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The Danish “11 for Health” programme raises health knowledge, well-being and fitness in ethnic minority 10-12-year-olds

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Key words: Minority health, non-communicable diseases, health promotion, physical education, association football, soccer
OBJECTIVES: This study investigated the effects of the health promotion intervention “11 for Health in Denmark” programme on 10-12-year-old ethnic minority schoolchildren’s enjoyment, health knowledge, well-being and fitness. METHODS: 1122 Danish 5th grade schoolchildren with ethnic minority background from 154 schools were randomised (5:1) to an intervention group (IG, n=944) or a control group (CG, n=178). The IG and CG were also divided into subgroups of children active in a sports club (IGPA: n=644; CGPA: n=122) and not active in a sports club (IGPI: n=300, CGPI: n=56). IG participated in the “11 for Health in Denmark” 11-week program, consisting of 2×45 min per week of football drills, small-sided games, and health education, whereas CG continued their regular activities. Pre-post physical testing and questionnaires were applied (short version of the multidimensional well-being questionnaire KIDSCREEN-27, and a 34-item health knowledge questionnaire). RESULTS: The “11 for Health in Denmark” programme was rated moderate-to-high on a 1-5 scale for enjoyment by girls (3.57) as well as boys (3.65). The intervention had positive between-group effect on health knowledge in relation to hygiene (IG vs GC: 10.6%-points (CI95%: 6.9:14.3), P<0.05), nutrition (9.6%-point (CI95%: 7.4:11.8), P<0.01)
and physical activity 4.4%-points (CI95%: 2.2;6.6) as well as overall health knowledge (5.7%-points, (CI95%: 4.3;7.1), P<0.05), with similar effects for girls and boys. The IGPI subgroup showed a positive effect on well-being (P=0.04, school and learning) and also fitness effects on performance and VO\(_2\) Max (P=0.02; P=0.01). The IGPA subgroup showed a positive effect on fitness scores (P=0.02, BMI). CONCLUSION: The intervention program was enjoyable and had a positive impact on health knowledge of ethnic minority background schoolchildren. In addition, the intervention programme had the strongest positive effects on well-being and fitness scores for the non-sports club-active children.

**Introduction**

Physical inactivity is strongly related to health problems in the western world [1-2], and many citizens do not follow national physical activity (PA) guidelines [2]. Physical inactivity (PI) is an increasing public health threat globally as well as in Denmark [3]. PI challenges citizens well-being and quality of life, but also has great economic costs [3]. Challenges also exist among children and recent research in Denmark has shown that only 26% of the 11-15-year-old schoolchildren in Denmark adhere to the national PA guidelines [4].

It is widely accepted that school-based health education can be a cost-effective and efficient strategy to deliver public health messages to children [5]. Furthermore, regular physical activity, especially during childhood and adolescence, has important positive effects on physical and mental health [6]. Many studies conclude that children, which are physically active during childhood, are more likely to also be active in later life [7-9].

Health education is included in school curriculum for 10-12-year old children in Denmark, but not in a formal manner and spread across subjects. It is compulsory for school children to undertake an average of 45 min of physical activity per day and physical education (PE) classes contribute with 2–3 of these 45 min bouts per week. Combining health education and physical activity provides a win-win scenario [10]. The present COVID-19 epidemic clearly demonstrates the need for children, as well as adults, to develop new and specific health knowledge and behaviors, urging for increased health education within schools [11].

Recent evidence also suggest that the choice of physical activities may also be important. In a study by Nielsen and colleagues [12] it was found that children (boys and girls) who played football in a sports club after school, had a higher daily level of moderate and vigorous activity compared to
their peers. Interestingly, half of the difference could be explained by higher activity levels during school time [12]. Such effects were also seen among other sports club active children, however, not with the same effect as football [12]. Another recently published study showed that involvement in leisure time sport, and especially in football, is associated with improved physical and mental health in 10-12-year-old girls, e.g., resting heart rate and cardiovascular fitness [13]. Thus, it seems fair to suggest that the children that are active in sports clubs in their leisure time, may be winning the race towards an active and healthy future. Hence, interventions aimed at improving physical activity in school for the non-active schoolchildren, seem important and could potentially be of great value for health later in life.

