Explaining socio-demographic differences in disengagement from sports in adolescence

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Purpose: The purpose of this longitudinal study is to identify risk groups for disengagement from sports during adolescence. In addition, it will be explored whether cognitive and environmental factors can explain socio-demographic differences in disengagement from sports. Methods: Data were obtained from the Environmental Determinants of Obesity in Rotterdam Schoolchildren study, and 357 adolescents were eligible for analysis. Socio-demographics (gender, ethnicity, education), individual cognitions and neighbourhood perceptions were assessed at baseline (2005/2006), and sports participation at baseline and at follow-up (2007/2008). Two dichotomous outcome variables were constructed: (i) disengagement from sports (yes/no) and (ii) ceased compliance with the fitnorm (i.e. cease engaging in sports ≥3 times/wk) (yes/no). Logistic regression and mediation analyses, we identified socio-demographic differences in the two outcomes. Subsequently, we applied mediation analyses to identify the contribution of cognitive and environmental explanatory factors of the socio-demographic differences. Results: Girls [odds ratio (OR): 2.5, 95% confidence interval (CI): 1.5–4.5] were more likely than boys to disengage from sports. Girls (OR: 2.5, 95% CI: 1.4–4.2), adolescents of non-Western background (OR: 1.8, 95% CI: 1.0–3.0) and those in lower educational levels (OR: 1.7, 95% CI: 1.0–2.9) were more likely to cease compliance with the fitnorm. Perceived neighbourhood safety partly explained gender differences in disengagement from sports (8%). Intention partly explained ethnic (32%) and educational differences (37%) in ceasing compliance with the fitnorm. Conclusions: Girls, lower-educated adolescents and those with a non-Western background showed more pronounced reductions in sports participation and compliance with the fitnorm. Intention and perceived neighbourhood safety could partially explain these differences.

Introduction

Regular sports participation has been associated with a reduced risk for various diseases and other negative health outcomes. To optimally achieve the benefits of physical activity for cardiovascular health, in The Netherlands, it is recommended that individuals comply with the 'fitnorm', i.e. participate in vigorous physical activity at least three times per week. Engaging in sports in adolescence increases the likelihood of being physically active in adulthood. Although in Western countries, many adolescents engage in sports activities in early adolescence, sports participation declines rapidly during adolescence. Socio-demographic differences in disengagement from sports are likely and may eventually lead to (widening) disparities in health. It is already known from cross-sectional studies that girls, lower-educated adolescents or those with lower academic achievements and adolescents form ethnic minority groups are less likely to engage in sports than boys, higher-educated adolescents and adolescents of Western background, respectively. Much less is known about socio-demographic differences in rates of disengagement from sports during adolescence. Groups at risk for disengagement from sports may be targeted in interventions. Two studies found some evidence for gender differences in declines in minutes spent and engaging in sufficient vigorous physical activity among adolescents. Both studies found stronger declines among adolescent boys compared with girls. However, currently there is no information on differences in disengagement with regards to ethnic background and educational level. Hence, more insight into these differences is needed to develop interventions aimed to promote sports participation, among socio-demographic groups at higher risk for disengagement from sports. That is what this study aims for. Apart from identifying differences between groups in disengagement from sports, it is also important to identify factors that may explain these differences, as these variables may be the target points for reduction of differences in disengagement from sports. Individual cognitions and perceptions of the environment may be such explaining factors. Indeed, among adults, socio-economic differences in physical activity are reported to be explained by cognitive and perceived environmental variables; similar processes may also play a role among adolescents. However, currently explanatory factors for demographic differences in disengagement from sports during adolescence have not been studied. Differences in disengagement from sports may be caused by differences in determinants, such as variables of the Theory of Planned Behaviour (TPB) or perceived environmental factors. The TPB is shown to be associated with adolescent sports participation and suggests that behaviour is determined by attitude, perceived behavioural control (PBC), subjective norm and intention to perform a behaviour. In addition, socio-ecological models suggest that, besides individual-level factors, environmental factors may play a role in shaping...
behaviour; for instance, perceived availability of sports facilities and perceived neighbourhood safety are associated with sports participation among adolescents. Besides being associated with sports behaviour, individual-level and environmental-level factors may explain socio-demographic differences in sports participation.

This longitudinal study aims to (i) explore socio-demographic differences in disengagement from sports over a 2-year period, and (ii) identify explanatory factors for disengagement from sports, by exploring potential cognitive and perceived environmental mediators of these socio-demographic differences.

Gender, ethnic background and educational level are the socio-demographic factors of interest. TPB variables (attitude, PBC, subjective norm and intention) and perceived environmental factors (perceived neighbourhood safety and perceived neighbourhood attractiveness) are the potential explanatory factors of interest.

