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A survey of students' attitudes to implementing physical activity in Danish vocational education schools

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Abstract

Background: With the purpose of increasing the level of physical activity (PA) among Danish adolescents the Danish government initiated a large scale vocational school reform in 2015 requiring that vocational schools must ensure that students are physically active 45 min every day.

Purpose: To investigate how many students' experience 45 min of PA per day as required by the Danish vocational school reform and to study possible associations between attitudes to PA and different student characteristics for instance students' self-reported fitness level.

Methods: Using a cross-sectional questionnaire vocational education students' attitudes and experiences with PA in school was assessed and combined with background questions about age, gender, self-reported PA in school and self-reported fitness level.

Results: 678 students with an average age of 17.2 (SD = 2.1) answered all questions. This study showed that Danish vocational school students self-reported 23.6 (SD = 16.6) minutes of PA per day. Only 18.3% of male students and 13.3% of female students self-reported 45 min of PA per day as required by the vocational school reform. This study also showed that Danish vocational school students had a relatively positive attitude to implementing PA in school. Self-reported fit students had a more positive attitude than self-reported unfit students and likewise students in the PA-high group presented a more positive attitude compared to the PA-low group. In addition, significantly more students with PA allocated on their lesson timetable were in the PA-high group. Students that were glad to attend the BP1 in general also had a more positive attitude towards implementing PA in school. Furthermore, students who were highly satisfied with the vocational schools' facilities for PA were more likely to be in the PA-high group.

Keywords: Health promotion, Vocational education, Education reform, Adolescent health, Physical activity, Survey

Background

With the purpose of increasing the level of PA among Danish adolescents the Danish government initiated a large scale vocational school reform in 2015. A crucial part of the reform stated that “*vocational colleges must organise the teaching in the basic programme in such a way that students participate in physical exercise and activity each day within the overall teaching time to an extent corresponding to an average of 45 min per day*” (The Danish Ministry of Education 2014). Using the school setting as a platform to implement health initiatives is in line with a growing global trend (Busch et al. 2013) and evidence suggests that school setting initiatives can increase PA levels among adolescents (Dobbins et al. 2009).

Participating in regular PA can have positive effects on adolescent’s health (Andersen et al. 2004, 2011; Granger et al. 2017; Strong et al. 2005), academic performance (Fedewa and Ahn 2011; Singh et al. 2012), and well-being (Ahn and Fedewa 2011; Biddle and Asare 2011; Norris et al. 2015). Despite the well-known benefits of PA 80% of the worlds’ 13–15-year-olds do not engage in the recommended 60 min of moderate to vigorous physical activity per day (Hallal et al. 2012).

While young children often rely on their parents to make health behavior choices, this changes gradually during adolescence, constituting this time-period as essential for both current and future health behavior of the 15 to 18-year-olds. Consequently, support from the school system is vital during this period as health behavior choices of adolescents’ tracks into adulthood (Berenson 2002).

The Danish legislative requirements from 2015 (The Danish Ministry of Education 2014) of 45 min of PA during a school day is the first time Danish vocational schools are obligated to implement PA in daily school practice. This is a challenge for many vocational schools, teachers, and students (COWI 2016). Some schools are implementing PA in the classroom teaching, some in recess while others have allocated timeslots on the lesson timetable.

The average fitness level of Danish children and youth has been stable over the past decades (Danish Health Authority 2011) with estimated maximum oxygen uptake for boys = 52 mL/min/kg and girls = 41 mL/min/kg in 1983, 1997, and 2003 respectively with no difference between the cohorts (Andersen et al. 2010). However, the polarization between the physically active and the physically inactive is growing and is especially large for adolescents (Danish Health Authority 2011). Also, research has shown that the odds of clustering cardiovascular disease risk factors in 9- and 15 year-old children is 3.29 times higher in the least physically active quintile compared to the most physically active quintile (Andersen et al. 2006). For this reason, the present study brings attention to the students that are least physically active during school, their attitude towards PA and association with their self-reported fitness level.

Purpose

The purpose of this study is to investigate how many students experience 45 min of PA per day as required by the Danish vocational school reform. Furthermore, the study investigates possible associations between attitudes to PA and different student characteristics for instance students’ self-reported fitness level.