A particular group of interest with regard to PI and health are ethnic minority children. In general, ethnic minority background citizens have poorer self-rated health, higher and more frequent incidences of long-term illness and poorer mental health than the majority population [14-16]. This is also the case for ethnic minority background children in Denmark. Children with ethnic minority backgrounds compared with children with ethnic Danish background have a higher blood sugar level [17], more frequent incidence of type 1 diabetes [17], greater D-vitamin deficiency [18-19], and poorer dental health [20-21] as well as increased incidence of obesity [22]. In addition, minority background children show more psychosocial challenges such as sleep problems, stress and loneliness compared to children with an ethnic Danish background [23-27]. Moreover, physical activity patterns highlight significant differences between children with an ethnic minority background and children with Danish majority background [28-30]. Girls with ethnic minority backgrounds participate significantly less in sports and physical activity than girls with ethnic Danish background, while there are less significant differences among the boys [29]. However, fewer boys are active in sports-clubs compared to their majority counterparts [29-30]. Health and physical activity patterns of ethnic minority children also impact their adult life [29-30]. Thus, effective interventions that include ethnic minority children are needed. School interventions are of particular interest because fewer ethnic minority children are active in sports clubs in their leisure time [28-30].

The “11 for Health in Denmark” large-scale cluster-randomised controlled trial provides a rare insight into an under researched group of schoolchildren with an ethnic minority background, who face more health-related challenges than their peers and show markedly different physical activity patterns. This study investigated whether a large-scale physical activity study affects ethnic minority to the same degree as ethnic majority schoolchildren [10; 31-34]. We hypothesized that the
participants enrolled in the “11 for Health in Denmark”, both girls and boys, would perceive the programme as enjoyable. We also hypothesized that the IG group would enhance their health knowledge compared to CG. We furthermore hypothesized that the “11 for Health in Denmark” programme would affect well-being and increase fitness levels in 10-12-year-old ethnic minority children more than the regular curriculum. However, we also hypothesized that the effects on well-being and fitness levels caused by the intervention may be most significant among ethnic minority children not enrolled in sports clubs.

Methods

Sample

The “11 for Health in Denmark” programme is a large-scale cluster-randomised controlled trial study, to which all Danish schools were invited. All children from the participating schools were included in the study, provided they had written consent from their parents. 154 schools located in 63% of the Danish municipalities (69 of 98) took part in the trial. 1122 Danish schoolchildren with ethnic minority background (53.1% boys and 46.9% girls) aged 10-12 years were part of our analysis. 944 children (mean age 11.58 ± 0.534; 53.7% boys) were assigned to IG and 178 children (mean age 11.42 ± 0.456; 50% boys) were assigned to CG. The IG and CG were also divided into subgroups of children physically active in sports (IGPA: n=644; CGPA: n=122) and children physically inactive in sport (IGPI: n=300, CGPI: n=56). This sample is part of a larger sample (n=3061) of the ‘11 for Health in Denmark’ programme (see figure 1). Demographic differences between IG and CG and the reliability of KIDSCREEN subscales have been reported elsewhere [31]. A 5:1 cluster-randomisation was performed at the school level using an online random selection tool. The control schools were offered the opportunity to use the “11 for Health” programme after the intervention period and after finalising all parts of the data collection. For the intervention group, the schoolchildren participated in the Danish version of the “11 for Health” programme encompassing health education, football drills and small-sided games 2x45 min/wk for 11 weeks. The control group participated in regular PE classes and physical activity during other classes and breaks. The intervention was delivered by the teachers at school, who prior to intervention start, had participated in a training course. The study was approved by the Regional Committees on Health Research Ethics for Copenhagen and Southern Denmark (J.no. H-16026885).
The “11 for Health in Denmark” intervention
The design, content and implementation protocol of the “11 for Health in Denmark” programme is published elsewhere [31]. The two weekly “11 for Health” sessions were either delivered within PE lessons or in any other subject, separated by at least 40 hours to optimise the physiological training effects. Prior to the actual intervention all the relevant educators (teachers and pedagogues) from each participating school participated in a 2½-day interactive training course. These training courses were conducted semi-annually over a 2-year period in three different geographical locations in the country. This ensured that no teacher or educator had more than 2 hours of travelling and ensured demographic diversity in the study. The training courses were facilitated by the Danish Football Association (DBU) and the University of Southern Denmark (SDU), in cooperation between experienced football coaches and scientists, who demonstrated the football skills and health-related discussions and explained the tests included in the project. Upon completion of the course, the ability of the participating teachers and educators to deliver the sessions was tested using a series of teach-backs [31]. All training course participants received a comprehensive manual describing the philosophy of the programme and the potential effects of the programme on well-being and health profile. The manual also outlines the skills required to teach the programme in an enjoyable yet educational way and defines the content and timing of each feature of the programme. The programme and manual were developed and modified with input from the teachers and pedagogues who participated in the pilot study [32-33].