Methods
This study draws on longitudinal data from the study on ENvironmental Determinants of Obesity in Rotterdam SchoolchildrEn (ENDORSE). ENDORSE was conducted in Rotterdam in 2005–2006 (baseline) and 2007–2008 (follow-up) among adolescents in the first and third year of secondary education. Rotterdam (The Netherlands) has ~600,000 inhabitants, of whom 46% are of non-Dutch origin. The medical ethics committee of the Erasmus Medical Center issued a ‘declaration of no objection’ for the ENDORSE study.

Sampling and procedure
At baseline, 56 schools were approached, and 24 schools were willing to participate in the ENDORSE study. A random selection of 17 of these schools participated. At baseline, in each school, five first- and third-year classes were selected for participation. At baseline, 13 schools had adolescents in their first year of secondary education who were invited to participate in the follow-up study 2 years later. During one school hour, the adolescents completed a questionnaire on dietary and physical activity and their determinants. Adolescents with complete data on the variables of interest were eligible for the analyses.

Measures
Sports participation
Sports participation was assessed at baseline and follow-up. Items on sports frequency during the past 7 days were used in the present study. These items were based on the Activity QUestionnaire for Adolescents and Adults, which showed moderate test−retest reproducibility (intraclass correlation = 0.59) for vigorous activities.

Adolescents could write down up to three sports in which they had participated during the past week, and on how many days (0–7 days) they had participated in each sport. A frequency measure of weekly sports participation was created by summing the frequencies of the reported sports activities. Two dichotomous variables were created from this score: (i) sports participation, defined as participating at least one time per week in sports (yes/no), and (ii) compliance with the fitnorm, defined as participating at least 3 times per week in sports (yes/no). These new variables were used to derive at the two outcome variables: disengagement from sports and cessation of compliance with the fitnorm. The outcome variable for disengagement was created by creating a dichotomous variable in which adolescents who participated in sports at baseline, but stopped at follow-up, were defined as ‘disengaged’ (1), whereas those who participated in sports at baseline and maintained their sports participation were considered not disengaged (0). To study cessation of compliance with the fitnorm, a similar procedure was followed.

Socio-demographic factors
The socio-demographic factors of interest were age, gender, ethnicity and education. Age, gender and ethnicity factors were constructed based on self-reported date of birth, gender, country of birth (of adolescent and both parents) from the baseline questionnaire. Exact age was calculated by subtracting the reported date of birth from the date of measurement. Based on country of birth of the adolescents and both parents, ethnicity was determined and categorized into Western and non-Western, according to the standards of Statistics Netherlands. Educational level was obtained from the schools and categorized into higher-level education (preparatory education for university) and lower-level education (vocational education).

Baseline TPB measures
All TPB variables had a 5-point answering scale. Attitude was assessed by two questions ‘I think that sports and leisure time physical activity are...’ [very bad (1) to very good (5) and very unpleasant (1) to very pleasant (5)]. Cronbach’s α for the attitude items was 0.80, and a mean attitude score was calculated. PBC was assessed by two items: a ‘capability’ item ‘How easy would it be for you to engage in sports or leisure time physical activity if you want to?’ [very difficult (1) to very easy (5)] and a ‘control’ item ‘To what extent do you decide for yourself to engage in sports or leisure time physical activity?’ [I do not decide this by myself at all (1) to I decide it all by myself (5)]. One item was used to assess subjective norm: ‘If I engage in sports or physical activity, my parents think that this is...’ [very bad (1) to very good (5)]. Intention was assessed by one item: ‘Do you intend to start/remain engaging in sports and physical activity in the next half year?’ [certainly not (1) to yes certainly (5)].

Baseline perceived neighbourhood measures
The perceived neighbourhood measures incorporated were perceived neighbourhood attractiveness: ‘I think my neighbourhood is attractive’, perceived safety: ‘I feel safe in my neighbourhood’ [totally disagree (1) to totally agree (5)] and perceived availability of sports facilities: ‘Are there sports facilities in your neighbourhood?’ [no (0), yes (1)].

