Body movements of boys with Attention Deficit Hyperactivity Disorder (ADHD) during computer video game play

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Abstract
The type and severity of body movements exhibited by 79 (unmedicated) boys clinically diagnosed with ADHD (30 Predominantly Inattentive Type and 49 Combined Type), and 67 non-ADHD boys were recorded while playing Crash Bandicoot I, a Sony Playstation platform computer video game. In Crash Bandicoot, participants control the movements of a small animated figure (CB) through a hazardous jungle environment. Two tasks totaling 12 trials were administered, each of which incorporated with and without Distractor conditions. For those trials with the Distractor, a segment of the television show “The Simpsons” was simultaneously played on a television screen adjacent to the computer game monitor and at an equal volume. Contrary to theory and expectations an analysis of the data did not reveal any statistically significant differences in the frequency, type and severity of body movements between the ADHD and non-ADHD boys, or between the ADHD subtypes during computer video game play. These findings have important implications for assessment and teaching processes in both classroom and therapeutic contexts.

Introduction
Attention-Deficit/Hyperactivity Disorder (ADHD) (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition Text Revision, DSM-IV TR, 2000) is the current diagnostic label for one of the most prevalent neurobiological/developmental disorders of childhood. ADHD is recognised to be comprised of difficulties with sustained attention, distractibility, impulse control, and hyperactivity (Barkley, 1997; Houghton et al., 1999; Schachar et al., 2000). Although
most individuals with ADHD have symptoms of both inattention, and hyperactivity-impulsivity, there are some individuals in whom one or the other pattern is predominant. Thus, the subtypes of ADHD are ADHD Predominantly Hyperactive-Impulsive Type (ADHD-HI); ADHD Predominantly Inattentive Type (ADHD-PI); and ADHD Combined Type (ADHD-CT) (See DSM-IV TR, 2000). Although there is some debate over the demarcation of subtypes, recent findings converge on the distinction between ADHD-PI and ADHD-CT (Barkley, 1997; Houghton et al., 1999).

Although ADHD is characterised by impulsive and hyperactive behaviors many parents question how their ADHD children can sit for hours focused on playing computer games, with no apparent hyperactive or fidgety behaviors. Tannock (1997) verified parents’ observations, but her findings also indicated that children with ADHD are more restless, inattentive, and talkative compared to their normal developing peers, even during highly motivating activities such as playing computer games (in this instance Pacman). This is very much in line with the most scientifically conceptual theory of ADHD to date (Barkley, 1997) in which it is posited that the central impairment in ADHD is behavioral inhibition. Consequently children with ADHD, and in particular the ADHD Combined Type (CT), make more motor movements than either ADHD Predominantly Inattentive Type (PI) or non-ADHD children.

Traditional laboratory based research using highly repetitive tasks have documented such differences in motor activity. For example, Inoue et al. (1998) used a standard computer based Continuous Performance Test (CPT) and an actigraph (ie, an electronic device that counts and stores the number of times the acceleration produced by motor activity exceeds a particular threshold during a given interval) with a sample of 20 unmedicated ADHD boys and 52 non-ADHD boys. Using the upper quartile of total motor activity as the criterion for distinguishing between the ADHD and Control groups, sensitivity was found to be 65% (ie, the proportion of the ADHD participants who exceeded the motor activity cutoff point) and specificity 76% (ie, the proportion of participants with excessive motor activity who were diagnosed as ADHD).

Dane, Schachar and Tannock (2000) also used actigraphs along with the traditional stop-signal laboratory task to examine the mean activity levels of 42 ADHD participants (20 Predominantly Inattentive Type and 22 Combined Type) and 22 non-ADHD boys. While the results revealed no significant group differences in activity level in the morning session, the children with ADHD were found to be significantly more active during the afternoon session than the Controls; no differences were found according to ADHD subtype.

To date, virtually all research on executive functions and body movements in children with ADHD has been conducted in laboratory settings, using traditional computer based CPTs. It appears that the only study which did not follow the traditional laboratory paradigm was that of Tannock (1997) which used Pacman. This computer game was, however, two dimensional, repetitive with a non-variable background, and incorporated restricted player-interface interactivity.
Although basic research is essential to test and develop theoretical understanding, it remains the case that the problems of children with ADHD are manifest in the real world—in the course of their everyday activities in complex environments. Hence, although it is assumed that laboratory CPTs tap processes that are relevant to everyday behavior, the generalisability of accounts based on this kind of work has yet to be tested in relation to more authentic contexts.