Questionnaire with basic information
In the questionnaire, the children answered general biographical questions about age, gender, country of birth, language at home, parents’ country of birth, parents’ employment status (employed/unemployed), and leisure-time sporting activities (Yes/No. If yes: which sport?). If they were involved in a sport, they were asked to report the number of weekly training sessions. If they were active in more than one leisure-time sport, they were instructed to state the sport they did most often. This part of the questionnaire was a self-developed section but based on a comparable questionnaire that has been used in previous studies in similar age groups in Denmark [34-35]. All data were collected at the participating schools during class.
Health knowledge and enjoyment of the intervention

The children’s health knowledge within each of the 10 health topics delivered through the “11 for Health in Denmark” intervention, was evaluated pre-intervention and post-intervention using a 34-item health knowledge questionnaire and distributed using SurveyXact. In this study we used a slightly modified version of that used in the pilot study [33], aiming at 50% correct answers at baseline to detect potential changes. The participants completed it using either a computer or tablet in the classroom. Items in the questionnaire were presented in one of two formats: (1) ‘true’, ‘false’ or ‘don’t know’ and (2) multiple-choice questions with four response options (only one of which was correct). The questions for the 10 health topics were distributed randomly within the questionnaire. The mean percentage and SD of correct responses to each health message were based on all individual answers for that health message. To evaluate the enjoyment of the “11 for Health in Denmark” intervention as the secondary outcome, the IG children reported whether they liked the programme and football in general. The exact questions were ‘How did you like the ‘11 for Health programme?’ and ‘How fun do you think football is?’ The answers were given on a Likert-type scale with values of 1 and 2 representing negative views (not at all and not), 3 a neutral view (neither/nor) and 4 and 5 positive views (fun/liked and very fun/liked a lot).

Well-being

A shortened Danish version of the generic KIDSCREEN-27 questionnaire [31] was used to measure self-reported well-being [36]. KIDSCREEN-27 is based on WHO’s definition of quality of life, it is multidimensional and comprises of 27 items covering five dimensions, including “physical well-being” (5 items, e.g., “In general, how would you say your health is?”); “psychological well-being” (7 items, e.g., “Thinking about the last week has your life been enjoyable?”); “peers and social support” (4 items, e.g., “Thinking about the last week have you had fun with your friends?”); and “school environment” (4 items, e.g., “Thinking about the last week have you been happy at school?”). In our version, we excluded the dimension “autonomy and parents” (7 items) as no changes were expected in this aspect based on the intervention and to minimize the number of questions the children had to answer. KIDSCREEN-27 uses a five-point Likert scale ranging from “never” to “always” or “not at all” to “extremely”. The standardized scores for the subscales are specified to have a mean of approximately 50 and a standard deviation of approximately 10. Higher scores indicate a better well-being. KIDSCREEN-27 has previously shown good reliability.
(Cronbach's alphas 0.80-0.84) and good test-retest reliability [37]. Questionnaires were filled out either before the physical testing or on a separate day.

