	Participants	26.96	38.77	31.36	Joiners	0.52	0.44	0.49
								Dropouts	43.72	36.56	41.05
Nonparticipants	29.84	25.11	28.08	Nonparticipants	73.04	61.23	68.64	Nonparticipants	29.32	24.67	27.59
Total	100.00	100.00	100.00	Total	100.00	100.00	100.00	Total	100.00	100.00	100.00

T1=baseline, T2=follow-up, OS= organized sports.
*significant difference between females and males in T2 ($p = .002$) and in OS participation patterns ($p = .024$).

Table 2. Distributions of educational and family related factors in organized sports participation patterns (%).

		OS participation patterns (%) (n=601–606)			
	n	Maintainers n=186–188	Dropouts n=248–250	Nonparticipants n=167–168	*p*
School achievement (T1)					**<.001**
low or medium (<6.5–8.9)	376	29.79	36.70	33.51	
high (9.0–10.0)	230	33.04	48.70	18.26	
Plans after comprehensive school (T1)					**<.001**
other than upper secondary school	133	26.32	29.32	44.36	
upper secondary school	473	32.35	44.61	23.04	
Family affluence (T1)					.98
low	148	29.05	41.89	29.05	
medium	279	31.90	40.50	27.60	
high	179	31.28	41.90	26.82	
Parental support for PA and sport (T1)					**<.001**
low	151	17.22	27.81	54.97	
medium	212	31.60	40.57	27.83	
high	243	39.09	50.21	10.70	
Change in parental support for PA and sport (T1->T2)					**.004**
weak decrease/no change/increase	183	31.15	33.33	35.52	
decrease	222	31.98	39.64	28.38	
strong decrease	196	29.59	50.51	19.90	

T1=baseline, T2=follow-up, OS=organized sports.
(p-values from Chi-square test).

et al. 2012; Paakkari et al. 2017). The findings could help promoting OS participation, which in turn supports PA (Aira et al. 2021; Batista et al. 2019) and health (Eime et al. 2013; Telford et al. 2016).

The patterns of *dropouts*, *maintainers*, *nonparticipants* and *joiners* were identified. Compared to previous research extending to emerging adulthood (Kwon et al. 2015), the proportion of dropouts was similar, but that of maintainers smaller, and that of nonparticipants larger. Also, gender differences emerged that were not previously identified in emerging adulthood (Kwon et al. 2015), insofar as males were more likely than females to be maintainers rather than nonparticipants or dropouts. The differences in the findings may be due to differences in the organizing bodies of the sports. Previous research (Kwon et al. 2015) explored OS in schools and sports clubs and showed that females had substantial opportunities to participate in school sports teams. The present study focused on SCs organized at local level mainly by associations typical in Finland. The implication would be that SCs, together with schools, need to find more ways of promoting females participation in particular. Note that in the current study, as in previous studies, there were very few joiners (Howie et al. 2016; Jakobsson et al. 2012), reinforcing the point that individuals rarely start OS participation in later adolescence.

This study is in line with previous findings showing that *high achievement at school* is related to OS participation (Jakobsson et al. 2012; Paakkari et al. 2017), but also adds information, since the relation was found among female maintainers and dropouts as compared to nonparticipants. This study further added information compared to previous research (Jakobsson et al. 2012) indicating that *upper secondary school aspiration* is related to being an OS maintainer and also a male dropout, as opposed to being

Table 3. Mixed multinomial logistic regression analysis of the educational and family related factors associated with the organized sports participation patterns by gender.

	Females	Nonparticipants (n=111) vs.					*Males*	Nonparticipants (n=56) vs.				
Educational and family-related factors	n	Maintainers (n=101) OR (95% CI)	*p*	Dropouts (n=165) OR (95% CI)	*p*	Dropouts vs. Maintainers OR (95% CI)	*p*	n	Maintainers (n=85) OR (95% CI)	p	Dropouts (n=83) OR (95% CI)	*p*	Dropouts vs. Maintainers OR (95% CI)	*p*
School achievement (T1)														
Low or medium	200	1		1		1		172	1		1		1	
High	177	**1.96 (1.07–3.59)**	**.029**	**2.50 (1.43–4.39)**	**.001**	0.78 (0.46–1.34)	.37	52	1.85 (0.73–4.70)	.20	1.29 (0.50–3.34)	.60	1.44 (0.70–2.95)	.32
Plans after comprehensive school (T1)														
Other than upper secondary school	67	1		1		1		65	1		1		1	
Upper secondary school	310	**2.28 (1.04–4.97)**	**.039**	1.77 (0.90–3.47)	.10	1.29 (0.58–2.88)	.54	159	**2.13 (1.01–4.51)**	**.048**	**3.99 (1.79–8.88)**	**.001**	0.53 (0.25–1.15)	.11
Change in parental support for PA and sport (T1->T2)														
Weak decrease/no change/increase	130	1		1		1		53	1		1		1	
Decrease	138	1.59 (0.85–2.97)	.15	**1.94 (1.07–3.50)**	**.029**	0.82 (0.45–1.49)	.51	84	0.86 (0.36–2.08)	.74	1.02 (0.41–2.55)	.96	0.84 (0.37–1.91)	.68
Strong decrease	109	1.71 (0.82–3.57)	.15	**3.79 (1.97–7.30)**	**<.001**	**0.45 (0.24–0.86)**	**.016**	87	1.44 (0.58–3.58)	.44	1.80 (0.71–4.58)	.22	0.80 (0.36–1.76)	.58
R^2 = .10 (Cox & Snell), .12 (Nagelkerke). Model $\chi^2(8) = 41.28$								R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(8) = 19.12$						

T1=baseline, T2=follow-up, PA=physical activity, OR=odds ratio, CI=confidence interval.

Table 4. Dropout, life status, and educational institution.

	n	Female			*p*	n	Male			*p*
Dropout										
mean age (in years)		17.12 (SD 1.27)					17.02 (SD 1.23)			
by age year (%)										
age 15	13	11.50				8	12.50			
age 16	26	23.01				15	23.44			
age 17	29	25.66				17	26.56			
age 18	25	22.12				16	25.00			
age 19	20	17.70				8	12.50			
Total	113	100.00				64	100.00			
Life status (%)		Maintainers n = 101	Dropouts n=167	Nonparticipants n = 112	0.47		Maintainers n = 87	Dropouts n = 82	Nonparticipants n = 56	0.69
Study	219	62.38	59.88	50.00		114	51.72	56.10	41.07	
Work/Entrepreneur	100	25.74	22.75	32.14		46	18.39	17.07	28.57	
Temporary lay-off/unemployed	25	5.94	6.59	7.14		20	10.34	6.10	10.71	
military/civil service	3	0.00	1.80	0.00		34	13.79	15.85	16.07	
maternity/paternity leave	2	0.00	0.60	0.89		0	0.00	0.00	0.00	
other	31	5.94	8.38	9.82		11	5.75	4.88	3.57	
Total	380	100.00	100.00	100.00		225	100.00	100.00	100.00	
Educational institution (%)					0.002					0.48
upper secondary school or university	148	34.46	46.62	18.92	100.00	84	42.86	39.29	17.86	100.00
vocational school or university of applied sciences	44	20.45	36.36	43.18	100.00	22	36.36	36.36	27.27	100.00
other	188	21.81	43.62	34.57	100.00	120	35.83	35.00	29.17	100.00
Total	380					226				

SD=standard deviation.

a nonparticipant. Furthermore, this study showed that dropping out of OS was at a maximum at age 17; also that (consistent with earlier findings; see Eime et al. 2008; Hardie Murphy, Rowe, and Woods 2017; Persson et al. 2020) *schoolwork* was an important reason for it. Note that at age 19 both maintainers and dropouts participated in academic studies more often than was the case among the nonparticipants, although the difference was non-significant among males. This contrasts with previous research indicating that in schools of high academic proficiency both females and males tend to be OS maintainers rather than dropouts (Wattie et al. 2014).

One interpretation of the findings is that higher educational goals are associated with OS participation but may also lead to dropout. Female maintainers may be goal-oriented in both academic education and OS, while dropouts may have academic success and need time for studies without seeing a future in OS. Male maintainers may want to have both academic education and OS, but for their part, dropouts may aim at academic education and need time for their studies, or see no future in OS. In this regard, one can identify a need to provide less time-consuming sporting activities for those who want to devote more time to studies – but also allow flexibility in studies (e.g. more time to complete a degree, or fewer compulsory courses) for those who want to have both OS and education in their life. This would help to maintain OS participation among those who have not yet started to live on their own, as research shows that change to living on one's own tends to lead to dropout (Van Houten, Kraaykamp, and Breedveld 2017).

There were no differences in *family affluence* between the patterns. In previous studies, the measures of wealth have varied, as have the findings (Jakobsson et al. 2012; Paakkari et al. 2017). This could indicate that family wealth may not determine OS participation as reliably as family income, which has been used in various studies (Desroches, Poulin, and Denault 2019; Findlay, Garner, and Kohen 2009; Manz et al. 2016). Our results may also have been affected by the financial support mechanisms in Finland: the level of economic wellbeing (typical of Nordic countries), and also of participants from the selected districts, may have provided fairly equal possibilities to participate.

Compared to nonparticipants, both maintainers and dropouts had typically experienced higher levels of parental support for PA and sport. The experience of *a decrease in parental support* increased the likelihood of being a female dropout rather than nonparticipant or maintainer. It seems reasonable to assume that the level of parental support remains relatively constant in cases where either participation or nonparticipation in OS is constant. However, among males the difference was not detected between dropouts and the other patterns, which may indicate that male dropouts had gone independently to the sports venue, or that they were still being encouraged towards PA. Causality could not be confirmed between participation change and changes in parental support; nevertheless, the common experience of a decrease in parental support suggests that it is related to growing up, as shown in previous research (Scarapicchia et al. 2017), and that it may precede dropping out of OS.

This study reinforces earlier findings that parental support is important for adolescents' sports participation (Howie, Daniels, and Guagliano 2020; Scarapicchia et al. 2017), and that this constitutes a stronger family-related determinant than purely economic factors (Desroches, Poulin, and Denault 2019; Jakobsson et al. 2012). Thus,

even if peer support may also be an important determinant for PA in this age bracket (Howie, Daniels, and Guagliano 2020; Scarapicchia et al. 2017), the maintenance of parental support especially among females needs to be considered in efforts to maintain OS participation. Moreover, the fact that joining in OS was rare in late-teenage underlines the importance of receiving parental support during childhood.

Maintainers in this study may include persons who have finished with one sport and joined in another (drop-off) (Fraser-Thomas, Falcão, and Wolman 2018) or who have changed their training volumes or competition level within a club (drop-through) (Geidne and Quennerstedt 2021). Moreover, dropouts included persons who had stopped doing sports but now functioned as coaches or other club officials in emerging adulthood. In addition, factors such as parental education or a sports background, plus adolescents' early sports experiences, may affect academic success and aspiration together with parental support for PA and sport. Future studies could explore more precisely the associations between diverse situations (in life, sport disciplines, training volumes, and goals) and OS participation patterns, and characterize patterns more precisely.

One strength of this study was that it included a comprehensive, longitudinal sample of a rarely studied age bracket. Moreover, it included educational and family-related factors and demonstrated gender differences within these that have not been encompassed in previous studies exploring OS participation patterns. On the other hand, a limitation lies in the fact that the aim of the original FHPSC study was to focus on OS participants. Thus, the sample was not nationally representative, given that OS participants were over-represented as compared to the national prevalence at age 15 (Blomqvist et al. 2019): this could also explain the higher average dropout age as compared to that of a nationally representative sample (at age 11; Blomqvist et al. 2019). Moreover, more of the study participants had academic aspirations compared to the national prevalence (StatFin. 2022). Note also that the study sample decreased substantially in the follow-up due to the data being collected directly from the participants and not through sports clubs and schools. It is also true, that females, and persons who had academic success and aspiration, and high parental support for PA/sport were overrepresented in the follow-up. However, the longitudinal sample was sufficient for the analyses by gender, and the study was able to show the substantial dropout pattern pertaining to OS – as well as the considerable degree of maintained participation and nonparticipation when adolescents grow up.

Another limitation is that the OS joiners were insufficient in number to obtain characterization. Note also that this study was based on self-reported data involving possible social desirability bias. However, self-reporting was unavoidable, given the nature of the factors explored. A final point to consider is that the study could not show conclusively that a decrease in parental support for PA and sport actually constituted a *cause* of dropping out of OS.

In conclusion, this study identified OS *dropouts, maintainers, nonparticipants* and *joiners*. Males were more likely than females to be maintainers than nonparticipants or dropouts. Among females, maintained participation was associated with academic success and aspiration, and with *not* experiencing a strong decrease in parental support for PA and sport, while dropping out was associated with academic success and a (strong) decrease in parental support. Among males, maintained participation and dropping out were associated with academic aspiration. The desire to concentrate on studies emerged

as the main reason for dropping out among both genders. These findings highlight a need for more flexible possibilities to combine OS participation and school studies, and the importance of parental support for sports.

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ORCID

Katja Rinta-Antila http://orcid.org/0000-0002-1346-212X
Pasi Koski http://orcid.org/0000-0001-5352-3698
Olli J Heinonen http://orcid.org/0000-0002-1722-1729
Raija Korpelainen http://orcid.org/0000-0002-3627-0542
Jari Parkkari http://orcid.org/0000-0001-5211-9845
Kai Savonen http://orcid.org/0000-0002-6871-8153
Kerttu Toivo http://orcid.org/0000-0002-4573-1937
Arja Uusitalo http://orcid.org/0000-0001-5177-0273
Tommi Vasankari http://orcid.org/0000-0001-7209-9351
Sami Kokko http://orcid.org/0000-0001-9436-5681

Data availability statement

The data for this study are not publicly available as they contain identification information. However, some parts of the data may be requested from the Principle Investigator (SK), upon reasonable request.

