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Active and non-active video gaming among Dutch adolescents: Who plays and how much?

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ABSTRACT

Objectives: The aim of study was to determine prevalence and identify demographic correlates of active and non-active gaming among adolescents.
Design: Cross-sectional.
Methods: A survey, assessing game behavior and correlates, was conducted among adolescents (12–16 years, $n = 373$), recruited via schools. Multivariable logistic regression analyses were conducted to examine demographic correlates of active gaming (≥1 h per week) and non-active gaming (>7 h per week).
Results: Of all participants ($n = 373$), 3% reported to play exclusively active games, 40% active games and non-active games, 40% exclusively non-active games, and 17% not playing video games at all. Active gaming adolescents played active games on average on 1.5 (sd = 1.2) days per school week for 36 (sd = 32.9) min and 1 (sd = 0.54) day per weekend for 42 (sd = 36.5) min. Non-active gaming adolescents played on average on 3.3 (sd = 1.6) days per school week for 65 (sd = 46.0) min and 1.4 (sd = 0.65) days per weekend for 80 (sd = 50.8) min. Adolescents attending lower levels of education were more likely to play active games ≥1 h per week than adolescents attending higher educational levels. Boys and older adolescents were more likely to play non-active games >7 h per week, than girls or younger adolescents.
Conclusions: Many adolescents play active games, especially those following a lower educational level, but time spent in this activity is relatively low compared to non-active gaming. To be feasible as a public health strategy, active gaming interventions should achieve more time is spent on active gaming at the expense of non-active gaming.

1. Introduction

Regular physical activity (PA) of at least moderate intensity is part of a healthy lifestyle and associated with better health outcomes in all age groups.[1,2] However, a decrease in PA is observed during adolescence.[3] Independent of PA, sedentary behaviors (e.g. watching TV and playing video games) have been associated with overweight[4] and potentially fitness.[5] Both increasing PA and reducing sedentary time are therefore key public health targets.[6,7]

Number of studies have shown that video games contribute significantly to sedentary time of adolescents.[8–10] Rideout et al. showed that on any given day a majority (60%) of children play sedentary video games (hereafter called non-active games), for a considerable time, i.e. almost 2 h/day.[8] In the Netherlands 95% of the 13–19 years old boys and 85% of the girls play video games and spend on average 10 and 4 h per week, respectively[9]. A new generation of video games, called active games (e.g. Xbox 360 Kinect, PlayStation®Move, and Nintendo Wii™), require PA[11] to play and might therefore contribute to both reducing sedentary time and increasing PA.[12] Active games elicit energy expenditure of 2–6 Metabolic Equivalents (METs), which is higher than non-active games and other sedentary activities.[12] Therefore, playing active games instead of non-active ones may be a promising strategy for promoting an active lifestyle and improving body composition.[13]

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Many studies have focused on prevalence of non-active gaming and showed that non-active gaming is associated with multiple demographic characteristics.[8,10,14] One of the most consistent results is boys spending more time in non-active gaming than girls.[8,10,14] Next, age, ethnicity and parents' educational level have been identified as correlates of non-active gaming; 11–14 years-olds play more than 8–10 years-olds,[8] Hispanic and African American youth (8–18 years-old) spend more time gaming than Caucasian youth,[8] and children from parents with low or medium education levels spend more time gaming than children of higher educated parents.[14,15]

Although multiple studies explored prevalence and demographic correlates of non-active gaming, this information seems to be lacking for active gaming. To date only two studies focused on prevalence and correlates of active gaming, showing mixed results.[16,17] A Canadian study showed that 25% of Canadian adolescents played active games and they were more likely to be female, play non-active video games, watch ≥2 h of television per day, be concerned about weight, and be non-smokers. A Dutch study showed that regular active gamers (≥1 h per week) were significantly younger than non-regular active gamers (<1 h per week) (13.5 versus 14.1 years) but showed no differences in gender, educational level (of adolescent and parent), ethnicity or sedentary behavior (TV/DVD and computer time) between regular active gamers (≥1 h per week) and non-regular active gamers (<1 h per week).[17] To our knowledge, no information is available on with whom and where adolescents play active games. This information will give insight into to what degree active gaming is a social activity, which is of importance because of the shown association with long term use.[18,19] Additionally, so far no studies have been conducted on prevalence and correlates of active gaming and non-active gaming simultaneously. Therefore, it remains unknown whether any differences exist between those who prefer playing video games in an active mode, or those who mainly play non-active games. Such information is of importance to provide insight into reach and feasibility of active games as a health promotion tool and can help intervention developers with designing active game interventions.