**Physical fitness**
The following procedures and methods were used to measure the children’s physical fitness.

**Procedures**
The physical fitness measurements were always performed in the same order, starting with resting BP, resting heart rate (RHR), and body composition measurements, followed by a standardized warm-up, a standing long jump test, and a Yo-Yo intermittent recovery level 1 children’s test (YYIR1C). All measurements were taken during the school day at the children’s schools. The physical testing was conducted by trained test personnel from the involved universities.

**Resting Blood Pressure and Heart Rate**
After 8 minutes of rest in a supine position, 3 BP measurements were taken at approximately one-minute intervals. The measurements were taken in a quiet room on the left upper arm with an automatic BP monitor (M6 HEM-7223-E, Omron, IL). The cuff size was adjusted to the arm as appropriate, and the BP measurement was tested on the children’s arm to let them know the feeling of the measurement. If the first 3 systolic BP (SBP) or diastolic BP (DBP) varied by more than 10 mm Hg, an extra measurement was taken. Resting HR was measured simultaneously by the automatic BP monitor.

**Body Composition**
Body mass, muscle mass (kg), and percentage body fat (%) were measured using an InBody 270 multifrequency body composition analyzer (Biospace, San Diego, CA). The subjects were weighed barefoot and in light clothing. A recent study from our laboratory tested the validity and reliability of the InBody 270 compared with DXA-scanning in 127, 10–12-year-old girls and boys, with interclass correlation of 0.99 for fat percentage and 0.97 for muscle mass [38]. Height was measured with 0.1 cm precision using a Tanita Leicester portable altimeter (Tanita, Amsterdam, Netherlands). For ethical reasons, the participants were not given the test results for their body composition.

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**Standing Long Jump**

The standing long jump was performed after a shortened version of the FIFA 11+ warm-up program as described by Ørntoft et al. [32]. The subjects performed 2 jumps separated by a 5–10-minute rest. The jumps were performed in shoes or bare feet. The subjects started standing still with their toes just behind a line and feet parallel and shoulder-width apart. The children were instructed to flex their knees to a 90° squat position with their hands on their hips and hold this position for around 2 seconds before jumping as far as they could, still with their hands on their hips. The distance from the start line to the heel position was measured in centimetres with a measuring tape. Each child had 2 attempts separated by 5–10 minutes; the longest jump was noted as the test result. The standing long jump is validated for Caucasian children aged 6–17 years and is strongly associated with upper-body (r =0.82–0.86) and lower-body (r=0.69–0.85) maximal muscle strength and showed a moderate-to high reliability [39].

**Cardiovascular Fitness**

Cardiovascular (CV) performance was estimated by the YYIR1C test. The test has been validated in children [40] and was performed indoors in a sports or gym hall. The test consisted of two 16-m shuttle runs back and forth between cones placed 16m apart at progressively increasing speeds, interspersed by 10 seconds of jogging after each bout of running around a cone placed 4 m behind the start line. Each run was separated by a beep sound from an audio played through loudspeakers. The tempo of the beep sounds was increased throughout the test. The first time the subject did not make the finish line in time, a warning was given; the second time, the test ended for the subject. Total running distance was recorded. Before the actual test, the children got familiar with the test procedure by running 3 shuttle runs at the lowest pace (also intended to provide an extra warm-up before the test). VO\(_2\)\(_{\text{max}}\) was estimated from the running distance in the YYIR1C test by the following equation: VO\(_2\)\(_{\text{max}}\) = 0.0116 x + 42.3 ml·min\(^{-1}\)·kg\(^{-1}\), as described by Ahler et al. [40].

**Balance Test**

Postural balance was assessed using the Stork balance stand test [41]. The children placed their hands on their hips, then placed the non-supporting foot against the inside knee of the supporting leg. They then raised their heel to balance on the ball of the foot. The test was conducted without shoes. A stopwatch was started as the heel was raised from the floor. The timer was stopped if (a)
the hand came off the hips, (b) the supporting foot swivelled or moved in any direction, (c) the non-supporting foot lost contact with the knee, and (d) the heel of the supporting foot touched the floor. The Stork balance test has been reported to have a high test–retest reliability in an athletic adolescent population and is found valid for young adults [41].