Analyses
School-level variance (0.06, SE: 0.22) and class-level variance (0.43, SE: 0.41) for disengagement from sports were non-significant. Similarly, school-level variance (0.06, SE: 0.17) and class-level variance (0.29, SE: 0.32) for ceased compliance with the fitnorm were non-significant. Therefore, multilevel analyses were not warranted. Multiple logistic regression analyses were conducted to test whether gender, ethnicity, education, compliance with the fitnorm and participating in sports were associated with dropout from the study between baseline and follow-up. All analyses were done for the two dichotomous outcomes: disengagement from sports and ceased compliance with the fitnorm. Multiple logistic regression analyses were performed to analyze the associations between socio-demographic factors (adjusted for each other) and the two outcomes. Univariate logistic regression analyses assessed possible associations of TPB variables and perceived neighbourhood measures with disengagement from sports and ceased compliance with the fitnorm. Subsequently, mediation analyses were performed to identify which TPB or neighbourhood variables could explain the socio-demographic differences in both outcomes. In the first step, the association between the independent factors (i.e. demographics) and the dependent factors (i.e. disengagement from sports/ceased compliance with fitnorm) was tested. In the second step, the association of the dependent factors with the potential explanatory
factors (i.e. TPB variables and perceived neighbourhood) was tested. In the third step, the association between the explanatory factor and the dependent factor was tested, adjusted for the independent factor. The mediation analyses were conducted using a macro,


giving bootstrapped indirect effects of the mediators (i.e. the explanatory factors) under study. The percentage mediated effect was calculated by dividing the coefficient of the indirect effect by the coefficient of the association between the socio-demographic factor and the behaviour. All analyses were conducted in SPSS 17.0. Associations were considered to be significant if the $P$-value was <0.05.

**Results**

**Participants**

Of the adolescents who completed the baseline survey ($N = 762$), 430 (56%) had follow-up data. Main reasons for dropout between baseline and follow-up were changing schools (57% of dropout), absenteeism during the week of measurements in the school (19% of dropout) and declining further participation in the study (10% of dropout). Adolescents who dropped out from the study were less likely to participate in sports at baseline than those who did not (78 vs. 88%). No significant differences were found between those who were in the follow-up study but did not have complete data on the variables of interest ($n = 73$) and those in the final sample ($n = 357$).

Most adolescents complied with the fitnorm (72.6%) and participated in sports (88.5%) at baseline (table 1). The overall prevalence of compliance with the fitnorm (51.0%) ($2: 35.07$) and sports participation (70.0%) ($2: 41.18$) was significantly lower after 2 years.

**Socio-demographic differences in ceased compliance with the fitnorm and disengagement from sports**

Girls (53.5 vs. 30.4%, $2: 13.76$), adolescents with a non-Western background (49.2 vs. 30.9%, $2: 8.97$) and lower-educated adolescents (45.2 vs. 31.9%, $2: 4.75$) were more likely to cease compliance with the fitnorm compared with boys, adolescents of Western background and higher-educated adolescents, respectively (Supplementary figure S1b). Similar patterns were found for disengagement from sports (Supplementary figure S1a); however, no educational differences in disengagement from sports were found. These results were confirmed in logistic regression analyses in which socio-demographic variables were adjusted for each other: adolescent girls [odds ratio (OR): 2.5, 95% confidence interval (CI): 1.4–4.2], those of non-Western background (OR: 1.8, 95% CI: 1.0–3.0) and those attaining lower education (OR: 1.7, 95% CI: 1.4–4.2], those of non-Western background (OR: 1.8, 95% CI: 0.4–0.8) to engage in sports, higher perceived safety (OR: 0.7, 95% CI: 0.5–0.9) and higher perceived attractiveness of the neighbourhood (OR: 0.7, 95% CI: 0.5–0.9) were associated with lower odds of disengagement from sports (table 2).

**Univariate associations of potential explanatory factors with ceased compliance with fitnorm and disengagement from sports**

Adolescents with a more positive attitude (OR: 0.4, 95% CI: 0.3–0.7) and a higher intention for sports participation (OR: 0.4, 95% CI: 0.2–0.6) were less likely to cease compliance with the fitnorm compared with those with a less favorable attitude and intention (table 2). A more positive attitude (OR: 0.5, 95% CI: 0.3–0.7), a more positive intention (OR: 0.6, 95% CI: 0.4–0.8) to engage in sports, higher perceived safety (OR: 0.7, 95% CI: 0.5–0.9) and higher perceived attractiveness of the neighbourhood (OR: 0.7, 95% CI: 0.5–0.9) were associated with lower odds of disengagement from sports (table 2).

**Socio-demographic differences in potential explanatory factors**

The results for socio-demographic differences in potential explanatory factors were similar for quitting compliance with the fitnorm and disengagement from sports (table 3). Girls perceived their environment as less safe than boys, and adolescents of non-Western background perceived sports behaviour to be more under their own control (PBC control component), but had a lower intention, than adolescents with a Western background. Higher-educated adolescents had a higher intention to engage in physical activity and sports than lower-educated adolescents (table 3).