Moreover, determining the performance of children with ADHD on computer video games, which address issues of motivational bias, might have significant implications for assessment, teaching, therapeutic, and treatment practices. Contrary to parents’ assertions about their ADHD child’s quiet and sustained focus during video game play, educators consistently cite problems that ADHD children demonstrate in remaining focused during traditional computer based assessment procedures and regular classroom lessons. Employing interactive computer video games (in formal settings) which engage interest and allow the child with ADHD to remain focused over sustained periods of time may have the potential to not only reduce motor movements, but to also permit more accurate assessments of their disorder and academic performance to be obtained. If computer video games facilitate ADHD children’s social and academic performance, particularly over time, then their use in regular classrooms would be highly beneficial to both teachers and students alike (Tannock, 1997).

According to Durkin and Aisbett (1999) most households are without a computer and there would be very few children who have not experienced playing computer video games. The computer game milieu immerses players into virtual worlds filled with high quality graphics and sound, and exciting story lines all of which work together to provide compelling entertainment. Consequently, the participatory nature of the computer video game (which is, in itself, a CPT) may provide a particularly ecologically valid venue in which to investigate the coordination and performance of children.

The present study therefore sought to determine differences in the frequency, type, and severity of motor movements between ADHD-PI, ADHD-CT and non-ADHD boys during computer video game play. Unlike previous research, the present study utilised a highly entertaining platform game entitled Crash Bandicoot I which was played on a Sony Playstation. Furthermore, unlike previous research, ADHD boys who had no diagnosed comorbid conditions (e.g., Conduct Disorder, Learning Disabilities, Anxiety Disorder) comprised the sample.

**Method**

Participants

Data were collected from 146 boys (79 ADHD and 67 non-ADHD boys) aged 6 years 4 months to 16 years 1 month. All of the ADHD participants had been diagnosed by a consultant pediatrician as meeting the DSM-IV-TR (American Psychiatric Association, 2000) criteria for ADHD and had not received any additional diagnoses at that time (e.g., learning disorders, conduct disorder, anxiety disorder). Consequently, only ADHD...
children with no diagnosed comorbid conditions were included in the present study. Of the ADHD participants, 30 were diagnosed as ADHD Predominantly Inattentive Type (ADHD-PI) and 49 were diagnosed as ADHD Combined Type (ADHD-CT). All ADHD children had been unmedicated for a minimum of 20 hours prior to administration of the computer video tasks. Ethics approval for this aspect of the research was obtained from the University Human Ethics Research Committee and was under the supervision of the participating consultant paediatrician (last author).

The Control group consisted of 67 non-ADHD boys who were recruited from one local public primary school situated within the same socio-economic region of the city as the pediatrician’s practice. Children at the participating school are screened each year to identify students who are “at risk of educational failure” (according to the criteria stipulated by the Education Department of Western Australia), and for reading disabilities (using the Neale Analysis of Reading Ability, Neale, 1989). Children identified through this process are referred to the school psychologist for further evaluation. Of the parents who volunteered their children to participate in the study, approximately 20% were excluded because their school psychological assessments and/or academic records indicated diagnosed conditions (including learning difficulties). As an additional check the school principal in consultation with the resident school psychologist confirmed the absence of learning difficulties and/or other conditions.

To be included in the study, children had to have an estimated Verbal or Performance IQ score of at least 80, based on four subtests (Vocabulary, Similarities, Block Design and Object Assembly) of the Wechsler Intelligence Scale for Children, 3rd Edition (Wechsler, 1991). These subtests have been found to correlate .93 to .95 with the full administration of the WISC-R (Sattler, 1988). The mean age and IQ estimates for the three Groups are presented in Table 1. A one-way multivariate analysis of variance (MANOVA) revealed no significant differences between the mean age, Verbal IQ, or Performance IQ of the three Groups \( F(6,284) = 1.780, p = .103 \).