Methods

The vocational education and training system in Denmark offers more than 100 different types of vocational educations e.g. carpenter, hairdresser, gardener, electrician or several other skilled professions. The students spend the majority of their time in practical training in an approved company or organization with 4–5 school periods during their 3–3½ years of education. For students who transfer directly from lower secondary the first school period is a 20-week basic program (BP-1). The BP-1 aims to give students a broad view of the vocational programs enabling the students to choose the right vocational education. Consequently, students at the BP-1 have not yet chosen which subject they will pursue and thus represents a very broad spectrum of students.

Sample schools

Twenty-eight schools were randomly chosen from a list of 94 Danish vocational schools. Seventeen of these schools participated in the survey whereas 11 schools were not able to participate due to exams or because the BP1 course had already ended. Data was collected during the last week of the basic course in January 2017 (9th–13th). The required sample size was estimated to 589 students given a margin of error of 4% and a 95% confidence interval. Based on an expected follow-up rate of 60% at least 982 students should be asked for participation. A total of 955 students received a link to the online questionnaire. Given a higher follow-up than anticipated the required number of students was reached.

Measurements

All information was obtained by a questionnaire developed for this study comprising 20 items concerned with different aspects of school related PA. Development of the questionnaire was inspired by studies on barriers and facilitators (Martins et al. 2015; Weatherson et al. 2017), existing questionnaires e.g. Kenyons (1968): “Attitudes Towards Physical Activity” (ATPA) and “International Physical Activity Questionnaire” (IPAQ) (Craig et al. 2003) as well as literature on survey methodology (Schwarz et al. 2008; Smyth 2016).

Initially, the students were asked about their age, gender and self-reported level of PA during school. The later was assessed on a scale from zero to “more than 60 min” (5 min intervals). The students were then asked when they had experienced exercise (E) and PA during BP1: (1) at social events, (2) during classroom teaching, (3) allocated PA on the lesson timetable, (4) during breaks/recess, (5) before or after school.

Using a 5-point Likert scale ranging from high disagreement to high agreement the student’s attitude to PA during school was assessed by asking if PA: (1) has an effect on social well-being in the class, (2) help the student to concentrate, (3) makes it more fun to go to school, (4) is a nice break from class room teaching, (5) makes the student learn more about health, (6) makes the student healthier, (7) disrupts teaching, (8) is not meaningful in a school day, (9) is a good idea. Using a similar 5-point Likert scale the schools’ facilities for PA were assessed by the students including (1) The classrooms, (2) The common areas e.g. hallway, stairways, hall, (3) Sports arena, (4) Outdoor areas and (5) The shower facilities. The students were then asked to assess their own fitness level

on a 5-point Likert scale ranging from poor to very good. Finally, the students should evaluate how glad they were with the BP1 on a 5-point Likert scale ranging from “not at all” to “to a very high degree”.

Statistical analysis

For all Likert scale items students were given the possibility to answer “do not know”. The use of this response ranged from 3.7% ($n/N = 25/678$) for the item “PA is a good idea” to 24.5% ($n/N = 166/678$) for the item on shower facilities indicating that this answer could also be interpreted as “not applicable” since not all Danish vocational schools have such facilities. For analysis-purposes all “do not know” answers were treated as missing data and list wise deletion was applied. Consequently, n varies and is provided for all analyses. Furthermore, all Likert scale items were skewed with few replies in the least positive response categories. The Brant test of the parallel regression assumption disclosed that using the 5-point Likert scale violated this assumption. Consequently, all Likert scale items were dichotomized to binary outcome with the two most positive responses versus the three less positive responses. Furthermore, a cut-off value of 10 min was applied to the 5-min interval-scaled item of self-reported level of PA during school, generating a binary variable: PA-low (≤ 10 min) and high PA-high (≥ 15 min).

Statistical analyses using χ^2 tests were performed to determine whether variances in attitudes towards PA and school facilities differed with different variables as level of PA, fitness, and gender. Multiple logistic regression analyses were used to investigate possible associations between the students’ attitudes towards PA or school facilities and different covariates. Initially, a model including six potential covariates was fitted with backward elimination of insignificant covariates. Age and PA level showed to be insignificant for all items on attitude and was thus removed. Whereas gender, self-reported fitness level, scheduled PA, and glad to attend BP1 were included in the final model despite not presenting significant results for all items. However, all models were validated with the Pearson goodness-of-fit test showing appropriate model specification. Nevertheless, all analyses were repeated without insignificant covariates with limited occurrence of changes to the results within the first decimal place.