References

Aira, T., T. Vasankari, O. J. Heinonen, R. Korpelainen, J. Kotkajuuri, J. Parkkari, K. Savonen, et al. 2021. "Physical Activity from Adolescence to Young Adulthood: Patterns of Change, and Their Associations with Activity Domains and Sedentary Time." *The International Journal of Behavioral Nutrition and Physical Activity* 18: 85. doi:10.1186/s12966-021-01130-x.

Arnett, J. J. 2000. "Emerging Adulthood: A Theory of Development from the Late Teens Through the Twenties." *The American Psychologist* 55 (5): 469–480. doi:10.1037/0003-066X.55.5.469.

Balish, S. M., C. McLaren, D. Rainham, and C. Blanchard. 2014. "Correlates of Youth Sport Attrition: A Review and Future Directions." *Psychology of Sport and Exercise* 15: 429–439. doi:10.1016/j.psychsport.2014.04.003.

Basterfield, L., J. K. Reilly, M. S. Pearce, K. N. Parkinson, A. J. Adamson, J. J. Reilly, and S. A. Wella. 2015. "Longitudinal Associations Between Sports Participation, Body Composition and Physical Activity from Childhood to Adolescence." *Journal of Science and Medicine in Sport* 18 (2): 178–182. doi:10.1016/j.jsams.2014.03.005.

Batista, M. B., C. L. P. Romanzini, C. C. L. Barbosa, G. B. Shigaki, M. Romanzini, and E. R. V. Ronque. 2019. "Participation in Sports in Childhood and Adolescence and Physical Activity in Adulthood: A Systematic Review." *Journal of Sports Sciences* 37 (19): 2253–2262. doi:10.1080/02640414.2019.1627696.

Blomqvist, M., K. Mononen, P. Koski, and S. Kokko. 2019. "Urheilu Ja Seuraharrastaminen." In *Chap. 5 in* Lasten Ja Nuorten Liikuntakäyttäytyminen Suomessa LIITU-Tutkimuksen Tuloksia 2018, edited by S. Kokko and L. Martin, 47–56. Valtioneuvosto: Valtion liikunta-neuvosto. https://www.liikuntaneuvosto.fi/wp-content/uploads/2019/09/VLN_LIITU-raportti_web-final-30.1.2019.pdf. Accessed 27 May 2021.

Crane, J., and V. Temple. 2015. "A Systematic Review of Dropout from Organized Sport Among Children and Youth." *European Physical Education Review* 21: 1)114–131. doi:10.1177/1356336X14555294.

Currie, C., M. M, B. W, H. B, T. T, and R. M. 2008. "Researching Health Inequalities in Adolescence: The Development of the Health Behaviour in School-Aged Children (HBSC) Family Affluence Scale." *Social Science & Medicine* 66: 1429–1436 doi:10.1016/j.socscimed.2007.11.024 .

Deelen, I., D. Ettema, and C. B. M. Kamphuis. 2018. "Time-Use and Environmental Determinants of Dropout from Organized Youth Football and Tennis." *BMC Public Health* 18 ((1)): 1022. doi:10.1186/s12889-018-5919-2.

Desroches, G., F. Poulin, and A. Denault. 2019. "Sports Participation Patterns Throughout High School and Their Antecedents." *Applied Developmental Science*. doi:10.1080/10888691.2019.1687297.

Eime, R. M., W. R. Payne, M. M. Casey, and J. T. Harvey. 2008. "Transition in Participation in Sport and Unstructured Physical Activity for Rural Living Adolescent Girls." *Health Education Research* 25 (2): 282–293. doi:10.1093/her/cyn060.

Eime, R. M., J. A. Young, J. T. Harvey, M. J. Charity, and W. R. Payne. 2013. "A Systematic Review of the Psychological and Social Benefits of Participation in Sport for Children and Adolescents: Informing Development of a Conceptual Model of Health Through Sport." *The International Journal of Behavioral Nutrition and Physical Activity* 10: 98. doi:10.1186/1479-5868-10-98.

Findlay, L. C., R. E. Garner, and D. E. Kohen. 2009. "Children's Organized Physical Activity Patterns from Childhood into Adolescence." *Journal of Physical Activity & Health* 6: 708–715. doi:10.1123/jpah.6.6.708.

Fraser-Thomas, J., W. Falcão, and L. Wolman. 2018. "Understanding Take-Up, Drop-Out and Drop-Off in Youth Sport." In *Routledge Handbook of Youth Sport*, edited by K. Green and A. Smith, 227–242. London: Routledge.

Geidne, S., and M. Quennerstedt. 2021. "Youth Perspectives on What Makes a Sport Club a Health-Promoting Setting–viewed Through Salutogenic Settings-Based Lens." *International Journal of Environmental Research and Public Health* 18 (14): 7704. doi:10.3390/ijerph18147704.

Hardie Murphy, M., D. A. Rowe, and C. B. Woods. 2017. "Impact of Physical Activity Domains on Subsequent Physical Activity in Youth: A 5-Year Longitudinal Study." *Journal of Sports Sciences* 35 (3): 262–268. doi:10.1080/02640414.2016.1161219.

Hopkins, C. S., C. Hopkins, S. Kanny, and A. Watson. 2022. "A Systematic Review of Factors Associated with Sport Participation Among Adolescent Females." *International Journal of Environmental Research and Public Health* 19: 3353. doi:10.3390/ijerph19063353.

Howie, E. K., B. T. Daniels, and J. M. Guagliano. 2020. "Promoting Physical Activity Through Youth Sports Programs: It's Social." *American Journal of Lifestyle Medicine* 14 (1): 78–88. doi:10.1177/1559827618754842.

Howie, E. K., J. A. McVeigh, A. J. Smith, and L. M. Straker. 2016. "Organized Sport Trajectories from Childhood to Adolescence and Health Associations." *Medicine & Science in Sports & Exercise* 48 (7): 1331–1339. doi:10.1249/MSS.0000000000000894.

Jakobsson, B. T., S. Lundvall, K. Redelius, and L.-M. Engström. 2012. "Almost All Start but Who Continue? A Longitudinal Study of Youth Participation in Swedish Club Sports." *European Physical Education Review* 18 (1): 3–18. doi:10.1177/1356336X11430660.

Kannas, L., edited by. 2004. *Koululaisten Terveys Ja Terveyskäyttäytyminen Muutoksessa. WHO-Koululaistutkimus 20 Vuotta. [The Health Behavior in School-Aged Children Study 20 Years]*, . Jyväskylä: University of Jyväskylä: Publications of Research Center for Health Promotion.

Kemp, B. J., D. P. Cliff, K. H. Chong, and A.-M. Parrish. 2019. "Longitudinal Changes in Domains of Physical Activity During Childhood and Adolescence: A Systematic Review." *Journal of Science and Medicine in Sport* 22 (6): 695–701. doi:10.1016/j.jsams.2018.12.012.

Kokko, S., L. Martin, S. Geidne, A. Van Hoye, A. Lane, J. Meganck, J. Scheerder, et al. 2019. "Does Sports Club Participation Contribute to Physical Activity Among Children and Adolescents? A Comparison Across Six European Countries." *Scandinavian Journal of Public Health* 47 (8): 851–858. doi:10.1177/1403494818786110.

Kokko, S., H. Selänne, L. Alanko, O. J. Heinonen, R. Korpelainen, K. Savonen, T. Vasankari, et al. 2015. "Health Promotion Activities of Sports Clubs and Coaches, and Health and Health Behaviours in Youth Participating in Sports Clubs: The Health Promoting Sports Club Study." *BMJ Open Sport & Exercise Medicine* 1 (1): e000034. doi:10.1136/bmjsem-2015-000034.

Kwon, S., K. F. Janz, E. M. Letuchy, T. L. Burns, and S. M. Levy. 2015. "Developmental Trajectories of Physical Activity, Sports, and Television Viewing During Childhood to Young Adulthood: Iowa Bone Development Study." *Jama Pediatrics* 169 (7): 666–672. doi:10.1001/jamapediatrics.2015.0327.

Lounassalo, I., K. Salin, A. Kankaanpää, M. Hirvensalo, S. Palomäki, A. Tolvanen, X. Yang, and T. H. Tammelin. 2019. "Distinct Trajectories of Physical Activity and Related Factors During the Life Course in the General Population: A Systematic Review." *BMC Public Health* 19: 271. doi:10.1186/s12889-019-6513-y.

Manz, K., S. Krug, A. Schienkiewitz, and J. D. Finger. 2016. "Determinants of Organised Sports Participation Patterns During the Transition from Childhood to Adolescence in Germany: Results of a Nationwide Cohort Study." *BMC Public Health* 16 (1): 939. doi:10.1186/s12889-016-3615-7.

Mathisen, F. K. S., S. Kokko, J. Tynjälä, T. Torsheim, and B. Wold. 2019. "Leisure-Time Physical Activity and Participation in Organized Sports: Changes from 1985-2014 in Finland and Norway." *Scandinavian Journal of Medicine & Science in Sports* 29 (8): 1232–1242. doi:10.1111/sms.13431.

Mattila, V. M., J. Parkkari, L. Koivusilta, P. Kannus, and A. Rimpelä. 2009. "Participation in Sports Club is a Strong Predictor of Injury Hospitalization: A Prospective Cohort Study." *Scandinavian Journal of Medicine & Science in Sports* 19 (2): 267–273. doi:10.1111/j.1600-0838.2008.00800.x.

Mononen, K., M. Blomqvist, P. Koski, and S. Kokko. 2021. "Urheilu Ja Seuraharrastaminen." In *Chap 4.1 in* Nuorten Liikuntakäyttäytyminen Suomessa LIITU-Tutkimuksen Tuloksia 2020, edited by S. Kokko, R. Hämylä, and L. Martin, 36–45. Valtioneuvosto: Valtion liikuntaneuvosto. https://www.liikuntaneuvosto.fi/wp-content/uploads/2021/05/Nuorten-liikuntakayttaytyminen-Suomessa-LIITU-tutkimuksen-tuloksia-2020.pdf Accessed 27 May 2021.

Mossman, G. J., C. Robertson, B. Williamson, and L. Cronin. 2021. "Coaches, Parents, or Peers: Who Has the Greatest Influence on Sports Participants' Life Skills Development?" *Journal of Sports Sciences* 39 (21): 2475–2484. doi:10.1080/02640414.2021.1939980.

Paakkari, L., S. Kokko, J. Villberg, O. Paakkari, and J. Tynjälä. 2017. "Health Literacy and Participation in Sports Club Activities Among Adolescents." *Scandinavian Journal of Public Health* 45 (8): 854–860. doi:10.1177/1403494817714189.

Persson, M., L. E. Espedalen, K. Stefansen, and Å. Strandbu. 2020. "Opting Out of Youth Sports: How Can We Understand the Social Processes Involved?" *Sport, Education & Society* 25 (7): 842–854. doi:10.1080/13573322.2019.1663811.

Scarapicchia, T. M. F., C. M. Sabiston, E. Pila, K. P. Arbour-Nicitopoulos, and G. Faulkner. 2017. "A Longitudinal Investigation of a Multidimensional Model of Social Support and Physical Activity Over the First Year of University." *Psychology of Sport and Exercise* 31: 11–20. doi:10.1016/j.psychsport.2017.03.011.

StatFin. 2022. Entrance to Education. Immediate Applying to Further Studies by Those Having Ended 9th Grade of Comprehensive School in 2000–2018. Accessed 1 April 2022. https://pxweb2.stat.fi/PxWeb/pxweb/en/StatFin/StatFin__khak/statfin_khak_pxt_11g4.px/table/tableViewLayout1/ .

Telford, R. M., R. D. Telford, T. Cochrane, R. B. Cunningham, L. S. Olive, and R. Davey. 2016. "The Influence of Sport Club Participation on Physical Activity, Fitness and Body Fat During Childhood and Adolescence: The LOOK Longitudinal Study." *Journal of Science and Medicine in Sport* 19 (5): 400–406. doi:10.1016/j.sams.2015.04.008.

Van Houten, J. M. A., G. Kraaykamp, and K. Breedveld. 2017. "When Do Young Adults Stop Practising a Sport? An Event History Analysis on the Impact of Four Major Life Events." *International Review for the Sociology of Sport* 52 (7): 858–874. doi:10.1177/1012690215619204.

Wattie, N., M. Tietjens, S. Cobley, J. Schorer, J. Baker, and D. Kurz. 2014. "Relative Age-Related Participation and Dropout Trends in German Youth Sports Clubs." *European Journal of Sports Science* 14 (1): 213–220. doi:10.1080/17461391.2012.681806.

Wichstrøm, T., and L. Wichstrøm. 2008. "Does Sports Participation During Adolescence Prevent Later Alcohol, Tobacco and Cannabis Use?" *Addiction* 104: 138–149. doi:10.1111/j.1360-0443-2008.02422.x.