### Table 1: Means and standard deviations of participants’ age, verbal IQ (VIQ), and performance IQ (PIQ) according to group

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Age Mean (SD)</th>
<th>VIQ Mean (SD)</th>
<th>PIQ Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD-PI</td>
<td>30</td>
<td>130.60 (30.44)</td>
<td>107.83 (17.21)</td>
<td>111.00 (21.55)</td>
</tr>
<tr>
<td>ADHD-CT</td>
<td>49</td>
<td>123.65 (29.08)</td>
<td>107.53 (15.57)</td>
<td>114.35 (16.19)</td>
</tr>
<tr>
<td>Controls</td>
<td>67</td>
<td>117.61 (20.86)</td>
<td>102.01 (15.41)</td>
<td>114.27 (17.42)</td>
</tr>
</tbody>
</table>

Settings
Video recordings of the ADHD participants video game play were made in a room located in the Centre for Attention and Related Disorders, The Graduate School of Education, The University of Western Australia. The recordings of the non-ADHD Control Group were undertaken in a room at their primary school. At both of the locations equipment was set up identically. There were two televisions positioned directly in front of the participant. One television served as the monitor for the computer video game play, while the other was used to concurrently show excerpts from an episode of the television show The Simpsons (Carey, 1997, 20th Century Fox), during computer video game trials which incorporated a Distraction. A video camera was positioned behind the televisions in the room so as to record face and body movements of participants throughout the computer video game play.

Computer video game play
The video game chosen was a platform game (Crash Bandicoot: 1996, US: Naughty Dog) which requires eye-hand coordination skills. This game is played on a Sony Playstation using a Sony hand held controller with a left-hand and right-hand keypad. The keypad on the left of the controller contained four response buttons arranged in a cross formation, which controlled the directional movement of the video game character, as indicated on each button (forward, backward, left and right). The other keypad contained four response buttons, only two of which were used in the present study, to control two types of vertical action of the character (spin and jump).

Crash Bandicoot requires participants to use the response buttons on the hand held console to control the movements of a small, animated figure (Crash Bandicoot, CB) to allow it to negotiate successfully through various hazards that occur while moving along a jungle path to reach a designated checkpoint. The same graphics are designed so that the participant appears to be standing behind CB and thus can readily assume the character’s role, thereby seeing the jungle path and its challenges through CB’s eyes. The journey is hazardous, involving risks of falling into chasms or being prevented from progressing along the path by rolling wheels, killer skunks, and snapping plants. The game provides situations in which success/survival depends on being able to alternate rapidly between moving fast towards the designated checkpoint and inhibiting movement to avoid the various hazards, while keeping in mind specific game rules.

Procedure
All children were tested in the morning and allowed three minutes practice time (five minutes for novices) prior to commencing the experimental conditions. This ensured that participants of all ages were sufficiently able to manoeuvre CB along the route. This is in line with previous research (Blumberg, 1998; Bremner and Andreasen, 1997) which has demonstrated that children as young as six years of age have sufficient psycho-motor skills to participate successfully in computer game play. Instructions for each of the four conditions (described below) were given immediately before the participant began that condition.
Participants were required to complete one specific game segment under four experimental conditions (presented in random order), which varied along two dimensions: working memory load (low, high) and distractor (absent, present). Each experimental condition comprised three attempts (a total of 12 attempts or “lives” per participant).

Condition One required the participant to maneuver the character CB from a starting point down the jungle path as quickly as possible to a checkpoint, or as far as possible, without touching any of the boxes that appeared along the path.

Condition Two required participants to maneuver CB down the jungle path as quickly as possible to the checkpoint, or as far as possible, whilst spinning open only those boxes marked with an arrow. Both tasks were also re-administered but in the presence of a Distractor, (Conditions Three and Four). This consisted of the presentation of a segment of the television show “The Simpsons” (Carey, 1997, 20th Century Fox) being played (with equal volume and graphics tuning) concurrently on an adjacent television screen. In this segment Bart Simpson and his school friends are training for football under the coaching of Ned Flanders; Homer Simpson is heckling Flanders from the stands. Prior to starting each of the experimental conditions the researcher held the controls while instructions pertaining to the task were given. Administration of the four game conditions lasted approximately 20 minutes. Inter-rater reliability checks based on 12% of the total data indicated agreement between two observers of: 89% for Whole Body movement, 98% for Arms, 93% for Legs, and 91% for Head, yielding a mean level of agreement of 92.7%.