**Mediation analyses**

Figure 1 shows the statistically significant mediation models. In these models, pathway A represents the association between the socio-demographic factor (e.g. ethnicity) and the explanatory factor (e.g. intention). Pathway B represents the association between the explanatory factor and the behaviour (e.g. ceased compliance with the fitnorm), adjusted for the socio-demographic factors. Pathway C represents the association between the socio-demographic factor and the behaviour, unadjusted for the explanatory factor. Pathway C’ is the association between the socio-demographic factor and the behaviour, adjusted for the explanatory factor.

**Table 1** Characteristics of the study population ($N = 357$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>percentage/value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>55.2%</td>
</tr>
<tr>
<td>Western background</td>
<td>52.4%</td>
</tr>
<tr>
<td>Higher education</td>
<td>43.4%</td>
</tr>
<tr>
<td>Age at baseline, in years (SD)</td>
<td>13.2 (0.6)</td>
</tr>
<tr>
<td>Participating in sports at T1</td>
<td>88.5%</td>
</tr>
<tr>
<td>Complying with fitnorm at T1</td>
<td>72.6%</td>
</tr>
<tr>
<td>Participating in sports at T2</td>
<td>70.0%</td>
</tr>
<tr>
<td>Complying with fitnorm at T2</td>
<td>51.0%</td>
</tr>
</tbody>
</table>

$T1 = baseline, T2 = follow-up.$

**Table 2** Associations of socio-demographic and cognitive factors with maintenance vs. reductions in complying with fitnorm and disengagement from sports

<table>
<thead>
<tr>
<th>Factor</th>
<th>$n = 259$ OR (95% CI)</th>
<th>$n = 316$ OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (0 = male, 1 = female)*</td>
<td>2.47 (1.44–4.21)</td>
<td>2.58 (1.50–4.45)</td>
</tr>
<tr>
<td>Ethnicity (0 = Western, 1 = non-Western)*</td>
<td>1.75 (1.03–2.97)</td>
<td>1.65 (0.95–2.85)</td>
</tr>
<tr>
<td>Education (0 = high, 1 = low)</td>
<td>1.72 (1.01–2.94)</td>
<td>1.50 (0.86–2.60)</td>
</tr>
<tr>
<td>Attitude</td>
<td>0.42 (0.26–0.68)</td>
<td>0.48 (0.31–0.75)</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>0.64 (0.40–1.03)</td>
<td>0.67 (0.42–1.06)</td>
</tr>
<tr>
<td>PBC—control</td>
<td>1.02 (0.70–1.49)</td>
<td>1.10 (0.75–1.61)</td>
</tr>
<tr>
<td>PBC—capability</td>
<td>0.79 (0.56–1.33)</td>
<td>0.76 (0.55–1.05)</td>
</tr>
<tr>
<td>Intention</td>
<td>0.36 (0.22–0.59)</td>
<td>0.59 (0.42–0.84)</td>
</tr>
<tr>
<td>Perceived safety</td>
<td>0.87 (0.65–1.16)</td>
<td>0.69 (0.52–0.92)</td>
</tr>
<tr>
<td>Perceived attractiveness</td>
<td>0.80 (0.64–1.01)</td>
<td>0.69 (0.54–0.86)</td>
</tr>
<tr>
<td>Perceived availability of</td>
<td>1.17 (0.65–2.11)</td>
<td>0.86 (0.48–1.52)</td>
</tr>
<tr>
<td>sports facilities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bold figures indicate significance of association at $P < 0.05.$

*All socio-demographic factors are adjusted for each other.
demographics (i.e. gender, ethnicity and education). The results of the mediation analyses show that perceived safety was a significant explanatory factor of the association between gender and disengagement from sports [indirect effect: 0.08 (95% CI: 0.01–0.22)], 8% mediated effect) (figure 1c).

For compliance with the fitnorm, attitude and intention to engage in sports were explored as potential explanatory factors in the relationship between education and ethnicity and ceased compliance with the fitnorm. Figure 1a shows that intention mediates 32% of the association between ethnicity and ceased compliance with the fitnorm [indirect effect: 0.18 (95% CI: 0.01–0.40)]. Intention also significantly mediated the association between education and ceased compliance with the fitnorm [indirect effect: 0.20 (95% CI: 0.05–0.41)], with a mediated effect of 37% (figure 1b).

**Discussion**

This study showed considerable socio-demographic differences in disengagement from sports and compliance with the fitnorm in early adolescence. It was found that girls, adolescents of non-Western background and adolescents who attend lower-level
education were more likely to disengage from sports and were more likely to cease compliance with the fitnorm over a 2-year period during adolescence. Intention for sports participation and physical activity partly explained the association between ethnicity and education, and ceased compliance with the fitnorm. Perceived neighbourhood safety partly explained the association between gender and disengagement from sports.