Statistics

Statistical analyses were performed using STATA. All analyses were based on the intention-to-treat method [42], based on an evaluation of the effect of introducing the 11 for Health in Denmark programme, with no corrections for actual attendance. A descriptive analysis of the sample was conducted with all participants’ data where there were valid replies at both pre- and post-intervention measuring points. If a child failed to reply to one question, all the other questions were still analyzed. The “sports active” and “sports inactive” distributions were analysed using a chi-square test. The applied significance level was 0.05. Mean (SD) values are reported for each of the 10 health messages, based on all individual items related to the message, together with an overall ‘11 for Health in Denmark’ intervention mean (SD) value. Pre to post, within-group differences were tested using a z-test. Afterwards, the between-group differences in delta values were tested using the difference-in-differences test. Effect sizes (ES) were calculated as recommended by Morris [43], with ES greater than 0.50 interpreted as large and ES of 0.50–0.30, 0.30–0.10 and <0.10, respectively, as medium, small and trivial [44].

Results

In the following section we will present the results of programme enjoyment, health knowledge, well-being and physical fitness.

Programme enjoyment

All minority school children

The ‘11 for Health in Denmark’ programme was evaluated as enjoyable with a moderate-to-high overall score (3.6±1.1 on a scale from 1-5). The children active in leisure sport outside of school rated the programme on average with 3.6±1.1 on enjoyment. Children not active outside of school rated the programme on average with 3.5±1.0 (on a scale from 1-5). This indicates that the children enjoyed the programme independent of how active they are in their time. These numbers are in line
with the overall sample, who elsewhere [10] reported an overall score of (3.6±1.0 on a scale from 1-5).

Girls versus boys
The girls found the ‘11 for Health in Denmark’ programme enjoyable with a moderate-to-high overall score (3.6±1.0 on a scale from 1-5). Boys also found the ‘11 for Health in Denmark’ programme enjoyable with a moderate-to-high overall score (3.6±1.1). Thus, both boys and girls find the programme equally enjoyable and fun. These numbers are in line with the overall sample who [10] evaluated the programme as enjoyable with equal moderate-to-high scores for girls (3.6±1.0) and boys (3.7±1.1).

Health knowledge

All pupils
The number of correct health knowledge answers increased (p<0.05) by 9.7±13.3%-points in IG (from 53.3±12.6 to 62.9±14.0%-points) and by 4.0±12.8%-points in CG (from 52.2±13.1 to 56.2±14.7%-points), with a significant between-group difference in favour of IG (difference in change score of 5.7%-points; (CI95%: 4.3;7.1), P<0.05) (Table 1). Marked between-group differences were observed for the main health knowledge areas, hygiene (IG v GC: 10.6%-points (CI95%: 6.9:14.3), P<0.05,), nutrition (9.6%-point (CI95%: 7.4:11.8), P<0.01), physical activity 4.4%-points (CI95%: 2.2:6.6), P<0.01) and a tendency for well-being (2%-points (CI95%: 0.2:4.2), P<0.0.069) but not for smoking/alcohol (Table 1). The within-group increases in health knowledge for each of the 5 main areas varied from 4.5-17.1%-points in IG and from 0.3-6.3%-points in GC, corresponding to decreases in the health knowledge deficit of 17-42% and 1-20%, respectively (Table 1). Results from the health knowledge questionnaire based on domains, can be found in Table 1.

*Insert table 1 here*

Well-being

All pupils
When analysing all pupils’ well-being from pre to post intervention no significant differences were found between IG and CG (table 2).

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Physically active in leisure-time sports clubs vs sports club inactive

When analysing differences in the four KIDSCREEN well-being subscales for the IG children active and not active in sports clubs after the intervention programme, we found significantly different changes with regard to perception of the school environment ($p=0.04$)(table 2). The children not active in sport clubs improved their school related well-being whereas sports club active children did not.