Instrumentation
Participants were videotaped throughout the four experimental conditions of the computer video game play to record facial and body movements. Each of the video tapes was subsequently viewed, in random order, by the first author who was blind to the ADHD diagnoses. For the purposes of analysis, body movements were divided into seven categories involving: head, arms, legs, feet, shoulders, face, and whole body. The severity of each movement was coded as a (1), (2), or (3), with (1) representing a slight movement, (2) indicating some extension of the body part but not full flexion, and (3) indicated fuller extension of the body part. For each individual participant, a tally was kept of the frequency, type and severity of body movements during computer game play.

Statistical analyses
Data were analysed using three-way (Group × Task × Distractor) multivariate analyses of variance (MANOVAs) with repeated measures on the last two factors (Task: One vs. Two and Distractor: Off vs. On). The dependent measures were the number of movements recorded for each part of the body, that is the head, arms, legs, face, and the whole body, respectively. Separate analyses were conducted according to movement severity (ie, slight, moderate, and severe) and a further three-way MANOVA was conducted on the total number of body movements.

Due to the innovative nature of this study and the data arising from it, and the potential contribution to theory, it was decided to examine the hypotheses at the $\alpha = .10$ level. Whilst this increases the likelihood of a Type I error, it was considered negligent to ignore possible effects which might be revealed in further controlled studies. Two hypotheses were examined in the present research:

Hypothesis One: Boys with ADHD will exhibit significantly more movements across all body categories than non-ADHD boys. In particular, the ADHD Combined Type (ADHD-CT) will exhibit significantly more body movements than the ADHD Predominantly Inattentive Type (ADHD-CT), who will exhibit significantly more body movements than the non-ADHD Control group.

Hypothesis Two: The presence of a Distractor and/or the additional working memory load presented in Task Two will significantly increase the frequency of body movements in both ADHD and Control boys, but the increase will be significantly more in the ADHD boys than in the Control boys.

Results
The three-way (Group $\times$ Task $\times$ Distractor) MANOVAs revealed no significant interactions or main effects for either the moderate or severe movement categories, indicating that the frequency of moderate or severe body movements was unaffected by Group, Task, or the Distractor. Whilst the separate three-way MANOVA conducted on the frequencies of slight body movements revealed a significant Group $\times$ Task $\times$ Distractor interaction $[F(14,274) = 1.60, p = .080]$, none of the lower-order interactions or main effects were significant. In the absence of a significant main effect for Group $[F(14,274) = .83, p = .626]$, Task $[F(7,137) = .96, p = .654]$, or Distractor $[F(7,137) = .66, p = .705]$, the mean body movement frequencies for the slight, moderate and severe categories have been reported (rounded to 2 decimal places) in Table 2.

The interpretation of this three-way interaction effect is complicated by the absence of any significant lower-order multivariate interactions or main effects. In addition, this multivariate interaction was only supported by univariate interactions on two of the seven body categories, namely Arm $[F(2,143) = 3.57, p = .031]$ and Face $[F(2,143) = 3.42, p = .035]$. It is therefore suggested that these interaction effects be interpreted with extreme caution. The nature of the univariate interaction for Slight Arm movement is illustrated in Figure 1.

Data were also examined by amalgamating the movement frequencies across the three degrees of severity (ie, Slight, Moderate, and Severe) to create overall measures of Head, Arm, Leg, Feet, Shoulders, Face, and Whole Body movements. An additional three-way MANOVA was conducted using these measures as the dependent variables and revealed a significant Group $\times$ Task $\times$ Distractor $[F(14,274) = 1.63, p = .071]$ interaction. This multivariate interaction was supported by univariate interactions for Arm...
### Table 2: Mean frequency of moderate and severe body movements by group