It was already known that girls, adolescents of non-Western backgrounds, and those attending lower educational levels engage less in sports in adolescence; this study showed they are also more likely to disengage from sports during adolescence. More specifically, we found that only gender was associated with disengagement from sports participation, whereas all demographic factors under study (i.e., gender, education and ethnic background) were associated with ceased compliance with the fitnorm. Hence, socio-demographic differences are especially present for compliance with the fitnorm. Our results imply that socio-demographic differences in sports participation expand during adolescence; therewith, the results of this study are alarming. Interventions aimed at maintaining sports participation or prevention of disengagement from sports need to target these aforementioned groups.

Contrary to our findings, van Mechelen et al. found that reductions in minutes spent in sports during adolescence are stronger among boys than among girls. This discrepancy may be due to differences in the definition of sports participation, which, in the study of van Mechelen et al., was in minutes spent above four metabolic equivalents (METs) separately for organized sport, non-organized sport and other vigorous activities. We studied sports participation and compliance with the fitnorm based on frequency data; perhaps boys disengage from sports less frequently, but show a decrease in the average time spent in sports per occasion.

Reasons for the observed differential declines in sports may arise from various situations, including physical, economic and social environmental factors. However, our study suggests that also cognitions, in particular intention in early adolescence, may explain a considerable part of differential ceased compliance with the fitnorm. This is in line with studies among adults, showing that intention to be physically active was associated with educational levels. Other studies among adults found that individual cognitions partly explained the association between recreational walking and environmental factors. Hence, in interventions aimed to tackle disengagement from sports, cognitions may be good target points.

Previous research has shown that adolescent girls report more barriers and fewer benefits of physical activity than boys. We could not confirm that these factors explained the differences in disengagement from sports. However, we did find that a small part of gender differences in sports participation could be explained by perceived neighbourhood safety. Girls perceive their neighbourhoods as less safe, which explains their higher likelihood to disengage from sports. This is consistent with other studies showing safety to be associated with physical activity of adolescent girls, and that safety is more important in influencing physical activity for girls than for boys. In addition, gender differences in physical activity may be due to gender-related variance in biological maturation.

Attitude, subjective norm and PBC were not identified as explanatory factors of socio-demographic differences in disengagement from sports, even though these variables were found to be explanatory factors for socio-demographic differences among adults. This might be because studies on adults used a cross-sectional design, whereas we studied disengagement from sports longitudinally. It may very well be that other factors are associated with changes in behaviour than with behaviour at a certain time. Another explanation may be that some attitudes regarding physical activity are cultural or gender specific, whereas we measured attitude broadly and did not include culture- and gender-specific beliefs. We may have thus missed some specific beliefs. However, the broad approach taken allowed us to compare the socio-demographic groups.

Major strengths of this study include its longitudinal design and the demographically diverse sample. A limitation is that it was conducted among a selective sample of urban Dutch adolescents; therefore, care should be taken in generalizing these results to other populations. Although this study was not powered to do mediation analyses in small subsamples, we were able to detect explanatory factors. Larger studies are needed to establish explanatory factors for the specific socio-demographic groups at risk for disengagement from sports. Finally, self-reported data on physical activity were used; even though a reliable instrument was used, the reports may not have been completely accurate. However, we based our analyses on frequency data only in which under-/over-reporting is less likely to be an issue than when self-reported time is considered. Unfortunately, the instrument used could not discriminate between organized and non-organized sports, although this may give further insight into reasons for socio-demographic differences in disengagement from sports. Future studies should take this into account.

To conclude, socio-demographic differences in disengagement from sports and ceased compliance with the fitnorm were observed. Girls, lower-educated adolescents and adolescents of non-Western background show more pronounced reductions in sports participation. The observed differences in education and ethnicity were partly explained by the intention to engage in sports. Gender differences were partly explained by perceived safety. Interventions to promote sports participation should be directed at those groups most likely to disengage from sports participation, focus on maintenance of sports participation and target intention and perceived safety.

Supplementary Data

Supplementary data are available at EURPUB online.

Funding

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Conflicts of interest: None declared.

Key points

- There are considerable socio-demographic differences in reductions in sports participation.
- Girls, adolescents who are lower educated and those of non-Western background show more pronounced reductions in sports participation.
- Intentions to be active could partly explain ethnic and educational differences in ceased compliance with the fitnorm.
- Perceived safety could partly explain gender differences in disengagement from sports.
- Interventions should, besides promoting sports participation, also focus on maintenance of sports participation in adolescence.

References