II

SPORTS-RELATED FACTORS PREDICTING MAINTAINED PARTICIPATION AND DROPOUT IN ORGANIZED SPORTS IN EMERGING ADULTHOOD: A FOUR-YEAR FOLLOW-UP STUDY

by

Rinta-Antila, K., Koski, P., Aira, T., Heinonen, O J., Korpelainen, R., Parkkari, J., Savonen, K., Toivo, K., Uusitalo, A., Valtonen, M., Vasankari, T., Villberg, J. & Kokko, S. (2023)

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ORIGINAL ARTICLE

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Sports-related factors predicting maintained participation and dropout in organized sports in emerging adulthood: A four-year follow-up study

Katja Rinta-Antila[1] | **Pasi Koski**[2] | **Tuula Aira**[1] | **Olli J. Heinonen**[3] | **Raija Korpelainen**[4,5,6] | **Jari Parkkari**[1,7] | **Kai Savonen**[8,9] | **Kerttu Toivo**[7] | **Arja Uusitalo**[10,11] | **Maarit Valtonen**[12] | **Tommi Vasankari**[13,14] | **Jari J. Villberg**[1] | **Sami Kokko**[1]

[1]Faculty of Sport and Health Sciences, Research Centre for Health Promotion, University of Jyväskylä, Jyväskylä, Finland

[2]Department of Teacher Education, University of Turku, Rauma, Finland

[3]Paavo Nurmi Centre and Unit for Health and Physical Activity, University of Turku, Turku, Finland

[4]Medical Research Center (MRC), University of Oulu and University Hospital of Oulu, Oulu, Finland

[5]Department of Sports and Exercise Medicine, Oulu Deaconess Institute Foundation sr., Oulu, Finland

[6]Center for Life Course Health Research, University of Oulu, Oulu, Finland

[7]Tampere Research Center of Sports Medicine, Tampere, Finland

[8]Department of Clinical Physiology and Nuclear Medicine, Science Service Center, Kuopio University Hospital, Kuopio, Finland

[9]Kuopio Research Institute of Exercise Medicine, Kuopio, Finland

[10]Clinic for Sports and Exercise Medicine, Foundation for Sports and Exercise Medicine Alppikatu 2, Helsinki, Finland

[11]Department of Sports and Exercise Medicine, Clinicum, University of Helsinki, Helsinki, Finland

[12]Research Institute for Olympic Sports, Jyväskylä, Finland

[13]UKK Institute of Health Promotion Research, Tampere, Finland

[14]Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland

Correspondence
Katja Rinta-Antila, Faculty of Sport and Health Sciences, University of Jyväskylä, PO Box 35, Jyväskylä 40014, Finland.
Email: katja.t.rinta-antila@jyu.fi

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Abstract

This study explored sports-related factors predicting organized sports participation in emerging adulthood. In the Finnish Health Promoting Sports Club (FHPSC) study, 354 sports club participants aged 15 at baseline reported their main sport, onset age, training volume, current competitive level, and future competitive orientation and participated in the follow-up study at age 19. There were differences in the proportions of maintainers and dropouts in a few sports: football (maintainers 58.6%), and among females, skating (maintainers 60.7%), and swimming (dropouts 80.0%). A binary logistic regression analysis showed that those who had started their main sport by school age (females OR 3.05/95% CI 1.34, 6.98; males OR 3.97/95% CI 1.48, 10.64) and had competed at national top level plus had aimed at success at the adult level competitions in future (females

OR 3.42/95% CI 1.16, 10.09; males OR 3.58/95% CI 1.12, 11.41; among females, also had competed at national top level plus had aimed at success at junior level competitions [OR 3.42/95% CI 1.20, 9.78]) were more likely maintainers than dropouts. Early onset in the main sport and competitiveness were related to maintained sports participation while the opposites were related to dropouts in the current organized sports system.

KEYWORDS

cohort study, competitive level, competitive orientation, sport discipline, training volume

1 | INTRODUCTION

About 40% of children (aged 5) and adolescents (aged 15) drop out of all organized sports while about 30%–50% of children and adolescents maintain their participation in sport(s) by emerging adulthood[1] (at age 19).[2,3] Dropout is defined by Gould (1987) on a continuum from dropping out of one sport (activity-specific) to dropping out of all sports permanently (domain-general).[4] Since participation in organized sports has multi-dimensional health benefits (e.g., related to fitness, body fat, lean mass, self-esteem, depressive symptoms, or social interaction),[5–7] dropping out from all sports can also be viewed as a public health concern.

Systematic reviews have shown factors impacting adolescents' organized sports participation (e.g., health and enjoyment)[8] and dropout (e.g., perceived lack of competence and injuries).[9,10] They have also revealed that prospective studies,[8,10] and research on, for example, the characteristics of club sports[8–10] and the transition into adulthood[11] are scarce. Moreover, operational definition for dropout (based on information about registration for season) was provided only by half of the studies,[10] or the majority of the studies focused on prolonged withdrawal from one sport (not all sports).[9]

International studies have shown that children's participation in organized sports has tended to begin at ever earlier ages (e.g., at age 3–4 in Denmark and Iceland),[12] adolescent (15–19 years old) club sports maintainers have *started participation at an early age*,[13] and have a longer sports history compared to dropouts.[14] Moreover, maintenance and dropout of *sports* have been shown to vary between disciplines in transition from childhood to adolescence (from age 10 to 14)[15] or to emerging adulthood (from age 10 to 23),[15] and more likely *team sports* participants maintain their participation compared to *individual sports* participants.[14] Furthermore, high *training volume* has been associated with maintained sports participation in later adolescence,[14] but also with dropout when physical, emotional, and scheduling problems as well as non-improving performance have been perceived.[17] Low *competitive levels* may also lead to dropout.[18]

Previous studies have explored organized sports participants' goal orientation,[14,19–21] and motivation,[21,22] and why they continue in sports.[13] The results suggest that (early) adult (18–61 year old) rock climbers in the United States are more task-oriented (e.g., improving one's skills) than ego-oriented (e.g., social comparison).[21] Moreover, the early onset age in sports, high training volume, and competitive experience have been associated with high skill development and competing motivations among Brazilian (12–18 years old) adolescent athletes in different sports.[22] Furthermore, team sports have been associated with high skill development motivation and individual sports with high competitive motivation.[22] Also, c*ompetitiveness* has been associated with maintaining sports participation in later adolescence.[13,14] However, longitudinal research is lacking on the association of *recreational*, *physical development*, *and competitive orientations* with maintained participation and dropout in organized sports.

In Finland too, mean *onset age* in organized sports in general has decreased over the decades (12 years before 1950s, 10 years in 1960s, 8 years in 1980s, and 7 years in the 21st century).[23–25] Current upper secondary school adolescents (16–20 year olds) have started on average at age 7, with football as their most *popular sport* (15%) (followed by dancing, horse riding, ice hockey, and floorball), average of three coach-led (90 min each), and one to two self-directed (75 min each) main sport *training sessions* weekly.[25] Overall, 73% of them (females 67%, males 82%) participate in *competitions*; 35% (f 28%, m 44%) at national level and 37% (f 24%, m 29%) at regional/local level competitions. Overall, 57% of adolescents (f 53%, m 62%) have *competitive orientation*: success at adult level [29% (f 23%, m 37%)] or at junior level [28% (f 30%, m 25%)] competitions. On the other hand, many adolescents participate without competitive orientation (43%, f 47%, m 38%).[25] Adolescents continue

in some sport disciplines (e.g., ice hockey) to a later age compared to some other disciplines (e.g., track and field).[26] Moreover, those who have high competitive orientation train more,[27] and maintainers have higher ego and task orientation than dropouts do.[28]

To date, there is lack of longitudinal studies exploring various sports-related factors simultaneously and non-competitive aspects as predictors of maintained organized sports participation and dropout. Identifying factors that favor maintained participation and dropout in organized sports among adolescents is important for supporting lifelong participation. Therefore, as permitted by the cohort data of the Finnish Health Promoting Sports Club (FHPSC) study,[29] the aim of the present study was to explore how various sports-related factors in adolescence predict organized sports participation in emerging adulthood. Maintained participation is considered as continuous participation in organized sport(s), and dropout as withdrawal from all organized sports during this four-year follow-up study.

2 | MATERIALS AND METHODS

2.1 | Sample

This study was based on the longitudinal health behavior questionnaire data of the Finnish Health Promoting Sports Club (FHPSC) study. In baseline (years 2013–14), 870 sports club participants aged 15 (mean age 15.4, SD 1.3; males 58%) from the six districts of the Centres of Excellence in Sports and Exercise Medicine in Finland answered sports-related queries. Of these, 354 participated in the follow-up study (years 2017–18) at age 19 (mean age 19.6, SD 1.4; males 43%) being sports club participants (i.e., maintainers, $n = 161$) or nonparticipants (i.e., dropouts, $n = 193$). The study participants represented the ten most popular winter and summer sports in Finland: basketball, cross-country skiing, floorball, ice hockey, skating, football, gymnastics, orienteering, swimming, and track and field. A detailed description of the baseline data collection can be found in the FHPSC study protocol article,[29] and of follow-up data collection in the recent FHPSC study.[3]

2.2 | Ethics

The Ethics Committee of the Healthcare District of Central Finland approved the study in 2012 and 2016 (record number 23U/2012&2016). Informed written consent was gathered from participants, and when participants were under 18 years old, from their guardians.

2.3 | Measures

Longitudinal organized sports participation patterns constructed in the previous FHPSC study[3] were used as the dependent variable with the categories of *maintainers* (reported participation in club sport training at baseline *and* follow-up) and *dropouts* (reported participation in club sport training at baseline but *not* in follow-up). *Sports-related factors* reported at age 15 at baseline were used in this current study as independent variables. The same kinds of survey items related to these factors and described below have been used in previous studies.[22,29–31]

Reported *main sports* (i.e., sports in which the adolescent participated the most) were coded according to the above-mentioned ten most popular winter and summer *sport disciplines* (also from the follow-up study data). The variable *type of sport* was created with two categories—*individual* and *team sport*—due to the small number of participants in some sports.

Study participants reported age of *onset of participation in their main sport*. The answers were categorized as *≤7*, *8–10*, *and 11–15* years (average age for onset of participation in main sport was 8.2 years) for discovering the most informative differences between maintainers and dropouts.

Adolescents reported the typical amount of coach-led main sport training sessions/week, self-directed main sport training sessions/week, and training minutes/session of these two training modes. *Main sport training volume (hours/typical week)* was calculated. The variable was dichotomized as ≤9 h/week (0–9 h) and >9 h/week (9.2–33.0) (average main sport training volume/week was 8.9 h).

Current competitive level was asked about with the following response options: 'National top level', 'Other national level like I Division', 'Regional level', 'Local level', 'I/we do not compete'. These were dichotomized as *national top-level* and *lower than national top-level* (all the other options).

Future competitive orientation as an athlete (the highest goal level) was asked about with the following response options: 'I have no competitive orientation, I play sports for recreation, 'I have no competitive orientation, I play sports for physical development', 'Success at junior regional/local level competitions', 'Success at junior national level competitions (national top level or similar)', 'Success at junior international level competitions', 'Success at adult national level competitions (national top level)', 'Success at adult international level competitions (European/World Championship or professional)'. These were categorized as *no competitive orientation*, *success at junior-level competitions*, and *success at adult-level competitions*.

The variable *current competitive level and future competitive orientation* were formed by combining the

recategorized current competitive level with the recategorized future competitive orientation, for a total of six categories: *national top level and success at adult level competitions*, *or success at junior level competitions*, *or no competitive orientation; lower than national top level and success at adult level competitions*, *or success at junior level competitions*, *or no competitive orientation*.

2.4 | Statistical analysis

The analyses were performed using SPSS Version 26, with the statistical significance set at $p < 0.05$. Differences in the proportions of maintainers and dropouts in the ten main sports, also separately among females and males, were assessed using chi-square test and Fisher's exact test. The maintenance of sports disciplines from age 15 to age 19 was explored using crosstabs. Differences in other sports-related factors between maintainers and dropouts, between individual and team sports maintainers as well as individual and team sports dropouts were assessed using a chi-square test and *z*-test. Differences between the main sport training hours and future competitive orientation were assessed using a chi-square test. The effect size was estimated by Cramer's V. The factors showing statistically significant differences in the bivariate analyses between maintainers and dropouts were entered into binary logistic regression analysis separately by gender for identifying the predictors of maintained organized sports participation and dropout. As there was interaction between the variables of current competitive level and future competitive orientation, the combined variable was used as a more interpretable variable.

3 | RESULTS

Among the ten *main sports* reported at age 15, there were differences in the proportions of maintainers and dropouts in football (maintainers 58.6%, χ^2 (1) = 4.83, $p = 0.028$, effect size = 0.12), and when females were explored separately, in skating (maintainers 60.7%, χ^2 (1) = 5.52, $p = 0.019$, effect size = 0.17), and swimming (dropouts 80.0%, χ^2 (1) = 3.88, $p = 0.049$, effect size = 0.14) at age 19. Among males, there was no difference in any main sport (Table 1).

All maintainers who had reported football, floorball, orienteering, or track and field ($n = 14$–31) as the main sport at age 15 reported the same sport as the main sport at age 19. Among the other main sports ($n = 9$–16), few participants had changed their main sport by age 19.

Onset of participation in main sport, *training volume*, *current competitive level* and, *future competitive orientation* were associated with organized sports participation at age 19. The distributions are presented in Table 2.

Training volume was associated with *future competitive orientation*. Adolescents who trained their main sport over 9 h/week at age 15 ($n = 120$) had more success at adult-level competitions as an orientation (60.0%) than success at junior-level competitions (31.7%) or no competitive orientation (8.3%) (χ^2 (2) = 37.23, $p < 0.001$, effect size = 0.34). Those who trained their main sport for a maximum of 9 h/week ($n = 203$) had more success at junior-level competitions as an orientation (44.3%) than success at adult-level competitions (27.6%) or no competitive orientation (28.1%).