<table>
<thead>
<tr>
<th>Body Category</th>
<th>ADHD-PI Mean (SD)</th>
<th>ADHD-CT Mean (SD)</th>
<th>Control Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Slight</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>0.20 (.12)</td>
<td>0.21 (.09)</td>
<td>0.37 (.08)</td>
</tr>
<tr>
<td>Arms</td>
<td>0.44 (.14)</td>
<td>0.26 (.11)</td>
<td>0.41 (.09)</td>
</tr>
<tr>
<td>Legs</td>
<td>0.46 (.25)</td>
<td>0.87 (.20)</td>
<td>0.91 (.17)</td>
</tr>
<tr>
<td>Feet</td>
<td>0.02 (.13)</td>
<td>0.19 (.10)</td>
<td>0.30 (.08)</td>
</tr>
<tr>
<td>Shoulders</td>
<td>0.18 (.09)</td>
<td>0.24 (.07)</td>
<td>0.27 (.06)</td>
</tr>
<tr>
<td>Whole Body</td>
<td>0.38 (.10)</td>
<td>0.27 (.08)</td>
<td>0.28 (.07)</td>
</tr>
<tr>
<td>Face</td>
<td>0.35 (.27)</td>
<td>0.84 (.21)</td>
<td>0.75 (.18)</td>
</tr>
<tr>
<td><strong>Moderate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>0.00 (.02)</td>
<td>0.03 (.02)</td>
<td>0.03 (.02)</td>
</tr>
<tr>
<td>Arms</td>
<td>0.15 (.11)</td>
<td>0.03 (.08)</td>
<td>0.13 (.07)</td>
</tr>
<tr>
<td>Legs</td>
<td>0.27 (.16)</td>
<td>0.22 (.12)</td>
<td>0.40 (.10)</td>
</tr>
<tr>
<td>Feet</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
</tr>
<tr>
<td>Shoulders</td>
<td>0.01 (.02)</td>
<td>0.03 (.02)</td>
<td>0.01 (.02)</td>
</tr>
<tr>
<td>Whole Body</td>
<td>0.38 (.11)</td>
<td>0.05 (.08)</td>
<td>0.10 (.07)</td>
</tr>
<tr>
<td>Face</td>
<td>0.00 (.02)</td>
<td>0.00 (.02)</td>
<td>0.02 (.02)</td>
</tr>
<tr>
<td><strong>Severe</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
</tr>
<tr>
<td>Arms</td>
<td>0.01 (.03)</td>
<td>0.00 (.02)</td>
<td>0.03 (.02)</td>
</tr>
<tr>
<td>Legs</td>
<td>0.13 (.09)</td>
<td>0.01 (.07)</td>
<td>0.17 (.06)</td>
</tr>
<tr>
<td>Feet</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
</tr>
<tr>
<td>Shoulders</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
</tr>
<tr>
<td>Whole Body</td>
<td>0.07 (.03)</td>
<td>0.00 (.02)</td>
<td>0.00 (.02)</td>
</tr>
<tr>
<td>Face</td>
<td>0.00 (.00)</td>
<td>0.00 (.00)</td>
<td>0.02 (.00)</td>
</tr>
</tbody>
</table>

Figure 1: Group × task × distractor interaction effect for slight arm movement
[F(2, 143) = 5.45, p = .005] and the Whole Body [F(2, 143) = 2.89, p = .059]. However, no evidence was found of any significant lower-order interactions or main effects.

The Total instances of body movement was also calculated by summing the movement frequencies for the component body parts. A three-way (Group × Task × Distractor) analysis of variance on the Total Body Movements revealed no significant interactions or main effects. The mean Total Body Movement frequencies for the three Groups have been plotted in Figure 2.

Taken in combination, these results appear to provide little or no evidence in support of either of the hypotheses which suggested that boys with ADHD would make significantly more motor movements whilst playing computer games than their non-ADHD counterparts. The findings would also appear to refute the suggestion that the presence of a Distractor (such as The Simpsons), or additional working memory load (such as that presented in Task Two) during the computer game task would result in additional perceptible body movements in boys with ADHD.

It is important to note, however, that a preliminary analysis of the video recordings that were taken in between the administration of the four computer game conditions has also revealed what may be an interesting result. It was observed that whilst the boys were being instructed as to what was required of them in the following task, 26% of the ADHD participants were fidgety in comparison to only 15% of the non-ADHD Control group. These preliminary findings might suggest that the failure to observe differences in the body movement frequencies of the ADHD and Control boys during computer game play might be suggestive of reduced hyperactive symptoms during computer game play.
Discussion

The present research revealed no overall difference in the frequency, severity and type of body movements between boys diagnosed with ADHD and non-ADHD boys during computer video game play. Contrary to expectations, there were no significant differences in motor activity for either the ADHD or Control participants between those trials that involved a Distractor and those that did not. Furthermore, no significant differences were observed between those trials which involved an increased working memory load (Task Two) and those that did not (Task One). While this finding was unexpected, and indeed counterintuitive, given the diagnostic requirement of pervasive hyperactive-impulsive symptoms for the ADHD Combined Type, it does appear to be consistent with the limited evidence available to date.