All statistical analyses were performed using SPSS 24.

Results

A total of 955 students received the questionnaire. Eighteen percent ($n/N = 175/955$) of the students did not answer any items whereas 10% ($n/N = 96/955$) answered only some items and was excluded. A further six students were excluded due to purposefully wrong answers—e.g. age of 100 years. Consequently, 678 students were included in the study resulting in a response rate of =71%. The average age was 17.2 years ($SD = 2.1$) and 56% of the students were males ($n = 377$).

Level of self-reported PA in vocational schools

On average students self-reported 23.6 ($SD = 16.6$) minutes of PA per day. More males (18.3%) than females (13.3%) self-reported being physically active in the required 45 min or more per day. However, more males (31.6%) than females (26.6%) were in the PA-low group. This difference in level of self-reported PA between the genders was significant

($p=0.029$). In addition, significantly more students with PA allocated on their lesson timetable were in the PA-high group ($p<0.000$). Self-reporting a low level of PA was independent of self-reported physical fitness level.

Students' attitudes to PA in vocational schools

Table 1 shows that the students in general have positive attitudes to implementing PA in vocational schools. The most affirmative attitudes were found to concern the students' experience of PA in school as a good idea (64.4%), a nice break from class room teaching (61.9%) and positively influencing social well-being in class (57.3%). A little less than half of the students found that PA during school made them healthier (48.3%), helped them concentrate (47.5%), and made school more fun (41.8%). Whereas 24.3% of the students replied that implementing PA in school learned them more about their health. Only 11.4% answered that PA interrupted their learning while 18.1% did not find it meaningful to spend time on PA in school.

For all nine items students in the PA-low group had a less positive attitude to PA compared with the PA-high group (Table 1). This difference depending on self-reported PA level was statistically significant for six of nine items (2, 3, 5, 6, 7, and 9). Similarly, significant differences in attitudes depending on self-reported fitness level were found for the following items: 1, 2, 3, 5, 6, and 9. For all nine items the self-reported fit students had a more positive attitude to implementing PA in school. However, on two items (4 and 8) the students' attitudes did not differ significantly depending on neither self-reported PA level nor self-reported fitness level. Likewise, students' attitudes to whether PA interrupts their learning (item 7) was independent of their self-reported fitness level and no

Table 1 Association between students' attitude to PA and self-reported PA in school (PA-high/PA-low) and self-reported fitness level (fit/unfit)