*Insert table 2 here*

Physical fitness

Children active in sport clubs

Physical fitness of IG compared to CG after the intervention programme only showed significant developmental differences with regard to BMI levels ($p=0.02$) (table 3).

*Insert table 3 here*

Children not active in leisure-time sport clubs

Physical fitness of IG compared to CG for the physically inactive in leisure-time sport clubs showed significant differences with regard to Yo-Yo test performance ($p=0.02$), height ($p=0.01$) and $VO_2$ max ($p=0.02$) (table 4). However, the intervention group was significantly taller than the control group, which might explain some of the differences in Yo-Yo and $VO_2$ max.

*Insert table 4 here*

Discussion

The major findings of the present study were that the “11 for Health in Denmark” intervention program had a positive impact on health knowledge of ethnic minority background schoolchildren and all participants rated the intervention enjoyable. Furthermore, the intervention seemed to have more positive effects on the children not previously active in sport clubs with regard to well-being and physical fitness.

Programme enjoyment

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It is well established that an essential aspect for the regular maintenance of physical activity is based on participants’ enjoyment [45-46], which was high in both genders in this study. The enjoyment of the programme is a promising result, as other studies show that enjoyable experiences are important for increasing activity levels in children and adolescent [47]. It is found particularly important, that both boys and girls rated the programme as moderate to highly enjoyable, since girls generally rate ‘football in general’ lower than the boys [10]. This is especially relevant since girls with ethnic minority background are more physically inactive [28-30] compared to boys and thus the potential health risks are higher for this group [17-22]. However, more research is needed on the specific effects of the ‘11 for Health in Denmark’ programme on ethnic minority background girls enjoyment as this construct was only assessed via one item.

Health knowledge
The findings in this study suggest that the ‘11 for Health in Denmark’ programme is a very successful intervention in increasing health knowledge. The strong improvements in 8 out of 10 topics suggest that the ‘11 for Health in Denmark’ programme is a successful broad-spectrum health education programme aligned with WHO’s broad definition of health. The health messages showing no between-group difference (‘Respect others’ and ‘Avoid drugs, alcohol and tobacco’) already showed high knowledge levels at baseline.

Well-being
The beneficial aspects of children’s activity in football clubs on mental and physiological health are clear and were outlined by Ørntoft et al. [32; 34] in a pilot study prior to this study. Furthermore, increased social competences in young football club members have been shown by Haugen et al. [44]. Madsen et al. [13] previously reported the positive effects of the 11 for Health programme on well-being. In this specific subsample of ethnic minority children well-being effects were found with regard to school environment and, here, only for those children not active in leisure-time sports clubs. Since ethnic minority background children are less active in leisure-time sports clubs compared to the majority children [29-30] this finding is especially relevant. Thus, the 11 for Health programme may be an important intervention to improve school well-being for the group of children not active in a sports club.

Physical fitness

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Ethnic minority background schoolchildren participating in leisure-time sports and enrolled in the ‘11 for Health in Denmark’ programme developed a better physical health profile, in particular a lower BMI than the control group. Lower BMI levels are important because ethnic minorities show a higher blood sugar level [17], more frequent incidence of type 1 diabetes [17], as well as increased incidence of obesity [22]. A lowered BMI may be a protective factor against such health risk factors. However, as stated earlier the relatively few significant findings among those children active in sport clubs may not be that surprising due to this groups’ higher levels of physical activity in their leisure time [13]. This group has a relative high fitness level from the start and more intense training loads than the ones in the intervention are needed to improve their fitness. Ethnic minority background schoolchildren in the ‘11 for Health in Denmark’ who were not physically active in their leisure-time, experienced positive effects on test performance and \( \text{VO}_2\text{max} \). Test performance in the YYIR1C testing is well correlated with maximal oxygen uptake measured in the laboratory setting [40]. Cardiovascular fitness in children and adolescents is known to affect risk factors for future BMI, body fat, and metabolic syndrome, making a good cardiovascular fitness important for future health [48]. With the high risk factors for this particular group in mind [17-22], these results show yet another important effect of the ‘11 for Health in Denmark’ programme. The positive development on the Yo-Yo test performance and \( \text{VO}_2\text{Max} \) are of particular interest as it suggests that ‘11 for Health in Denmark’ can significantly enhance the physical fitness of an often health challenged subgroup, namely children not active in sport clubs in their leisure time. Collectively these results suggest that the ‘11 for Health in Denmark’ can be an important intervention programme for ethnic minority background children health in western countries.