To be clinically diagnosed by a consultant developmental paediatrician as ADHD, the boys in the present study must have demonstrated “a persistent pattern of inattention and/or hyperactivity-impulsivity... and clear evidence of clinically significant impairment in social, academic, or occupational functioning” (DSM IV, TR 2000, 93). That no significant differences were evident between the ADHD and non-ADHD boys during computer video game play is an important finding and highlights the success of the computer video game in contributing to the reduction in motor movements.

Tannock (1997) subsequently verified the anecdotal accounts of parents and practitioners who observed that ADHD children appear able to concentrate on computer game tasks for lengthy periods. In addition, Tannock also found that that these children’s symptoms were considerably reduced when engaged in motivating activities such as watching television or playing computer games. That the present research found the mean number of body movements to be close to zero could be taken to indicate that ADHD children made few if any movements during the computer game play and seemed to be engrossed in the task at hand. In other words, the boys diagnosed as ADHD behaved no differently to the non-ADHD boys during computer game play, thereby demonstrating the effect that this activity had in reducing body movements.

These findings also appear to lend support to the literature that suggests that when tests are attractive (activating), ADHD children are able to sustain attention for longer periods. In line with this Borger and Van der Meere (2000) found that children with ADHD could sustain attention for more than 36 minutes in paced and self-paced Continuous Performance Test conditions. Although the tasks in the present study were somewhat shorter, averaging 20 minutes (or 30 minutes including instructions), the limited instances of body movement observed among the ADHD boys suggest that they were able to sustain their attention on the computer game tasks for an extended period of time.

Tannock’s (1997) findings, however, also indicated that children with ADHD are more restless, inattentive, and talkative than non-ADHD children, even during highly motivating activities. Although the present study provided tentative evidence from a preliminary analysis to suggest that the ADHD boys were more fidgety between the
experimental computer game conditions than their non-ADHD counterparts and that they were in general more talkative, further research is needed to clarify this.

The findings of the present research have important implications for current theory driving the conceptualisation of ADHD. Investigators have hypothesised that the cognitive and behavioral problems associated with ADHD reflect a motivational deficit (e.g., Sergeant, 2000). This may account for why children with ADHD can concentrate for lengthy periods of time while playing computer games, yet have difficulty on tasks which require delayed gratification. In proposing his Unifying Theory of ADHD Barkley (1997) predicted that immediate reinforcement at the point of performance allows for an increased degree of self-control (and therefore reduced motor activity) in the child with ADHD. Computer video games provide reinforcement at the point of performance over extended periods of time. Thus the present research not only provides support for Barkley’s assertion, but also suggests that computer video games may be an additional resource to address the academic and behavioural performance that children with ADHD experience. For example, the consequences of increased motivation through computer video game format includes being able to sit still and concentrate. This, may in turn lead to increased academic performance in terms of quantity and quality. What is now required is a controlled evaluation of traditional school based curriculum materials delivered to children with ADHD in interactive computer based formats.

The failure to observe significant differences between the body movement frequencies of the two ADHD subtypes is consistent with Dane, Schachar and Tannock (2000) who also found no differences in the motor activity of ADHD and Control groups during morning sessions. However, Dane et al. (2000) did report significant differences in motor activity of ADHD and Control participants during afternoon testing sessions; no subtype differences were found. That there were no differences in the present study between the boys diagnosed with a disorder characterised by hyperactive and impulsive behaviours (ADHD-CT) and a disorder characterised by passive behaviours (ADHD-PI) also indicates the degree of success that the computer video games had in reducing body movements.

In summary, the present study, which controlled for comorbidity and medication status, revealed no significant differences in the body movement frequency of ADHD and Control participants during computer video game play, according to ADHD Subtype, Distractor, or additional working memory load. The theoretical and practical implications of these findings are far reaching. With reference to theory a motivational deficit seems to be apparent, while from a practical perspective computer video games appear to offer educators and parents an additional resource through which the debilitating social and academic behaviour of boys with ADHD might be addressed.

References