When the sports-related factors were simultaneously explored, *onset of the main sport* and *current competitive level together with future competitive orientation* predicted organized sports participation. Onset of the main sport by age 7 compared to by age 11 or later (*females* 3.05, CI 1.34–6.98, $p = 0.008$; *males* 3.97, CI 1.48–10.64, $p = 0.006$), and competing at national top level aiming at success at adult-level competitions compared to lower or non-competitive level and non-competitive orientation (*females* 3.42, CI 1.16–10.09, $p = 0.026$; *males* 3.58, CI 1.12–11.41, $p = 0.031$) increased the odds of being a maintainer rather than a dropout at age 19. In addition, among *females*, a combination of competing at the national top level and having success at junior-level competitions as an orientation increased the odds of being a maintainer rather than a dropout (3.42, CI 1.20–9.78, $p = 0.022$) (Table 3).

The distribution of individual and team sports maintainers and individual and team sports dropouts by sports-related factors is presented in Table 4.

4 | DISCUSSION

This study explored how various sports-related factors predicted maintained participation and dropout in organized sports in a cohort from adolescence to emerging adulthood.

As a result of exploring *main sports*, there were differences in the proportions of maintainers and dropouts in a few sports at age 19. Previous studies have shown variability in the maintenance, start, and dropout of different sports,[15,16,26] and suggest that this is due to cultural context,[15,16] opportunities to participate, promotion by national-level associations,[16] and the studied age group.[15] Hence, in Finland, a larger proportion of maintainers compared to dropouts in football may be due to better promotion of the sport and the availability of clubs and teams of different levels because of the large number of participants. On the other hand, in figure skating, a need for

TABLE 1 Distributions of maintainers and dropouts at age 19 by main sport discipline reported at age 15 ($n = 354$).

	Total							Females							Males						
		Maintainers ($n = 161$)	Dropouts ($n = 193$)	χ^2			Effect size		Maintainers ($n = 81$)	Dropouts ($n = 119$)	χ^2			Effect size		Maintainers ($n = 80$)	Dropouts ($n = 73$)	χ^2			Effect size
Main sport discipline at age 15	*n*	%		Value	df	*p*	Cramer's V	*n*	%		Value	df	*p*	Cramer's V	*n*	%		Value	df	*p*	Cramer's V
Skating	30	60.0	40.0	2.79	1	0.095	0.09	28	60.7	39.3	5.52	1	**0.019**	0.17	2	50.0	50.0	0.00	1	1.000[a]	0.01
vs. Other sports	324	44.1	55.9					172	37.2	62.8					151	52.3	47.7				
Football	58	58.6	41.4	4.83	1	**0.028**	0.12	23	52.2	47.8	1.47	1	0.225	0.09	35	62.9	37.1	2.03	1	0.154	0.12
vs. Other sports	296	42.9	57.1					177	39.0	61.0					118	49.2	50.8				
Floorball	36	47.2	52.8	0.05	1	0.825	0.01	13	53.8	46.2	1.03	1	0.311	0.07	23	43.5	56.5	0.84	1	0.359	0.07
vs. Other sports	318	45.3	54.7					187	39.6	60.4					130	53.8	46.2				
Cross-country skiing	34	47.1	52.9	0.04	1	0.846	0.01	18	38.9	61.1	0.02	1	0.884	0.01	16	56.3	43.8	0.11	1	0.737	0.03
vs. Other sports	320	45.3	54.7					182	40.7	59.3					137	51.8	48.2				
Orienteering	30	46.7	53.3	0.02	1	0.891	0.00	22	54.5	45.5	2.02	1	0.155	0.10	8	25.0	75.0	2.52	1	.152[a]	0.13
vs. Other sports	324	45.4	54.6					178	38.8	61.2					145	53.8	46.2				
Ice hockey	31	45.2	54.8	0.00	1	0.970	0.00	3	0.0	100.0	2.07	1	0.273[a]	0.10	28	50.0	50.0	0.07	1	0.789	0.02
vs. Other sports	323	45.5	54.5					197	41.1	58.9					125	52.8	47.2				
Basketball	33	42.4	57.6	0.14	1	0.711	0.02	18	33.3	66.7	0.42	1	0.516	0.05	15	53.3	46.7	0.01	1	0.932	0.01
vs. Other sports	321	45.8	54.2					182	41.2	58.8					138	52.2	47.8				
Track and field	42	35.7	64.3	1.83	1	0.176	0.07	27	25.9	74.1	2.75	1	0.097	0.12	15	53.3	46.7	0.01	1	0.932	0.01
vs. Other sports	312	46.8	53.2					173	42.8	57.2					138	52.2	47.8				
Gymnastics	30	33.3	66.7	1.95	1	0.163	0.07	28	32.1	67.9	0.94	1	0.331	0.07	2	50.0	50.0	0.00	1	1.000[a]	0.01
vs. Other sports	324	46.6	53.4					172	41.9	58.1					151	52.3	47.7				
Swimming	30	30.0	70.0	3.17	1	0.075	0.10	20	20.0	80.0	3.88	1	**0.049**	0.14	9	55.6	44.4	0.04	1	1.000[a]	0.02
vs. Other sports	324	46.9	53.1					180	42.8	57.2					144	52.1	47.9				

Note: Bold indicates significant *p*-values.

[a]*Fisher's exact test*.

TABLE 2 Distributions of maintainers and dropouts at age 19 by sports-related factor reported at age 15 ($n = 323$).

		Maintainers ($n = 1490$	Dropouts ($n = 174$)	χ^2			Effect size
Sports-related factors at age 15	***n***	**%**		**Value**	**df**	***p***	**Cramer's V**
Type of main sport							
Team	169	50.3	49.7	2.48	1	0.116	0.09
Individual	154	41.6	58.4				
Onset of participation in main sport							
≤7 yr.	143	58.0[a]	42.0[a]	17.81	2	**<0.001**	0.24
8–10 yr.	104	42.3	57.7				
11–15 yr.	76	28.9[a]	71.1[a]				
Main sport training volume (hours/typical week)							
>9	120	55.0[a]	45.0[a]	6.05	1	**0.014**	0.14
≤9	203	40.9[a]	59.1[a]				
Current competitive level							
National top level	174	52.9[a]	47.1[a]	6.90	1	**0.009**	0.15
Lower than national top level	149	38.3[a]	61.7[a]				
Future competitive orientation							
Success at adult-level competitions	128	60.2[a]	39.8[a]	19.80	2	**<0.001**	0.25
Success at junior-level competitions	128	41.4	58.6				
No competitive orientation	67	28.4[a]	71.6[a]				
Current competitive level & future competitive orientation							
National top level & success at adult-level competitions	96	61.5[a]	38.5[a]	21.94	5	**0.001**	0.26
Lower than national top level & success at adult-level competitions	32	56.3	43.8				
National top level & success at junior-level competitions	64	46.9	53.1				
Lower than national top level & success at junior-level competitions	64	35.9	64.1				
Lower than national top level & no competitive orientation	53	30.2[a]	69.8[a]				
National top level & no competitive orientation	14	21.4	78.6				

[a]Difference according to *z*-test.

high investments and international success may explain the larger proportion of maintainers compared to dropouts among females.

Previous research suggests that there may be a stable period in the activity changes after puberty.[15] In addition, in the current study, only a few adolescents had *changed* their main sport. One interpretation is that the organized sports system emphasizes competitiveness that does not allow a later start. Moreover, few adolescents may participate in various sports and are hence able to change their main sport, or the adolescents may choose their main sport at an earlier age. The results highlight a need to develop and promote possibilities to change and start sport later in adolescence for lifelong participation.

This study shows that the *onset of participation in the main sport* by school age is predicted maintain participation in organized sports. Moreover, finding one's main sport at an early school age predicted that maintaining participation was as likely as dropping out. Previous studies have explored the overall onset of participation in organized sports, showing that late teenage maintainers had started participation at an early age,[13] and earlier than dropouts.[14] One interpretation is that parents' support in sport (e.g., encouragement, transport, and doing physical activity or sports with child or adolescent) through childhood and adolescence affect early and maintained participation.[3,32] Moreover, early participation may lead to the formation of organized sports

TABLE 3 Sports-related factors predicting maintained participation compared to dropping out by gender ($n = 323$).

Sports-related factors at age 15	Females ($n = 184$)	OR (95% CI)	p	Males ($n = 139$)	OR (95% CI)	p
Onset of participation in main sport						
≤7 yr.	73	3.05 (1.34–6.98)	**0.008**	70	3.97 (1.48–10.64)	**0.006**
8–10 yr.	64	1.69 (0.71–4.02)	0.233	40	1.72 (0.59–5.03)	0.320
11–15 yr.	47	1		29	1	
Main sport training volume (hours/typical week)						
>9	60	0.75 (0.37–1.53)	0.434	60	1.79 (0.81–3.99)	0.153
≤9	124	1		79	1	
Current competitive level & future competitive orientation						
National top level & success at adult-level competitions	44	3.42 (1.16–10.09)	**0.026**	52	3.58 (1.12–11.41)	**0.031**
National top level & success at junior-level competitions	45	3.42 (1.20–9.78)	**0.022**	19	0.94 (0.25–3.64)	0.933
National top level & no competitive orientation	9	0.94 (0.16–5.66)	0.945	5	0.29 (0.03–3.36)	0.321
Lower than national top level & success at adult-level competitions	11	3.39 (0.72–15.97)	0.122	21	2.98 (0.80–11.15)	0.104
Lower than national top level & success at junior-level competitions	43	1.89 (0.66–5.41)	0.233	21	1.01 (0.28–3.70)	0.990
Lower than national top level & no competitive orientation	32	1		21	1	

Note: Females: $R^2 = 0.09$ (Cox & Snell), 0.12 (Nagelkerke). Model χ^2 (8) = 17.28; Males: $R^2 = 0.18$ (Cox & Snell), 0.24 (Nagelkerke). Model χ^2 (8) = 27.79.
Abbreviations: CI, confidence interval; OR, odds ratio.

participation as a lifestyle habit and hence maintain participation, as research has shown that a physically active lifestyle tracks from early childhood onwards.[33] On the other hand, competitiveness in the current sports system requires the early onset of participation. Moreover, later onset compared to one's peers may negatively affect perceived competence, which is an important dropout reason among adolescents.[9,10]

Previous international research has shown the health benefits of organized physical activity at an early age (age 0–4),[34] and that early participation (age 2–5) in organized individual or team sports (e.g., dance, judo, hydro-gymnastics, t-ball) is mostly beneficial in psychosocial development.[35,36] Although the current study did not explore if adolescents had participated only in the main sport or various sports, it suggests that a long training history in the main sport seems not necessarily to lead to getting bored with the sport, which is, however, one significant dropout reason in late adolescence.[3] This is supported by recent studies that suggest, contrary to earlier understanding, that *early sport specialization* may not be a dropout risk.[37,38] Hence, encouragement to find enjoyable sports by school age may be in many ways beneficial and better ensure maintained participation in organized sports in emerging adulthood.

This study showed that those who had had a high *main sport training volume* were more often maintainers than dropouts in line with previous research.[14] Moreover, high future competitive orientation was associated with high training volume as in the previous FHPSC study,[27] and the result supports the study that associated high competitive motivation with high training volume.[22] However, in the current study, when training volume was explored simultaneously with other sports-related factors, it did not predict maintained participation. It seems that high training volume does not necessarily lead to boredom and dropout, and that it depends on how other factors support or disturb sports participation. High training volume may be seen as a sacrifice or an investment that keeps one playing sports. Research has shown that high training volume with perceived tiredness, negative relationships in sports, scheduling problems, and non-improving performance may lead to dropout.[17] Providing sufficient rest and sleep, flexibility in sport (goals) and other activities (e.g., school studies[3]), and positive relationships in sports could support maintained participation.

The highest *current competitive level* and highest *future competitive orientation* characterized more maintainers than dropouts, a finding that is in line with

TABLE 4 Distributions of individual and team sports maintainers and individual and team sports dropouts at age 19 by sports-related factor reported at age 15 ($n = 323$).

	Maintainers ($n = 149$)							Dropouts ($n = 174$)						
		Individual	Team	χ^2			Effect size		Individual	Team	χ^2			Effect size
Sports-related factors at age 15	***n***	**%**		**Value**	**df**	***p***	**Cramer's V**	***n***	**%**		**Value**	**df**	***p***	**Cramer's V**
Onset of participation in main sport														
≤7 yr.	83	41.0	59.0	0.58	2	0.748	0.06	60	51.7	48.3	0.53	2	0.765	0.06
8–10 yr.	44	47.7	52.3					60	55.0	45.0				
11–15 yr.	22	40.9	59.1					54	48.1	51.9				
Main sport training volume (hours/typical week)														
>9	66	34.8	65.2	3.18	1	0.075	0.15	54	63.0[a]	37.0[a]	3.96	1	**0.047**	0.15
≤9	83	49.4	50.6					120	46.7[a]	53.3[a]				
Current competitive level														
National top level	92	52.2[a]	47.8[a]	8.35	1	**0.004**	0.24	82	63.4[a]	36.6[a]	8.49	1	**0.004**	0.22
Lower than national top level	57	28.1[a]	71.9[a]					92	41.3[a]	58.7[a]				
Future competitive orientation														
Success at adult-level competitions	77	45.5	54.5	1.20	2	0.548	0.09	51	62.7	37.3	6.12	2	**0.047**	0.19
Success at junior-level competitions	53	43.4	56.6					75	41.3[a]	58.7[a]				
No competitive orientation	19	31.6	68.4					48	56.3	43.8				

[a]Difference according to *z*-test.

previous research showing adolescent maintainers are willing or adapting themselves to compete[13,14,28] or to be more ego-oriented than dropouts are.[28] Moreover, maintainers' early onset of participation in their main sport and competitiveness are in line with the research that shows an association of early onset with competitive and skill development motivation.[22] The current study results also support previous research showing that participation at a lower competitive level may predict dropout.[18] One reason may be the lack of motivation if there are no opportunities (e.g., due to the team's competitive goals or the athlete's competence) to rise to a higher competitive level. This study also showed that participation without a competitive orientation, that is, a recreational or developmental goal, may predict dropout. This again may be due to the current sports system emphasizing competitiveness and not providing alternative, less competitive, or recreational activities, as also suggested by Thedin Jakobsson.[13] Furthermore, not all the *female* maintainers in this current study aimed at success at adult-level competitions, that is, not at a long competitive sports career. Competitiveness (and perhaps encouragement for that) may better ensure maintained participation in the current organized sports. However, it is important to provide alternatives for strongly competitive sports and get adolescents to discuss attractive activities and goals if the aim is the lifelong participation of as many adolescents as possible.