| Items on attitudes to PA | Agreement | PA-high % (n) | PA-low % (n) | <i>p</i> | Fit % (n) | Unfit % (n) | <i>p</i> |
|-------------------------------------------------------------------------|-----------|---------------|--------------|----------|------------|-------------|----------|
| 1. It has a positive effect on social well-being in the class (n = 634) | High | 59.0 (266) | 53.0 (97) | 0.168 | 62.4 (151) | 54.1 (212) | 0.040 |
| | Low | 41.0 (185) | 47.0 (86) | | 37.6 (91) | 45.9 (180) | |
| 2. It helps me concentrate (n = 632) | High | 50.0 (223) | 41.4 (77) | 0.048 | 59.2 (142) | 40.3 (158) | 0.000 |
| | Low | 50.0 (223) | 58.6 (109) | | 40.8 (98) | 59.7 (234) | |
| 3. It makes it more fun to go to school (n = 636) | High | 44.4 (200) | 35.5 (66) | 0.037 | 51.5 (123) | 36.0 (143) | 0.000 |
| | Low | 55.6 (250) | 64.5 (120) | | 48.5 (116) | 64.0 (254) | |
| 4. It is a nice break from classroom teaching (n = 643) | High | 63.2 (290) | 58.7 (108) | 0.290 | 66.4 (160) | 59.2 (238) | 0.069 |
| | Low | 36.8 (169) | 41.3 (76) | | 33.6 (81) | 40.8 (164) | |
| 5. I have learned more about health (n = 622) | High | 26.6 (118) | 18.4 (33) | 0.031 | 31.1 (73) | 20.2 (78) | 0.002 |
| | Low | 73.4 (325) | 81.6 (146) | | 68.9 (162) | 79.8 (309) | |
| 6. It has made me more healthy (n = 646) | High | 51.5 (238) | 40.2 (74) | 0.010 | 56.6 (137) | 43.3 (175) | 0.001 |
| | Low | 48.5 (224) | 59.8 (110) | | 43.4 (105) | 56.7 (229) | |
| 7. It interrupts my learning (n = 621) | High | 9.9 (44) | 15.4 (27) | 0.050 | 12.0 (28) | 11.1 (43) | 0.746 |
| | Low | 90.1 (402) | 84.6 (148) | | 88.0 (206) | 88.9 (344) | |
| 8. It is not meaningful to spend time on PA during school (n = 601) | High | 17.5 (75) | 19.8 (34) | 0.511 | 20.7 (46) | 16.6 (63) | 0.208 |
| | Low | 82.5 (354) | 80.2 (138) | | 79.3 (176) | 83.4 (316) | |
| 9. It is a good idea (n = 653) | High | 66.3 (307) | 56.3 (107) | 0.016 | 72.1 (176) | 58.2 (238) | 0.000 |
| | Low | 33.7 (156) | 43.7 (83) | | 27.9 (68) | 41.8 (171) | |

Italic values are statistically significant ($p \leq 0.05$)

Table 2 Multivariate association between students' attitude to PA in school and self-reported fitness level, contentment with BP1, gender and scheduled PA

| Students who highly agree? | Self-reported fitness level: fit (reference: Unfit, OR = 1.0) | Glad to attend BP1: very glad (reference: not glad, OR = 1.0) | Gender: female (reference: male, OR = 1.0) | PA scheduled: yes (reference: no, OR = 1.0) | Constant |
|-------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------|---------------------------------------------|----------|
| 1. It has a positive effect on social well-being in the class (n = 621) | | | | | |
| OR | 1.4 | 1.7 | 1.1 | 1.0 | 0.694 |
| 95% CI | 1.0–2.0 | 1.2–2.3 | 0.8–1.6 | 0.7–1.4 | |
| <i>P</i> | 0.037 | 0.003 | 0.409 | 0.943 | |
| 2. It helps me concentrate | | | | | |
| OR | 2.3 ^a | 2.3 | 1.5 | 1.1 | 0.202 |
| 95% CI | 1.7–3.3 | 1.6–3.2 | 1.1–2.1 | 0.8–1.6 | |
| <i>P</i> | 0.000 | 0.000 | 0.020 | 0.492 | |
| 3. It makes it more fun to go to school | | | | | |
| OR | 2.0 ^a | 2.1 | 1.4 | 1.7 ^a | 0.164 |
| 95% CI | 1.4–2.8 | 1.5–3.0 | 1.0–1.9 | 1.2–2.4 | |
| <i>P</i> | 0.000 | 0.000 | 0.071 | 0.002 | |
| 4. It is a nice break from classroom teaching | | | | | |
| OR | 1.5 ^a | 2.7 | 1.4 | 1.4 | 0.422 |
| 95% CI | 1.0–2.1 | 2.0–3.8 | 1.0–1.9 | 1.0–1.9 | |
| <i>p</i> | 0.029 | 0.000 | 0.085 | 0.083 | |
| 5. I have learned more about health | | | | | |
| OR | 1.9 ^a | 1.8 | 1.6 ^a | 1.5 | 0.068 |
| 95% CI | 1.3–2.7 | 1.2–2.8 | 1.1–2.3 | 1.0–2.2 | |
| <i>p</i> | 0.002 | 0.005 | 0.020 | 0.053 | |
| 6. It has made me more healthy | | | | | |
| OR | 1.6 ^a | 1.8 ^a | 0.9 | 1.2 | 0.609 |
| 95% CI | 1.2–2.3 | 1.2–2.5 | 0.6–1.2 | 0.8–1.6 | |
| <i>p</i> | 0.003 | 0.001 | 0.416 | 0.387 | |
| 7. It interrupts my learning | | | | | |
| OR | 1.2 | 0.6 | 0.7 | 0.9 | 0.320 |
| 95% CI | 0.7–1.9 | 0.4–0.9 | 0.4–1.1 | 0.5–1.5 | |
| <i>p</i> | 0.593 | 0.026 | 0.135 | 0.677 | |
| 8. It is not meaningful to spend time on PA during school | | | | | |
| OR | 1.3 | 0.9 | 0.7 | 1.0 | 0.334 |
| 95% CI | 0.8–2.0 | 0.6–1.4 | 0.5–1.2 | 0.7–1.5 | |
| <i>p</i> | 0.260 | 0.583 | 0.191 | 0.979 | |
| 9. It is a good idea | | | | | |
| OR | 2.0 ^a | 2.2 ^a | 1.4 | 1.5 | 0.432 |
| 95% CI | 1.4–2.8 | 1.6–3.1 | 1.0–1.9 | 1.1–2.1 | |
| <i>p</i> | 0.000 | 0.000 | 0.071 | 0.023 | |