The aims of the current study were to (1) explore to which game consoles/applications adolescents have access to in their home; (2) evaluate the prevalence and time spent in active and non-active gaming; (3) explore active and non-active game locations and companions; and (4) examine demographic correlates of active and non-active gaming.

2. Methods

The present study reports data from two surveys assessed one month apart. There was no intervention delivered to participants between the administration of the two surveys. The present study reports cross-sectional data from the first questionnaire completed by adolescents. Only some unchangeable factors (country of birth, game companions and locations and access to consoles/applications were derived from the time 2 questionnaire (T2).

The Dutch secondary school system consists of three levels of education: (1) pre-vocational, (2) higher continued education, and (3) pre-university. Adolescents were recruited from five secondary schools of covering all educational levels and geographic diversity aiming to include a sample comparable to the Dutch adolescent population at large. In each participating school, between four and six classes of students in the first to fourth year of secondary school (i.e. age 12–16 years old) were invited to participate. All adolescents willing to participate completed a questionnaire in class. Hereafter, they received a letter for their parents explaining the study. If parents had objections against their child participating in the survey, they could fill in the form, return it to the researchers and then their child's questionnaire was deleted. 420 adolescents filled in the first questionnaire, three parents requested his or her child to be excluded, resulting in approved responses from 417 adolescents. Adolescents for whom gaming behavior could not be computed because of missing values in the questionnaire ($n = 44$) were excluded, resulting in a total sample of 373 adolescents with complete data. The Central Committee on Research Involving Human Subjects (CCMO) in the Netherlands provided an exemption for this study to seek formal approval at the Medical Ethics Committee.

On the day of the first and second survey a researcher explained study goals and procedures in the classroom. The researcher asked adolescents in class whether or not they played video games (active and/or non-active games) at least once a week. Those who answered "yes" (further referred to as 'gamers') subsequently received the 'gaming questionnaire', containing questions about gaming characteristics and demographics. Those who answered "no" (further referred to as 'non-gamers') received a 'non-gamers questionnaire', only asking about demographics. Participants completed the paper-and-pencil questionnaires in class during school-time supervised by the researcher or teacher. As part of the larger study the gamers completed a second questionnaire one month later (T2) in the classroom. For the present study, we used the questions about country of birth, access to game consoles, game companion and location from this T2 questionnaire. Among adolescents who completed both questionnaires there was a random incentive draw for two MP3 players, six gift vouchers for video games of €10, and six gift cards for video games of €25.

Demographics (birth date, gender, educational level *(pre-vocational; higher continued education; pre-university*), country of birth (T2)) were inquired. Educational level was dichotomized in low level (pre-vocational) and high level (higher continued education and pre-university). Adolescent's ethnicity (*Dutch; non-Dutch* i.e. at least one parent was born abroad (cf. Statistics Netherlands, 2012)[20] was assessed. Degree of urbanization was determined using surrounding addresses density of the municipality of adolescent's school (moderately through extremely urbanized = urban; not urbanized through hardly urbanized = non-urban) (cf. Statistics Netherlands, 1998).[21]

Access to game consoles/applications (*e.g. PC, Xbox, PlayStation, Gamecube, Nintendo Wii, Dance Dance Revolution, EyeToy, Mobile phone, iPod, PDA or other*) in adolescents' home was assessed at T2.

Time spent playing active and non-active games was assessed using questions derived from existing and validated questionnaires on energy balance related behaviors for adolescents and modified to reflect the target behavior gaming.[22] For both active and non-active gaming, frequency and duration was asked separately for school and weekend days. Frequency was assessed by asking: "*How often do you play active/non-active games during a school week/the weekend?*" with answering categories ranging from 1 to 5 days a week for a school week and 1 or 2 days for the weekend. Answering options "*never*" and "*I did not engage in that activity last week but I normally do*" were coded at zero. Duration was assessed by asking "*How much time do you spend playing active games/non-active games on a school day/weekend day?*" with answering categories <30 min, 30–60 min, 1–2 h, and >2 h. For calculating average time spent on gaming per school week or weekend, the number of days per school week or weekend was multiplied by the mid category values of the duration of gaming per day ("<30 min" = 15 min; "30–60 min" = 45 min; "1–2 h" = 90 min; "> 2 h" = 150 min). Next school week and weekend were combined to calculate mean hours per week. Next, time spent active gaming was dichotomized in <1 h per week and ≥1 h per week.[17] Because there is no general accepted cut off value for active gaming, this