Results concerning the *type of sport* showed that high training volume and competitive level were more common in individual sports than they were in team sports. Previous research has shown that individual sport participants have high competitive motivation,[22] but also, contrary to the current study results, that they drop out more often than do team sport participants, which may relate to personal experience of failure in competitions.[14] Mental support may be needed especially for individual sport participants with perceived failures and goals.

4.1 | Strengths and limitations

The strengths of this study include its longitudinal sample of a rarely studied age bracket covering the most popular winter and summer sports in Finland. Moreover, this study focused on various sports-related factors and took into account non-competitive participation and orientation predicting organized sports participation which were not seen in previous research.[16,18] This is of importance since there is evidence of many organized sports participants having recreational reasons for participation,[25] and when the aim is to prevent dropout. Note that there were no differences in the competitive levels and orientations between those who participated in both study time points and those who participated only in the baseline study.

One limitation of the study is that self-reported training volumes may not equal the actual training sessions and minutes. Moreover, this study did not reveal if training volumes, competitive level, and orientation changed over time. In future research, objective training volume measurements compared with volumes from different kinds of training sessions would increase reliability. Note also that more females than males continued the follow-up study. In addition to sports-related factors, various other individual, social, and environmental factors may affect maintained participation in organized sports in emerging adulthood, and it is important to study attractive organized sports activities from adolescents' point of view.

5 | PERSPECTIVES

Since participation in organized sports has multi-dimensional health benefits,[5–7] dropping out can be viewed as a public health concern. This study showed that there were differences in the proportions of maintainers and dropouts in a few main sports, and only a few adolescents changed their main sport by age 19. This may be due to opportunities to participate and promotion of the sport as shown also in previous research.[16] Moreover, in line with previous studies,[13,14,18] early onset in main sport and competitiveness are related to maintained sports participation while the opposites are related to dropout in the current organized sports system. These results suggest that supporting early onset in organized sports may ensure later participation since physically active lifestyle starts to develop in early childhood.[33] Moreover, sport system emphasizing early specialization and competitiveness suits some adolescents while among the others it may lead to dropout. In addition to competitiveness in club sports, less competitive and more recreational organized sports as well as possibilities to join in and change the sport later in adolescence are needed for avoiding constant dropout. It is also important to discuss the benefits of organized sports and various possibilities to participate with adolescents.

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CONFLICT OF INTEREST STATEMENT

The authors report no conflict of interest.

DATA AVAILABILITY STATEMENT

The data for this study are not publicly available, because they contain identification information. However, some parts of the data may be requested from the principle investigator (SK) upon reasonable request.

ORCID

Katja Rinta-Antila https://orcid.org/0000-0002-1346-212X
Pasi Koski https://orcid.org/0000-0001-5352-3698
Tuula Aira https://orcid.org/0000-0001-9770-1732
Olli J. Heinonen https://orcid.org/0000-0002-1722-1729
Raija Korpelainen https://orcid.org/0000-0002-3627-0542
Jari Parkkari https://orcid.org/0000-0001-5211-9845
Kai Savonen https://orcid.org/0000-0002-6871-8153
Maarit Valtonen https://orcid.org/0000-0001-8883-2255
Tommi Vasankari https://orcid.org/0000-0001-7209-9351
Sami Kokko https://orcid.org/0000-0001-9436-5681

REFERENCES

1. Arnett JJ. Emerging adulthood: a theory of development from the late teens through the twenties. *Am Psychol*. 2000; 55:469-480.
2. Kwon S, Janz KF, Letuchy EM, Burns TL, Levy SM. Developmental trajectories of physical activity, sports, and television viewing during childhood to young adulthood: Iowa bone development study. *JAMA Pediatr*. 2015;169(7):666-672.
3. Rinta-Antila K, Koski P, Heinonen OJ, et al. Educational and family-related determinants of organized sports participation patterns from adolescence to emerging adulthood: a four-year follow-up study. *Int J Health Promot Educ*. 2022;1-15. doi:10.1080/14635240.2022.2116943
4. Gould D. Understanding attrition in children's sport. In: Gould D, Weiss MR, eds. *Advances in Pediatric Sport Sciences, Behavioral Issues*. Vol. 2. Human Kinetics; 1987:61-85.
5. Eime RM, Young JA, Harvey JT, Charity MJ, Payne WR. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *Int J Behav Nutr Phys Act*. 2013;10:98.
6. Howie EK, Mcveigh JA, Smith AJ, Straker LM. Organized sport trajectories from childhood to adolescence and health associations. *Med Sci Sports Exerc*. 2016;48(7):1331-1339.
7. Telford RM, Telford RD, Cochrane T, Cunningham RB, Olive LS, Davey R. The influence of sport club participation on physical activity, fitness and body fat during childhood and adolescence: the LOOK longitudinal study. *J Sci Med Sport*. 2016;19:400-406.
8. Hopkins CS, Hopkins C, Kanny S, Watson A. A systematic review of factors associated with sport participation among adolescent females. *Int J Environ Res Public Health*. 2022;19:3353.
9. Balish SM, Rainham D, Blanchard C. Correlates of youth sport attrition: a review and future directions. *Psychol Sport Exerc*. 2014;15:429-439.
10. Crane J, Temple V. A systematic review of dropout from organized sport among children and youth. *Eur Phy Educ Rev*. 2015;21(1):114-131.
11. Lounassalo I, Salin K, Kankaanpää A, et al. Distinct trajectories of physical activity and related factors during the life course in the general population: a systematic review. *BMC Public Health*. 2019;19:271.
12. Green K, Sigurjónsson T, Skille EÅ. Conclusion. In: Green K, Sigurjónsson T, Skille EÅ, eds. *Sport in Scandinavia and the Nordic Countries*. Routledge; 2019:173-204.
13. Thedin JB. What makes teenagers continue? A salutogenic approach to understanding youth participation in Swedish club sports. *Phys Educ Sport Pedagogy*. 2014;19(3):239-252.
14. Baron-Thiene A, Alfermann D. Personal characteristics as predictors for dual career dropout versus continuation – a prospective study of adolescent athletes from German elite sport schools. *Psychol Sport Exerc*. 2015;21:42-49.
15. Brooke HL, Corder K, Griffin SJ, van Sluijs EMF. Physical activity maintenance in the transition to adolescence: a longitudinal study of the roles of sport and lifestyle activities in British youth. *PLoS ONE*. 2014;9(2):e89028.
16. Hardie Murphy M, Rowe DA, Woods CB. Impact of physical activity domains on subsequent physical activity in youth: a 5-year longitudinal study. *J Sports Sci*. 2017;35(3):262-268.
17. Larson HK, McHugh TLF, Young BW, Rodgers WM. Pathways from youth to masters swimming: exploring long-term influences of youth swimming experiences. *Psychol Sport Exerc*. 2019;41:12-20.
18. Moulds K, Abbott S, Pion J, Brophy-Williams C, Heathcote M, Cobley S. Sink or swim? A survival analysis of sport dropout in Australian youth swimmers. *Scand J Med Sci Sports*. 2020;30:2222-2233.
19. Duda JL, Chi L, Newton ML, Walling MD, Catley D. Task and ego orientation and intrinsic motivation in sport. *Int J Sport Psychol*. 1995;26:40-63.
20. Nicholls JG, Cheung PC, Lauer J, Patashnick M. Individual differences in academic motivation: perceived ability, goals, beliefs, and values. *Learn Individ Differ*. 1989;1(1):63-84.
21. Gonzales GB. Motivation and goal grientation in rock climbers. *J Sport Behav*. 2019;42:48-62.
22. Guedes DP, Netto JES. Sport participation motives of young Brazilian athletes. *Percept Mot Skills*. 2013;117(3):742-759.
23. Koski P. *Liikunta- ja urheiluseurat muutoksessa. Helsinki: Suomen Liikunta ja Urheilu*. SLU-julkaisusarja 7/09. SLU; 2009.
24. Koski P, Mäenpää P. Suomalaiset liikunta- ja urheiluseurat muutoksessa 1986–2016. Opetus- Ja kulttuuriministeriön Julkaisuja, 25 2018.
25. Mononen K, Blomqvist M, Koski P, Kokko S. Urheilu ja seuraharrastaminen. In: Kokko S, Hämylä R, Martin L, eds. *Nuorten liikuntakäyttäytyminen Suomessa; LIITU-tutkimuksen tuloksia 2020 [the physical activity behaviours of adolescents in Finland;*

results of the LIITU Study]. State Sport Council Publications: Vol 1; 2021:36-45.
26. Lehtonen K, Lämsä J, Pesonen P, Hakonen H. *Kilpailuluvasta toimijarekisteriksi - lajiliittojen lisenssiselvitys 2017*. LIKES& KIHU; 2018.
27. Aira T, Salin K, Vasankari T, et al. Training volume and intensity of physical activity among young athletes: the Health Promoting Sports Club (HPSC) study. *Adv Phys Educ*. 2019;9:270-287.
28. Rottensteiner C, Tolvanen A, Laakso L, Konttinen N. Youth athletes' motivation, perceived competence, and persistence in organized team sports. *J Sport Behav*. 2015;38(4):432-449.
29. Kokko S, Selänne H, Alanko L, et al. Health promotion activities of sports clubs and coaches, and health and health behaviours in youth participating in sports clubs: the Health Promoting Sports Club study. *BMJ Open Sport Exerc Med*. 2015;1:e000034.
30. Kokko S. *Health Promoting Sports Club - Youth Sports club's Health Promotion Profiles, Guidance, and Associated Coaching Practice*. University of Jyväskylä; 2010.
31. Kokko S, Hämylä R. *Lasten ja nuorten liikuntakäyttäytyminen Suomessa. LIITU-tutkimuksen tuloksia 2014 [the physical activity behaviours of children and adolescents in Finland; results of the LIITU study 2014]*. State Sport Council Publications; 2015: Vol 2:2015.
32. Jakobsson BT, Lundvall S, Redelius K, Engström LM. Almost all start but who continue? A longitudinal study of youth participation in Swedish club sports. *Eur Phy Educ Rev*. 2012;18(1):3-18.
33. Telama R, Yang X, Leskinen E, et al. Tracking of physical activity from early childhood through youth into adulthood. *Med Sci Sports Exerc*. 2014;46(5):955-962.
34. Carson V, Lee EY, Hewitt L, et al. Systematic review of the relationships between physical activity and health indicators in the early years (0–4 years). *BMC Public Health*. 2017;17:854.
35. Harlow M, Wolman L, Fraser-Thomas J. Should toddlers and preschoolers participate in organized sport? A scoping review of developmental outcomes associated with young children's sport participation. *Int Rev Sport Exerc Psychol*. 2020;13(1):40-64.
36. McNeill J, Howard SJ, Vella SA, Cliff DP. Longitudinal associations of physical activity and modified organized sport participation with executive function and psychosocial health in preschoolers. *J Sports Sci*. 2020;38(24):2858-2865.
37. Larson HK, Young BW, McHugh TLF, Rodgers WM. Markers of early specialization and their relationships with burnout and dropout in swimming. *J Sport Exerc Psychol*. 2019;41(1):46-54.
38. Downing C, Redelius K, Nordin-Bates S. Early specialisation among Swedish aesthetic performers: exploring motivation and perceptions of parental influence. *Int J Sport Exerc Psychol*. 2022;20(4):1013-1032.