Italic values are statistically significant ($p \leq 0.05$)

P: *p* value; OR: odds ratio; 95% CI: confidence interval

^a Removing insignificant variables merely changed OR with 0.1–0.4

significant difference depending on self-reported PA level was found for their attitudes towards the effect of self-reported PA on social well-being (item 1).

As shown in Table 2, self-reported fitness level and contentment with BP1 proved to be the two covariates most frequently associated with the attitude items. Results indicated

Table 3 Association between students' satisfaction with school facilities for PA and PA level during school time

| | PA-low % (n) | PA-high % (n) | <i>p</i> |
|--------------------------------|--------------|---------------|--------------|
| Classrooms (n = 637) | | | |
| High | 44.4 (80) | 55.4 (253) | <i>0.013</i> |
| Low | 55.6 (100) | 44.6 (204) | |
| Outdoor areas (n = 625) | | | |
| High | 46.9 (83) | 55.8 (250) | <i>0.044</i> |
| Low | 53.1 (94) | 44.2 (198) | |
| Common areas (n = 625) | | | |
| High | 52.6 (91) | 57.3 (259) | 0.290 |
| Low | 47.4 (82) | 42.7 (193) | |
| Sports arena (n = 525) | | | |
| High | 33.6 (48) | 52.9 (202) | <i>0.000</i> |
| Low | 66.4 (95) | 47.1 (180) | |
| Showering facilities (n = 512) | | | |
| High | 30.6 (44) | 44.8 (165) | <i>0.003</i> |
| Low | 69.4 (100) | 55.2 (203) | |

Italic values are statistically significant (p ≤ 0.05)

that students who self-report being fit or glad to attend BP1 were more likely to present positive attitudes towards PA during school. Highest odds ratios were found for the most content students who had 2.1–2.7 times larger odds of having a positive attitude to item 2, 3, 4 and 9, compared to the less content students. Similar results were found regarding students reporting high fitness level with 1.9–2.3 greater odds for item 2, 3, 5, and 9 than the self-reported unfit students.

The association between gender and attitude proved to be less consistent and results were only significant for two of nine items where female students had a higher probability of a positive attitude towards the effect of PA on their concentration (OR = 1.5, *p* = 0.02) and learning about health (OR = 1.6, *p* = 0.02) than male students. Likewise, scheduled PA was only significantly associated with two items namely responding that PA is a good idea (OR = 1.5, *p* = 0.023) and that it makes school more fun (OR = 1.7, *p* = 0.002) compared to students without PA scheduled on the lesson timetable.

Facilities

More than one in five students replied “do not know” to items on quality of sports arena (n/N = 153/678, 22.6%) and showering facilities (n/N = 166/678, 24.5%) indicating a possible lack of these facilities at some vocational schools. Results showed that approximately half of the students in Danish vocational schools were highly satisfied with the PA facilities at their school (Table 3). For showering facilities this was only the case for 40.8% of the students (n/N = 209/512) whereas high satisfaction with the common areas were a little more widespread (n/N = 350/625, 56.0%). Analysis showed that students who were highly satisfied with the vocational schools' facilities were more likely to be in the PA-high group (Table 3). This difference between PA-high and PA-low was significant for all facilities except common areas.