**Limitations**

A limitation of this study was that we did not collect data on the ethnic minority background children’s everyday activities such as active transport, or other social or physical activities, which in other studies has been found higher for especially the boys during school days [29]. Neither do we have any data on the duration of participation in leisure-time sports club activities for the informants. More time in a leisure-time sports club is probably more beneficial to well-being and physical health. Finally, the YYIR1C test has only been evaluated for children with moderate-to-high \( \text{VO}_2\text{max} \) values, which may result in overestimation of the \( \text{VO}_2\text{max} \) values for the least fit leisure-time inactive informants in this study and an underestimation of the actual \( \text{VO}_2\text{max} \) difference between the leisure-time active and inactive. Lastly, this study lacks results about the
long-term effects of the programme and if changes in health knowledge had an influence on health attitude and health behaviour at a later stage in life.

**Perspectives**

Building on this study, Madsen et al. [31] and Larsen et al. [10] studies on well-being, health knowledge and physical fitness for schoolchildren participated in the school-based intervention “11 for Health in Denmark. The “11 for Health in Denmark” program can contribute to increased health knowledge, well-being and physical fitness in 5th grade children with ethnic minority background and will hopefully be used in the future for the benefit of more children regardless of their background. The results provide specific information of an often overlooked subgroup with substantial health challenges now and later in life compared to their peers. The result should be taken into consideration by parents, politician, schools and sports organizations to increase ethnic minority children’s participation in physical activity. A higher degree of physical activity, would possibly increase fitness profile and well-being of future generations, which is particular important to ethnic minority school children in Denmark.

**Conclusion**

The “11 for Health in Denmark” intervention had a positive impact on health knowledge in ethnic minority background schoolchildren and they rated the intervention as enjoyable. Furthermore, the “11 for Health in Denmark” programme had positive psychological effects on school well-being, on those children who were non-sports-club active prior to the intervention. The intervention program also had positive effects on physical fitness level scores and distance covered/test performance measures, for those who were non-sports-club active prior to the intervention. The leisure-time sport active children in IG had a significant positive effect on BMI levels, compared to the CG. In sum, the ‘11 for Health’ model seems to be a promising intervention for health promotion in ethnic minority background schoolchildren aged 10–12 years and especially for those children not active in a sports club.

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**Contributors:** KR implemented the intervention, conducted testing, analysed the data, prepared the first draft of the paper, revised the manuscript and approved the final submission. SRC analysed the data, prepared the first draft of the paper and revised the manuscript. MNL modified the “FIFA 11 for Health” programme for the Danish context (“11 for Health in Denmark”), contributed to the education manual, conducted testing, analysed the data, revised the manuscript and approved the final submission. A-ME contributed to the design of the study, revised the manuscript and approved the final submission. MM, EEM & CSA implemented the intervention, conducted testing, revised the manuscript and approved the final submission. PK modified the “11 for Health” programme for the European context (“FIFA 11 for Health in Europe”) and subsequently for the Danish context (“11 for Health in Denmark”), designed the study, applied for funding, implemented the intervention, revised the manuscript and approved the final version of the paper.

**Competing interests:** No competing interests.

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**Data availability statement:** Research data are not shared.
References


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Table 1: Health knowledge pre and post divided into domains and collectively.
## Table 2: Data from pre and post intervention programme, as well as active vs inactive, on well-being based on the four subscales of KIDSCREEN for physical active in leisure-time sports clubs and physical inactive in leisure-time sports clubs.

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Table 4: Physical fitness pre and post the intervention programme of ethnic minority background children not physical active in sport clubs