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III

PERCEIVED COACHES' HEALTH PROMOTION ACTIVITY, MAINTENANCE OF PARTICIPATION IN SPORTS, AND LIFESTYLE HABITS AMONG EMERGING ADULTS: A FOUR-YEAR FOLLOW-UP STUDY

by

Rinta-Antila, K., Koski, P., Aira, T., Heinonen, O J., Korpelainen, R., Parkkari, J., Savonen, K., Toivo, K., Uusitalo, A., Valtonen, M., Vasankari, T., Villberg, J. & Kokko, S. (2024)

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RESEARCH ARTICLE

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Perceived coaches' health promotion activity, maintenance of participation in sports, and lifestyle habits among emerging adults: a four-year follow-up study

Katja Rinta-Antila[a], Pasi Koski[b], Tuula Aira[a], Olli J. Heinonen[c], Raija Korpelainen[d,e,f], Jari Parkkari[a,g], Kai Savonen[h,i], Kerttu Toivo[g], Arja Uusitalo[j,k], Maarit Valtonen[l], Tommi Vasankari[m,n], Jari Villberg[a] and Sami Kokko[a]

[a]Faculty of Sport and Health Sciences, Research Centre for Health Promotion, University of Jyväskylä, Jyväskylä, Finland; [b]Department of Teacher Education, University of Turku, Rauma, Finland; [c]Paavo Nurmi Centre & Unit for Health and Physical Activity, University of Turku, Turku, Finland; [d]Medical Research Center (MRC), University of Oulu and University Hospital of Oulu, Oulu, Finland; [e]Department of Sports and Exercise Medicine, Oulu Deaconess Institute Foundation sr., Oulu, Finland; [f]Research Unit of Population Health, University of Oulu, Oulu, Finland; [g]Tampere Research Center of Sports Medicine, Tampere, Finland; [h]Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Kuopio, Finland; [i]Kuopio Research Institute of Exercise Medicine, Kuopio, Finland; [j]Clinic for Sports and Exercise Medicine, Foundation for Sports and Exercise Medicine, Helsinki, Finland; [k]Department of Sports and Exercise Medicine, Clinicum, University of Helsinki, Helsinki, Finland; [l]Research Institute for Olympic Sports, Jyväskylä, Finland; [m]UKK Institute of Health Promotion Research, Tampere, Finland; [n]Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland

ABSTRACT

Objectives: This study focused on how adolescents' perceptions of coaches' health promotion activity predict maintained participation and dropout in organized sports in emerging adulthood. In addition, differences in lifestyle habits between maintainers, dropouts, and nonparticipants in organized sports were explored.

Materials and Methods: Overall, 616 adolescents reported organized sports participation in the Finnish Health Promoting Sports Club (FHPSC) study at ages 15 and 19. Of these, 323 reported coach's health promotion activity on health topics at the age of 15. An index of a coach's general health promotion activity was formed. At age 19, all study participants reported their lifestyle habits.

Results: Among males, those who had perceived coaches' general health promotion activity as frequent were more likely to be maintainers than dropouts (48.6% vs. 20.0%) (p = .002). Among females, there was no significant difference (32.0% vs. 28.4%). Logistic regression analysis adjusted for gender showed that perceiving coach's general health promotion activity as frequent increased the odds of being a maintainer rather than a dropout. Moreover, maintainers had higher odds of having healthy lifestyle habits when compared to nonparticipants (related to physical activity; sleep; fruit and vegetable consumption; and cigarette use) or dropouts (related to physical activity; and cigarette use). In addition, dropouts had higher odds of having healthy lifestyle habits than nonparticipants (related to sleep; and cigarette use).

Conclusions: Perceiving coaches' health promotion activity as frequent was related to maintained participation in organized sports among males. Maintainers were more likely to have more healthy lifestyle habits than nonparticipants and dropouts. There is a need to invest in coaches' health promotion activity when it is infrequent. A more detailed understanding is needed of coaches' health promotion activity that supports both maintained participation in sports, especially among females, and healthy lifestyle habits in emerging adulthood.

KEY MESSAGE

There is a need to invest in coaches' health promotion activity when it is infrequent in order to support adolescents' continued participation in organized sports and healthy lifestyle habits in emerging adulthood.

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CONTACT Katja Rinta-Antila katja.t.rinta-antila@jyu.fi Faculty of Sport and Health Sciences, University of Jyväskylä, PO Box 35, FI-40014, Finland

Introduction

Sports clubs, as settings of organized sports, informal education, and voluntary participation, have been acknowledged as potential settings for health promotion [1–4]. Participation in club sports is popular among children and adolescents [5, 6], and it has various physical (e.g. fitness) [7], psychological, and social (e.g. self-esteem, social interaction) [8] health benefits despite some disadvantages (e.g. injuries) [9]. Health promotion in sports clubs is more than increasing participants' physical activity via sports activities. This includes, for example, creating healthy environments for sports or dealing with various health issues within sports activities [10, 11]. This benefits both sports and public health.

Previous cross-sectional research has identified sports clubs' positive health promotion orientation [11, 12], which may lead to higher level of health promotion guidance activity [13]. This, in turn, may support the participants' performance and development in sports [3]. Research on *coaches' health promotion activity* has shown that coaches have estimated themselves as more active than sports participants have perceived [14]. Both coaches and sports participants have reported that from various health topics, coaches most often discuss sleep, injury prevention, and training when ill [14]. In addition, promotion of a healthy lifestyle by coaches is associated with sports participants' enjoyment in sports [15, 16] and perceived health among adults [16]. Moreover, promoting fair play is associated with a decreased intention to drop out [15], increased enjoyment, and better perceived health among adults [16].

Longitudinal evidence is scarce. It shows how adolescents' perceptions of sports club's health promotion policies and practices change longitudinally and that policies and practices, for example, related to the friendliness of coaches and injury prevention, may influence sports club participartion [17]. This is important knowledge because injuries are common among organized sports participants; at least one acute injury in the past year was reported by 44% of 14 to 16 year-old [9] and by 33% of 16 to 20 year-old [18] organized sports participants. Moreover together with illness, injuries are a significant reason for dropout in organized sports for 52% of female and 45% of male dropouts aged 15 to 19 years [19]. However, to date longitudinal research on how coaches' health promotion activity relates to maintained participation and dropout in organized sports in emerging adulthood [20], including female sports participants, is lacking [14, 16, 21].

Adolescent organized sports participants have been shown to be more likely to have *healthy lifestyle habits* (e.g. related to physical activity, nutrition, and substance use) than nonparticipants in adolescence in Norway and Finland [22–24] as well as in adulthood in Finland [25]. However, studies have shown that unhealthy lifestyle habits are common among organized sports participants. For example, about 80% of female and 70% of male organized sports participants aged 15 in Finland did not fill the recommendations for physical activity (60 min of moderate to vigorous physical activity/day) [26, 27] or sleep (at least 9 h/night) on schooldays [26, 28]. Moreover, 40–53% of female and 66–75% of male organized sports participants did not eat vegetables and fruits daily [29]. In addition, 74% of Finnish 16–20-year-old active sports club participants were not physically active enough [24]. Longitudinal research from the United States shows that substance use at age 19–22 was more likely among those who had participated in organized sports at age 18 than among nonparticipants [30]. Moreover, 40% of organized sports participants dropped out of club sports by emerging adulthood [19, 31]. However, research is mainly cross-sectional, and longitudinal studies on how changes in participation in organized sports are related to lifestyle habits in emerging adulthood are scarce.

This longitudinal study aimed firstly to explore adolescents' perceptions of coaches' health promotion activity and their association with the maintenance of participation in organized sports in emerging adulthood. Secondly, differences in lifestyle habits between maintainers, dropouts, and nonparticipants in organized sports were explored.

In this study, sports clubs refer to the independent organizations of the third sector typical in Finland and other Nordic as well as some European countries, mostly working on a voluntary basis, i.e. voluntary associations, providing sports for voluntary participants, having mostly voluntary but also paid coaches, using the sport facilities of the municipality or their own, charging for members and participation, and possibly receiving state and municipality subsidies [32].

Materials and methods

Ethics

The study was approved by the Ethics Committee of the Healthcare District of Central Finland in 2012 and 2016 (record numbers 23U/2012 and 2016). Written informed consent was obtained from the participants,

and when participants were under 18 years of age, from their guardians.

Sample

This longitudinal study was based on the health behavior questionnaire data of the Finnish Health Promoting Sports Club (FHPSC) study (see the study protocol article) [33]. The adolescents were recruited *via* sports clubs (organized sports participants) and schools (organized sports participants or nonparticipants) [33]. Double answers were combined, resulting in 2149 study participants at baseline (2013–2014). Of these, 619 adolescents (of which 382 reported being females and 227 males) aged 15 (mean age 15.5, SD 0.6) participated again at age 19 in the follow-up study (2017–2018). Of these, 191 were *maintainers* (i.e. sports participants at both time points), 255 *dropouts* (i.e. sports participants at baseline, but sport nonparticipants at follow-up), 170 *nonparticipants* (i.e. sports nonparticipants at both time points), and 3 *joiners* (i.e. sports nonparticipants in baseline, but sports participants at follow-up) at age 19 as a result of a previous FHPSC study [19]. Due to a small number, joiners were excluded from the analyses. All study participants answered questions related to lifestyle habits at the age of 19 years. Only organized sports participants recruited *via* sports clubs ($n = 323$) were asked to report their perceptions of coaches' health promotion activity on various health topics at age 15 (Table 1).

Measures

At baseline, a question battery related to *perceived coach's health promotion activity on health topics* was used, and the adolescents were asked *'How often during the past six months has your coach discussed the following health topics with you?'* (see Table 1). The health topics were selected for the battery in a previous study [34]. A 4-point response scale was used: very often, often, rarely, and never. These were dichotomized as *frequent* (very often/often) and *infrequent* (rarely/never). The sum variable, that is, the index of *coach's general health promotion activity* was formed of the health topics and 33% splitting was used resulting in categories of *frequent, medium,* and *infrequent*. Dichotomization, sum variable and splitting to thirds have also been used in previous studies [14, 34].

The questions related to *lifestyle habits* in follow-up were validated in a previous Health Behavior in School-aged Children (HBSC) study [33, 35]. The same questions were used at both measurement points; hence, based on the recommendation of moderate to vigorous physical activity for adolescents aged ≤ 18 years (60 min/day) [27] *physical activity* was assessed by the following item: *'During the past seven days, how often have you done physical activity for at least 60 min'* The response options were 0,1,2,3,4,5,6, and 7 days. These were dichotomized as *7 days/week* and *< 7 days/week* to explore whether the recommendation was met.

Sleep was assessed using the following items: (i) *'When do you usually go to bed weekdays?'*, the response options: 'at 21.00/21.30/…/02.00 a'clock at the latest or later' (ii) *'When do you usually wake up weekdays?'*, the response options: 'At 5.00/5.30/…/8.00 a'clock at latest or later. According to the recommendations, the appropriate sleep duration for young adults (age 18 onwards) is 7–9 h [28]. *Sleep duration* was calculated, and the variable was dichotomized as follows: *≥ 8 h* (average recommendation met) and *< 8 h* (not met).

The use of salad, fruits, and vegetables was assessed by the following question: '*How often do you eat following food items?*'. The items were 'salad', 'fruits', and 'vegetables'. The response options for each item were: 'never/less than once a week/once a week/2–4 days a week/5–6 days a week/once a day every day/more than once a day every day'. The sum variable was formed and dichotomized as follows: *at least one of these (salad, fruits, or vegetables) more than once a day every day* and *less*, since the recommendation is five portions per day [36].

The use of cigarette, *snuff,* and *alcohol* was assessed by the following question: *'How often do you use cigarette/snuff/alcohol at the moment?'*. The response

Table 1. Study sample.

Baseline study participants recruited from sports clubs and schools	Follow-up study participants	Organized sports participation patterns	Total sample of study participants recruited from sports clubs and schools				Study participants recruited from sports clubs (part of the total sample)		
			Female	Male	N/A	Total	Female	Male	Total
2149	619 (mean age 15.5, SD 0.6)	MAINTAINERS	101	87	3	191	75	74	149
		DROPOUTS	167	83	5	255	109	65	174
		NONPARTICIPANTS	112	56	2	170			
		Joiners	2	1	0	3			
		Total	382	227	10	619	184	139	323

options for cigarette and snuff use were daily/every week, but not every day/less than once a week/I don't use'; and for alcohol use 'Once a week or more often/ couple of times per month/about once a month/less frequently/I don't use'. The variables were dichotomized as follows: *no use* and *use* (= all the other options) since cigarette and snuff impact negatively on health and are a cause of death and disease [37], amount of alcohol used (moderate or binge drinking) was unknown, and no amount of alcohol that is safe for health can be established [38].

Longitudinal organized sports participation patterns [19] were used with categories *maintainers* and *dropouts* when the coach's health promotion activity was explored between the patterns, and with categories *maintainers, dropouts,* and *nonparticipants* when lifestyle habits were explored.

Statistical analysis

Analyses were performed using SPSS Version 26, with statistical significance set at $p < 0.05$. *Percentage distributions* of female and male sports participants according to how they perceived the coaches' health promotion activity in different health topics, and of female and male maintainers and dropouts according to how they perceived coaches' general health promotion activity, and of maintainers, dropouts, and nonparticipants according to the lifestyle habits, were conducted. Due to a small number of males in some categories the lifestyle habits were not analysed separately by gender. *Chi-square test, Fisher's exact test,* and *z-test* were used to test the differences between organized sports participation patterns. The effect size was estimated using *Cramer's V. Binary logistic regression analysis* was used to explore how coaches' general health promotion activity related to organized sports participation patterns, and how the patterns related to lifestyle habits, which, in the bivariate analyses, showed statistically significant differences between the patterns. The models were adjusted for gender.

Results

The percentage distributions of female and male sports participants at age 15 according to how they *perceived coaches' health promotion activity in different health topics* are shown in Table 2. The majority of the female and male organized sports participants (51.8–69.6%) perceived coaches' health promotion activity as frequent in the health topics of sleep and rest, injury prevention, and training when ill.

Perceived coaches' general health promotion activity was associated with changes in organized sports participation among males. Males who had perceived coaches' general health promotion activity as frequent were more likely maintainers than dropouts (48.6 vs. 20.0%) (χ^2 (2) = 12.89, p = .002, effect size = 0.30). There was no difference among females (Table 3). According to the regression analysis, perceiving coach's health promotion activity as frequent increased the odds of being a maintainer rather than a dropout (OR 1.78, 95% CI 1.03–3.07, p = .038) (Table 4).

The percentage distributions of maintainers, dropouts, and nonparticipants according to the *lifestyle habits* reported at age 19 are presented in Table 5. Maintainers had healthy lifestyle habits more commonly when compared to nonparticipants or dropouts (22.3–93.7 vs. 6.0–74.1 or 6.7–85.9%, respectively), with

Table 2. The percentage distributions of female and male sports participants at age 15 according to how they perceived coaches' health promotion activity in different health topics (%).