Table 4 Multivariate association between students’ satisfaction with facilities for PA and self-reported physical fitness, contentment with BP1, gender and scheduled PA

| | Self-reported physical fitness: fit (reference: unfit, OR = 1.0) | Glad to attend BP1: very glad (reference: not glad, OR = 1.0) | Gender: female (reference: male, OR = 1.0) | PA scheduled: yes (reference: no, OR = 1.0) | Constant |
|----------------------|------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------|---------------------------------------------|----------|
| Classrooms | | | | | |
| OR | 1.3 | 2.6 | 1.3 | 1.5 ^a | 0.288 |
| 95% CI | 0.9–1.8 | 1.8–3.6 | 1.0–1.8 | 1.1–2.2 | |
| <i>P</i> | 0.156 | 0.000 | 0.091 | 0.001 | |
| Outdoor areas | | | | | |
| OR | 1.0 | 1.9 | 1.7 | 1.1 | 0.327 |
| 95% CI | 0.7–1.4 | 1.4–2.7 | 1.2–2.4 | 0.8–1.5 | |
| <i>P</i> | 0.869 | 0.000 | 0.001 | 0.723 | |
| Common areas | | | | | |
| OR | 1.3 | 2.4 | 1.5 ^a | 1.0 | 0.376 |
| 95% CI | 1.0–1.8 | 1.7–3.4 | 1.0–2.1 | 0.7–1.4 | |
| <i>P</i> | 0.152 | 0.000 | 0.026 | 0.951 | |
| Sports arena | | | | | |
| OR | 1.5 | 1.8 | 2.9 | 2.1 | 0.074 |
| 95% CI | 1.0–2.2 | 1.2–2.7 | 2.0–4.2 | 1.4–3.1 | |
| <i>p</i> | 0.048 | 0.003 | 0.000 | 0.000 | |
| Showering facilities | | | | | |
| OR | 1.3 | 1.4 | 1.7 ^a | 1.5 | 0.192 |
| 95% CI | 0.9–1.9 | 0.9–2.0 | 1.1–2.4 | 1.0–2.2 | |
| <i>p</i> | 0.155 | 0.103 | 0.008 | 0.036 | |

Italic values are statistically significant ($p \leq 0.05$)

P: p value; OR: odds ratio; 95% CI: confidence interval

^a Removing insignificant variables merely changed OR with 0.1–0.4

Analysis of the association between high satisfaction with school facilities and the four different covariates, showed that contentment with BP1 and gender were the two items presenting most frequent association (Table 4). Accordingly, students who were glad to attend BP1 had higher odds for being satisfied with the facilities, except for showering facilities, than students who were unhappy with BP1. Similarly, results showed that compared to male students, female students were more satisfied with all facilities except classrooms. Having PA scheduled was positively associated with high satisfaction with classrooms, sports arena and showering facilities whereas self-reporting high fitness level only was positively associated with satisfaction regarding the sports arena.

Discussion

To our knowledge this is the first study to investigate students’ level of self-reported PA during school and attitude to implementing PA at vocational school level. We found that students self-reported on average 23.6 min (SD = 16.6) of PA per school day. Only 18.3% of male students and 13.3% of female students self-reported 45 min of PA per day as required by law. Consequently, there is still some way to go before implementation within this setting meets policy requirements. However, previous studies focusing on implementation of similar PA policies within Canadian elementary schools does confirm

that implementation is complex (Weatherson et al. 2017). In this review from 2017 Weatherson et al. concludes that despite the PA policy being mandated back in 2005, only 49% of the students were given the opportunity to be active for 20 min per day more than 10 years later. This indicates that fulfillment of PA policies takes time across school settings and warrants continuous evaluation in terms of implementation status.

The students in our study in general, had relatively positive attitudes to PA in school. Nevertheless, our findings also reveal that attitudes to implementation of PA are positively associated with self-reported fitness level, PA level and overall contentment with BP1.