	Total (n = 323)		Females (n = 184)		Males (n = 139)		χ2			Effect size
Health topics	Frequent	Infrequent	Frequent	Infrequent	Frequent	Infrequent	Value	df	p	Cramer's V
Injury prevention	67.2	32.8	69.6	30.4	64.0	36.0	1.10	1	.294	0.06
Sleep/rest	65.3	34.7	66.3	33.7	64.0	36.0	0.18	1	.671	0.02
Training when ill	56.0	44.0	59.2	40.8	51.8	48.2	1.78	1	.182	0.07
Physically active lifestyle	46.7	53.3	45.7	54.3	48.2	51.8	0.21	1	.649	0.03
Nutrition	46.1	53.9	45.7	54.3	46.8	53.2	0.04	1	.843	0.01
Hygiene	27.6	72.4	29.3	70.7	25.2	74.8	0.69	1	.406	0.05
Cigarette	10.8	89.2	9.2	90.8	12.9	87.1	1.13	1	.288	0.06
Doping substances	10.2	89.9	11.4	88.6	8.6	91.4	0.67	1	.414	0.05
Alcohol	9.6	90.4	8.7	91.3	10.8	89.2	0.40	1	.527	0.04
Snuff	8.7	91.3	6.0	94.0	12.2	87.8	3.91	1	.048	0.11
Violence related to sport	8.4	91.6	7.1	92.9	10.1	89.9	0.93	1	.334	0.05
Drugs	6.8	93.2	5.4	94.6	8.6	91.4	1.28	1	.259	0.06
Sexual issues	2.8	97.2	1.6	98.4	4.3	95.7	2.11	1	.181[F]	0.08

[F]= Fisher's exact test.

Table 3. The percentage distributions of female and male maintainers and dropouts according to how they perceived coach's general health promotion activity (%).

	Females ($n = 184$)		χ^2			Effect size	Males ($n = 139$)		χ^2			Effect size
Coach's general health promotion activity	Maintainers	Dropouts	Value	df	*p*	Cramer's V	Maintainers	Dropouts	Value	df	*p*	Cramer's V
Frequent	32.0	28.4	0.37	2	.829	0.05	48.6*	20.0*	12.89	2	.002	0.30
Medium	32.0	35.8					23.0*	41.5*				
Infrequent	36.0	35.8					28.4	38.5				

*difference according to z-test.

Table 4. Binary logistic regression analysis of the association of coach's general health promotion activity with maintained participation compared to dropout ($n = 323$).

	OR (95% CI)	*p*
Coach's general health promotion activity		
Infrequent	1	
Medium	0.83 (0.48-1.42)	.48
Frequent	1.78 (1.03-3.07)	.038

OR = odds ratio, CI = confidence interval.
The model was adjusted for gender.

the exception of alcohol use, when compared to non-participants (89.5 vs. 80.6%).

In the regression analysis, maintainers had higher odds of meeting the recommendations of physical activity (OR 4.36, 95% CI 2.10–9.04, $p < .001$) and sleep (OR 2.48, 95% CI 1.57–3.92, $p < .001$), eating salads, fruits, and vegetables more than once a day every day (OR 2.25, 95% CI 1.41–3.60, $p < .001$), and not using cigarettes (OR 5.31, 95% CI 2.62–10.73, $p < .001$), but lower odds of not using alcohol (OR 0.49, 95% CI 0.27–0.90, $p = .021$) when compared to nonparticipants. Maintainers had higher odds of meeting the physical activity recommendation (OR 4.05, 95% CI 2.19–7.49, $p < .001$) and not using cigarettes (OR 2.51, 95% CI 1.23–5.10, $p = .011$) when compared to dropouts. Dropouts had higher odds of meeting the sleep recommendation (OR 1.83, 95% CI 1.21–2.77, $p = .004$) and not using cigarettes (OR 2.12, 95% CI 1.28–3.50, $p = .003$), but lower odds of not using alcohol (OR 0.43, 95% CI 0.25–0.77, $p = .004$) when compared to nonparticipants (Table 6).

Discussion

This study focused on *sports participants' perceptions of coaches' health promotion activity* and how these perceptions predicted *maintained participation and dropout* in organized sports in emerging adulthood. In addition, differences in *lifestyle habits between maintainers, dropouts,* and *nonparticipants* in organized sports were explored.

The majority of the 15-year-old female and male participants in organized sports perceived that *coaches' health promotion activity in the health topics related to* sleep and rest, injury prevention, and training when ill, was frequent, but in most of the health topics it was infrequent. However, also many sports participants perceived, that coaches discussed injury prevention, sleep, and training when ill, infrequently. These results reinforce previous research on males [14] and adds to the knowledge on females.

It is understandable that health topics related to sports training and performance are frequently addressed during training. However, there may be many reasons why coaches are not active in various health topics. Previous research has shown that lack of time and competence may explain coaches' inactivity in health promotion [39, 40]. This may especially apply to typical Finnish youth sports clubs, where coaches mainly work on a voluntary basis [32]. In addition, coaches may assume that sports participants behave healthily, for example, are physically active enough and do not use substances, or that other stakeholders like home and school are responsible for adolescents' health promotion. Moreover, some topics are more sensitive, for example, nutrition and sexual issues, and may be why they are not frequently discussed.

The current study also adds knowledge on gender differences by showing that more likely males than females perceived that snuff use was frequently discussed by coaches. This may be due to more typical snuff use among males which in turn may reflect coaches' reactive rather than proactive behavior in health promotion as previous study with the same cohort suggests [23].

This study also showed, for the first time, to our knowledge, that among males, those who had *perceived coaches' general health promotion activity* as frequent were more likely maintainers than dropouts, but among females, there was no difference. A previous study with the same cohort and international research have shown that more commonly males have a strong competitive orientation than females [41, 42]. Hence, one interpretation is that more male maintainers put effort into competitive sports and are participants in sports clubs in which coaches have competence in

Table 5. The percentage distributions of maintainers, dropouts, and nonparticipants according to the lifestyle habits reported at age 19 (%).

Lifestyle habits	Total $n = 609–616$	Maintainers $n = 188–191$	Dropouts $n = 253–255$	Nonparticipants $n = 168–170$		χ2		Effect size
Physical activity					Value	df	*p*	Cramer's V
7 days/week	11.3	22.3[a]	6.7[b]	6.0[b]	32.88	2	<.001	0.23
< 7 days/week	88.7	77.7[a]	93.3[b]	94.0[b]				
Sleep								
≥ 8 h	66.6	72.8[a]	69.6[b]	55.3[b]	14.05	2	<.001	0.15
< 8 h	33.4	27.2[a]	30.4[b]	44.7[b]				
Salad, fruits, and vegetables								
At least one of these more than once a day every day	33.3	39.8[a]	33.7[a,b]	25.3[b]	8.55	2	.014	0.12
Less	66.7	60.2[a]	66.3[a,b]	74.7[b]				
Alcohol								
No use	12.5	10.5[a]	9.4[a]	19.4[b]	10.37	2	.006	0.13
Use	87.5	89.5[a]	90.6[a]	80.6[b]				
Cigarette								
No use	85.1	93.7[a]	85.9[b]	74.1[c]	27.43	2	<.001	0.21
Use	14.9	6.3[a]	14.1[b]	25.9[c]				
Snuff								
No use	89.4	90.6[a]	89.0[a]	88.8[a]	0.38	2	.828	0.03
Use	10.6	9.4[a]	11.0[a]	11.2[a]				

[a,b,c]= differences according to z-test.

Table 6. Binary logistic regression analysis of the lifestyle habits at age 19 according to the patterns of organized sports participation ($n = 323$).

Organized sports participation patterns	Physical activity 7 d/wk			Sleep ≥ 8 h			Salad, fruits, and vegetables (at least one of these more than once a day every day)			No alcohol use			No cigarette use		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Maintainers vs. nonparticipants*	4.36	2.10–9.04	<.001	2.48	1.57–3.92	<.001	2.25	1.41–3.60	<.001	0.49	0.27–0.90	.021	5.31	2.62–10.73	<.001
Maintainers vs. dropouts*	4.05	2.19–7.49	<.001	1.36	0.83–2.09	.164	1.48	0.99–2.23	.057	1.13	0.60–2.13	.698	2.51	1.23–5.10	.011
Dropouts vs. nonparticipants*	1.08	0.48–2.44	.860	1.83	1.21–2.77	.004	1.52	0.98–2.36	.064	0.43	0.25–0.77	.004	2.12	1.28–3.50	.003

OR = odds ratio, CI = confidence interval.
The model was adjusted for gender. *reference category.

health promotion and see health promotion activities important for athletes' success. Among females, other factors such as school studies, injuries, or friends dropping out of sports as significant dropout reasons of the same cohort [19] may influence sports participation, and coaches' frequent health promotion activity may not necessarily maintain it.

Since there were also many female and male maintainers who had perceived coaches' general health promotion activity as infrequent, other significant factors for participation in sports, for example enjoyment in sports [43, 44], friends [44], and competitiveness [42], may maintain participation. On the other hand, many female and male dropouts had perceived coaches' health promotion activity as infrequent. This may affect dropping out, especially if other factors do not favor participation. Moreover, individuals may differ in how they perceive the same quantity and quality of health promotion activities. The quantity and tone of the discussion, especially on sensitive topics such as nutrition in aesthetic or weight-sensitive sports such as gymnastics and figure skating, may affect the intention to drop out.

The current study also added knowledge by showing that maintainers were more likely to have more *healthy lifestyle habits* in emerging adulthood than nonparticipants or dropouts. In addition, dropouts were more likely to have more healthy lifestyle habits than nonparticipants. In previous publications, the 15-year-old sports participants of the same cohort showed to have more often healthy lifestyle habits compared to nonparticipants of the same age [23, 26, 29]. Moreover, another Finnish study showed a positive association between sports participation in adolescence and lifestyle habits in adulthood [25].

Healthier lifestyle habits among sports participants compared to other groups may be due to many factors. Our previous findings suggest for example that perceived parental support for physical activity and sport, adolescents' academic success [19] as well as competitive orientation [42] are related to maintained participation in organized sports in emerging adulthood. Also, high parental education is associated with participation in organized sports and healthy lifestyle habits among teenagers [22]. Thus, exposure to support and knowledge in various environments i.e. in sports clubs, at school, and at home, and one's own understanding as well as motivation to behave healthily for success in sports could explain the healthier lifestyle habits of maintainers. On the other hand, more maintainers and dropouts reported alcohol use compared to nonparticipants in the current study; however, at age 15, there was no difference between sports participants and nonparticipants [23]. This result is in line with international research showing that sports participation at teenage years was more likely than nonparticipation related to alcohol use in early adulthood [30]. Friends in sports teams and social pressure may affect alcohol use.

The results of this current study also provide an opportunity to compare the lifestyle habits of those who continued to participate in sports clubs with their lifestyle habits at the age of 15 [26, 29]. The majority of the maintainers in the current study met the average recommendation for sleep of aged 18–25, that is, at least 8 h/night [28], on weekdays, as the majority of the sports participants at age 15 years of the same cohort met this minimum recommendation for sleep of aged 14–17 [28] on weekdays (73% vs. females 78%, males 80%) [26]. However, almost as many maintainers in the current study as sports participants at age 15 did not meet 60 min of physical activity daily (78% vs. 83% f, 70% m) [26] or did not eat salads, fruits, or vegetables many times per day or daily (60% vs. 40–53% f, 66–75% m) [29]. Other activities such as school studies or work together with time used in organized sports training may explain why 60 min of physical activity per day is not met. In addition, it may be usual in emerging adulthood not to think of diseases or losing one's health, which could explain the low consumption of salads, fruits, and vegetables. These habits are also in line with frequently (sleep) and infrequently (physical activity and nutrition) discussed health topics.

The current study showed some positive results related to perceived coaches' health promotion activity and maintained sports participation, as well as sports maintainers' lifestyle habits. However, it also suggests that coaches' discussions on e.g. injury prevention and many lifestyle habits are not always sufficient or timely, and do not often support maintained participation or promote healthy lifestyle habits since also many maintainers had unhealthy lifestyle habits. These suggestions are also supported by the fact that injuries are common in organized sports [9, 18], and together with a focus on studying, they are a significant reason for dropout among both females and males [19].

Injury prevention strategies used in sports club [17], and coaches' behavior have been shown to affect the decision to participate in sports [17, 45]. In addition, if there is an injury, it could be important to ensure social connections and involve injured sports participants in the sports society with peers during rehabilitation. Moreover, promoting flexibility in combining studies and sports may support maintained participation in sports. Hence, health promotion may reduce health-related reasons for dropout, such as pressure related to time use or injuries [19, 45]. Furthermore, encouragement of healthy lifestyle habits by coaches has been shown to have a positive effect on participants' enjoyment of sport [15, 16] which in turn may maintain participation [43, 44].

There is a need to promote coaches' health promotion activity when it is infrequent, and not forget the responsibility of home and formal education. However, there may also be a need to promote coaches' knowledge and competence in health promotion [39, 40].

Strengths and limitations

The strengths of this study include longitudinal data that provides an opportunity to explore longitudinal organized sports participation patterns that are rarely used in studies focusing on coaches' health promotion activity or sports participants' lifestyle habits. Moreover, this study explored rarely studied late adolescent age brackets and females.

One limitation is that the perception differences in the quantity and quality of the coaches' health promotion activity may have affected the questionnaire answers. In addition, for the possibility of getting a trend in the cohort study, the physical activity recommendation for adolescents (i.e. 60 min/day of moderate to vigorous physical activity) was also used at age 19, and not the recommendation for adults (aged 18–64 years; ≥ 150 min/week of moderate to vigorous physical activity) [27]. There might be more study participants who complete the less time-demanding physical activity recommendation. Moreover, dichotomization of the variables related to the lifestyle habits hides variation among maintainers, dropouts, and nonparticipants, but provides possibility to explore whether

recommendations for lifestyle habits are met. Many measures of lifestyle habits still show a need for health promotion within organized sports activities.

In the future, it is important to study the association of lifestyle habits with sports participation patterns by gender with a larger sample. In addition, measures of quality should be used regards to health promotion activity and lifestyle habits (e.g. related to sleep and diet). Studies using different methods, such as interviews and observations, are also needed to determine the quality of health promotion activities that support maintained participation in organized sports among adolescents.

Conclusions

Perceiving coaches' health promotion activity as frequent was related to maintained participation in organized sports among males. Maintainers were more likely to have more healthy lifestyle habits than non-participants and dropouts. There is a need to invest in coaches' health promotion activity when it is infrequent. A more detailed understanding is needed of coaches' health promotion activity that supports both maintained participation in sports, especially among females, and healthy lifestyle habits in emerging adulthood.

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Authors contributions

SK was the principal investigator for the HPSC study and was a major contributor to reviewing the manuscript together with KR. KR and JV designed and conducted the analyses and KR drafted the manuscript. PK, TA, OH, RK, JP, KS, KT, AU, MV, TV, JV, and SK critically reviewed the final manuscript. All authors contributed to the design of the study and have read and approved the final manuscript.

Disclosure statement

The authors report no conflict of interest.

Data availability

The data used in this study are not publicly available because they contain identification information. However, some parts of the data may be requested by the principal investigator (SK) upon reasonable request.

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ORCID

Katja Rinta-Antila http://orcid.org/0000-0002-1346-212X
Pasi Koski http://orcid.org/0000-0001-5352-3698
Tuula Aira http://orcid.org/0000-0001-9770-1732
Olli J. Heinonen http://orcid.org/0000-0002-1722-1729
Raija Korpelainen http://orcid.org/0000-0002-3627-0542
Jari Parkkari http://orcid.org/0000-0001-5211-9845
Kai Savonen http://orcid.org/0000-0002-6871-8153
Arja Uusitalo http://orcid.org/0000-0001-5177-0273
Tommi Vasankari http://orcid.org/0000-0001-7209-9351
Sami Kokko http://orcid.org/0000-0001-9436-5681

References

[1] Geidne S, Quennerstedt M, Eriksson C. The youth sports club as a health-promoting setting: an integrative review of research. Scand J Public Health. 2013;41(3):1–11. doi: 10.1177/1403494812473204.
[2] Van Hoye A, Geidne S, Seghers J, et al. 2022. Health promotion in sports settings. In: Handbook of settings-based health promotion. Cham (Switzerland): Springer, 189–200.
[3] Kokko S. Guidelines for youth sports clubs to develop, implement, and assess health promotion within its activities. Health Promot Pract. 2014;15(3):373–382. doi: 10.1177/1524839913513900.
[4] Kokko S. Sports clubs as settings for health promotion: fundamentals and an overview to research. Scand J Public Health. 2014;42(15 Suppl):60–65. doi: 10.1177/1403494814545105.
[5] Mathisen FKS, Kokko S, Tynjälä J, et al. Leisure-time physical activity and participation in organized sports: changes from 1985 to 2014 in Finland and Norway. Scand J Med Sci Sports. 2019;29(8):1232–1242. doi: 10.1111/sms.13431.
[6] Kokko S, Martin L, Geidne S, et al. Does sports club participation contribute to physical activity among children and adolescents? A comparison across six European countries. Scand J Public Health. 2019;47(8):851–858. doi: 10.1177/1403494818786110.
[7] Telford RM, Telford RD, Cochrane T, et al. The influence of sport club participation on physical activity, fitness and body fat during childhood and adolescence: the LOOK longitudinal study. J Sci Med Sport. 2016;19(5):400–406. doi: 10.1016/j.jsams.2015.04.008.
[8] Eime RM, Young JA, Harvey JT, et al. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. Int J Behav Nutr Phys Act. 2013;10(1):98. doi: 10.1186/1479-5868-10-98.

[9] Ristolainen L, Toivo K, Parkkari J, et al. Acute and overuse injuries among sports club members and non-members: the finnish health promoting sports club (FHPSC) study. BMC Musculoskelet Disord. 2019;20(1):32. doi: 10.1186/s12891-019-2417-3.
[10] Eime RM, Payne WR, Harvey JT. Making sporting clubs healthy and welcoming environments: a strategy to increase participation. J Sci Med Sport. 2008;11(2):146–154. doi: 10.1016/j.jsams.2006.12.121.
[11] Kokko S, Kannas L, Villberg J. Health promotion profile of youth sports clubs in Finland: club officials' and coaches' perceptions. Health Promot Int. 2008;24(1):26–35. doi: 10.1093/heapro/dan040.
[12] Van Hoye A, Sarrazin P, Heuzé JP, et al. Coaches' perceptions of french sports clubs: health-promotion activities, aims and coach motivation. Health Educ J. 2015;74(2):231–243. doi: 10.1177/0017896914531510.
[13] Kokko S. Health promoting sports club - Youth sports club's health promotion profiles, guidance, and associated coaching practice. Jyväskylä: University of Jyväskylä; 2010.
[14] Kokko S, Villberg J, Kannas L. Health promotion in sport coaching: coaches and young male athletes' evaluations on the health promotion activity of coaches. Int J Sports Sci Coach. 2015;10(2–3):339–352. doi: 10.1260/1747-9541.10.2-3.339.
[15] Van Hoye A, Heuzé JP, Van den Broucke S, et al. Are coaches' health promotion activities beneficial for sport participants? A multilevel analysis. J Sci Med Sport. 2016;19(12):1028–1032. doi: 10.1016/j.jsams.2016.03.002.
[16] Van Hoye A, Johnson S, Geidne S, et al. Relationship between coaches' health promotion activities, sports experience and health among adults. Health Educ J. 2020;79(7):763–774. doi: 10.1177/0017896920919777.
[17] Casey MM, Eime RM, Harvey JT, et al. The influence of a healthy welcoming environment on participation in club sport by adolescent girls: a longitudinal study. BMC Sports Sci Med Rehabil. 2017;9(1):12. doi: 10.1186/s13102-017-0076-y.
[18] Parkkari J, Leppänen M. Liikuntavammat urheiluseuroissa, vapaa-ajalla ja opiskeluliikunnassa. In: Kokko S, Hämylä R, Martin L, editors. Nuorten liikuntakäyttäytyminen suomessa; LIITU-tutkimuksen tuloksia 2020. [The physical activity behaviours of adolescents in Finland; results of the LIITU study]. Helsinki: State Sport Council Publications; 2021. vol. 1, pp. 90–94.
[19] Rinta-Antila K, Koski P, Heinonen OJ, et al. Educational and family-related determinants of organized sports participation patterns from adolescence to emerging adulthood: a four-year follow-up study. Int J Health Promot Educ. 2022;61(06):317–331. doi: 10.1080/14635240.2022.2116943.
[20] Arnett JJ. Emerging adulthood: a theory of development from the late teens through the twenties. Am Psychol. 2000;55(5):469–480.
[21] Van Hoye A, Heuzé JP, Meganck J, et al. Coaches' and players' perceptions of health promotion activities in sport clubs. Health Educ J. 2018;77(2):169–178. doi: 10.1177/0017896917739445.
[22] Torstveit MK, Johansen BT, Haugland SH, et al. Participation in organized sports is associated with decreased likelihood of unhealthy lifestyle habits in adolescents. Scand J Med Sci Sports. 2018;28(11):2384–2396. doi: 10.1111/sms.13250.
[23] Ng K, Mäkelä K, Parkkari J, et al. Coaches' health promotion activity and substance use in youth sports. Societies. 2017;7(2):4. doi: 10.3390/soc7020004.
[24] Mononen K, Blomqvist M, Koski P, et al. Urheilu ja seuraharrastaminen. In: Kokko S, Hämylä R, Martin L, editors. Nuorten liikuntakäyttäytyminen suomessa; LIITU-tutkimuksen tuloksia 2020 [The physical activity behaviours of adolescents in Finland; results of the LIITU study]. Helsinki: State Sport Council Publications; 2021. vol. 1, pp. 36–45.
[25] Palomäki S, Hirvensalo M, Smith K, et al. Does organized sport participation during youth predict healthy habits in adulthood? A 28-year longitudinal study. Scand J Med Sci Sports. 2018;28(8):1908–1915. doi: 10.1111/sms.13205.
[26] Mäkelä K, Kokko S, Kannas L, et al. Physical activity, screen time and sleep among youth participating and non-participating in organized sports–The Finnish Health Promoting Sports Club (FHPSC) study. APE. 2016;06(04):378–388. doi: 10.4236/ape.2016.64038.
[27] World Health Organization. Global recommendations on physical activity for health. 2010; [cited 2023 Sep 28] Available from: https://iris.who.int/bitstream/handle/10665/44399/9789241599979_eng.pdf?sequence=1;
[28] Hirshkowitz M, Whiton K, Albert SM, et al. National sleep foundation's sleep time duration recommendations: methodology and results summary. Sleep Health. 2015;1(1):40–43. doi: 10.1016/j.sleh.2014.12.010.
[29] Heikkilä L, Korpelainen R, Aira T, et al. The associations between adolescents' sports club participation and dietary habits. Transl Sports Med. 2021;4(5):617–626. doi: 10.1002/tsm2.249.
[30] Veliz P, Schulenberg J, Patrick M, et al. Competitive sports participation in high school and subsequent substance use in young adulthood: assessing differences based on level of contact. Int Rev Sociol Sport. 2017;52(2):240–259. doi: 10.1177/1012690215586998.
[31] Kwon S, Janz KF, Letuchy EM, et al. Developmental trajectories of physical activity, sports, and television viewing during childhood to young adulthood: Iowa Bone Development study. JAMA Pediatr. 2015;169(7):666–672. doi: 10.1001/jamapediatrics.2015.0327.
[32] Koski P, Itkonen H, Lehtonen K, et al. Sports clubs in Finland. In: Breuer C, Hoekman R, Nagel S, and van der Werff H, editors. Sport clubs in Europe: a cross-national comparative perspective. Switzerland: Springer International Publishing; 2015. pp. 147–160.
[33] Kokko S, Selänne H, Alanko L, et al. Health promotion activities of sports clubs and coaches, and health and health behaviours in youth participating in sports clubs: the health promoting sports club study. BMJ Open Sport Exerc Med. 2015;1(1):e000034. doi: 10.1136/bmjsem-2015-000034.
[34] Kokko S, Kannas L, Villberg J, et al. Health promotion guidance activity of youth sports clubs. Health Educ. 2011;111(6):452–463. doi: 10.1108/09654281111180454.
[35] Currie C, Inchley J, Molcho M, et al. Health Behaviour in School-aged Children (HBSC) study protocol: background, methodology and mandatory items for the 2013/14 survey. 2014; [cited 2023 Mar 29]. Available from: http://www.hbsc.org.

[36] World Health Organization. Healthy diet. 2020; [cited 2024 Jan 16]. Available from: https://www.who.int/news-room/fact-sheets/detail/healthy-diet.
[37] World Health Organization. Tobacco. 2010; [cited 2024 Jan 16]. Available from: https://www.who.int/europe/news-room/fact-sheets/item/tobacco.
[38] Anderson BO, Berdzuli N, Ilbawi A, et al. Health and cancer risks associated with low levels of alcohol consumption. Lancet Public Health. 2023;8(1):e6–e7. doi: 10.1016/S2468-2667(22)00317-6.
[39] Lane A, Murphy N, Donohoe A, et al. Health promotion orientation of GAA sports clubs in Ireland. Sport Soc. 2017;20(2):235–243. doi: 10.1080/17430437.2016.1173920.
[40] Kokko S, Kannas L. Terveyskasvatus nuorten jääkiekkovalmennuksessa [health education in ice hockey coaching of adolescents]. Liik Tiede. 2004;41:45–48.
[41] Baron-Thiene A, Alfermann D. Personal characteristics as predictors for dual career dropout versus continuation – A prospective study of adolescent athletes from german elite sport schools. Psychol Sport Exerc. 2015;21:42–49. doi: 10.1016/j.psychsport.2015.04.006.
[42] Rinta-Antila K, Koski P, Aira T, et al. Sports-related factors predicting maintained participation and dropout in organized sports in emerging adulthood: a four-year follow-up study. Scand J Med Sci Sports. 2023;34(1):e14523. doi: 10.1111/sms.14523.
[43] Hopkins CS, Hopkins C, Kanny S, et al. A systematic review of factors associated with sport participation among adolescent females. Int J Environ Res Public Health. 2022;19(6):3353. doi: 10.3390/ijerph19063353.
[44] Thedin Jakobsson B. What makes teenagers continue? A salutogenic approach to understanding youth participation in swedish club sports. Phys Educ Sport Pedagogy. 2014;19(3):239–252. doi: 10.1080/17408989.2012.754003.
[45] Rottensteiner C, Laakso L, Pihlaja T, et al. Personal reasons for withdrawal from team sports and the influence of significant others among young athletes. Int J Sports Sci Coach. 2013;8(1):19–32. doi: 10.1260/1747-9541.8.1.19.