The cross-sectional nature of this data does not allow us to conclude on the causal relationships but these associations suggests that teachers should be aware of both the students' PA level and fitness level as well as their contentment with the school as this potentially affects the students attitudes to PA in vocational schools. The link between attitude to PA and the level of self-reported PA is important. Earlier studies have shown that attitude to PA in adolescents is a predictor of PA level 5 and 10 years later (Graham et al. 2011). Working with students' attitudes thus both have a short-term effect on implementation of PA in school but also on long term level of PA.

Furthermore, there is a potential risk of creating a situation where the "rich get richer" as the students that already have positive attitudes to PA and already has a higher fitness level are more physically active in school while the students who are most in need of PA are least physically active students. Earlier research from a team-sport setting has shown how children with lower skill levels are less active than children with higher skill level participating in the same activity (Randers et al. 2014). Even though the context in this current study is different from a team-sport setting the risk of creating activities that suits the already physically active is still true. Activities to increase PA during schools must therefore be designed to include all students and not only the students with the most positive attitudes towards PA.

The analysis shows that allocating PA on the lesson time-table is associated with students self-reporting more PA in school. This indicates that allocation of slots on the time-table for PA is an effective way to increase the level of PA. At a consensus conference in 2016 24 international researchers concluded that: "*Time taken away from academic lessons in favor of physical activity has been shown to not come at the cost of scholastic performance in children and youth*" (Bangsbo et al. 2016) indicating that allocating time on the time table for PA can raise the level of PA without risk of decreasing the academic performance.

Facilities

The findings show a clear association between students' satisfaction with the schools facilities and the risk of being in the PA-low group (Table 3). Christiansen et al. (2017) found a similar link between student's satisfaction with school facilities and level of PA in lower secondary school. Data from this current study suggest that the same is true in a vocational school setting.

Students who experience allocated time for PA on the lesson time-table have more positive attitudes to their schools' class rooms, sports arena as well as showering

facilities while no association was found for common or outdoor areas. A possible explanation might be that schools with unsuitable or lack of sports arena and/or showering facilities will be less likely to schedule PA.

Results show that self-reported fit students were more likely to be highly satisfied with the sports arena. This finding is in line with research from primary and lower secondary school where motivation to PA and physical education has proven to be closely linked to the students' own perception of skill level (Davies et al. 2015). It is reasonable to assume, that the types of activities taking place in the sports arena differ from activities in the class room or common area. The fact that we only found an association between fitness and satisfaction with the sports arena could suggest that the activities linked to the sports arena especially suits the needs and preferences of the self-reported fit students.

Limitations

The cross-sectional nature of this study does not enable any conclusions on causal relationships. The associations shown in this study should be further researched in different intervention designs to establish cause and effect. Another limitation to the design is that it is based solely upon on the students' subjective assessments of all aspects of their PA, both in terms of own self-reported fitness level and school related PA. Self-reporting PA has shown to have only low to moderate correlation to direct PA measurements (Prince et al. 2008) thus conclusions on self-reporting should be interpreted with caution. Furthermore, the questionnaire used in the study has not yet been validated thoroughly in terms of content and construct validity. However, review of data showed no serious floor or ceiling effect, and the overall impression based on feedback from the students is that the questions were easy to comprehend and answer.

Conclusions

This study showed that Danish vocational school students self-reported 23.6 (SD = 16.6) minutes of physical activity per day and only 18.3% of male students and 13.3% of female students self-reported 45 min of PA per day as required by the vocational school reform. In general, students had a relatively positive attitude to implementation of PA. However, this was particularly true when students self-reported being fit or high PA level during school. In addition, positive attitude towards PA and satisfaction with PA facilities were associated with PA level, being fit, allocation of PA, and being highly content with the vocational school/BP1.

This study indicates that both policy makers and teachers at vocational schools should take into consideration that students with different self-reported levels of PA as well as self-reported fitness levels display significantly different attitudes towards PA in vocational schools. Activities and initiatives in vocational schools should thusly be designed to include both the physically active and physically inactive students taking their different attitudes into account.

Additional file

[Additional file 1.](#) The full dataset.

Authors' contributions

JVS and AM has participated in all parts of this study. MW has participated in analyzing the data and writing the paper. All authors read and approved the final manuscript.

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Not applicable.

Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

The raw data is attached in additional file 1.

Consent for publication

Not applicable.

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Not applicable.

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