

Middle School Children and Their Use of Interactive Media

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Abstract: We live in an age of interactive media. In recent years, there has been an increasing concern over the association between interactive media, such as computers and video games and reports of aches and pains in users. It is suggested that the physical set-up and individual styles of using interactive media has an influence over this discomfort. As children grow up, they will interact and use interactive media throughout most of their life. Healthy interactive media techniques may be vital to preventing/reducing the incidence of discomfort/pain associated with interactive media. This research paper will describe a study, which has collected health and comfort data on the incidence and prevalence of computer-related musculoskeletal discomfort/pain among 6th and 7th grade students in three middle schools in New England. General base line data from the first year of this three-year study, where students will be tracked for any reports of musculoskeletal discomfort/pain, will be reported.

INTRODUCTION

Currently there are approximately 45 million children in schools in the United States, and almost all are exposed to computers in that setting. As of 1999, almost 90% of schools had Internet access and that number is expected to grow to 100% (Center for Information Technology and Health Research, 2001). It is estimated that over 30 million American elementary school children have computers in the home (US Census Bureau). This number is expected to continue to increase over the next few years (Oates, Evans, Hedge, 1998).

There are limited studies on the effects of computer use on a child's physical well being (Oates, Evans, Hedge, 1998). Research on the designs of computer workstations for adults has suggested that a poorly set-up computer workstation is associated with increased musculoskeletal discomfort and musculoskeletal disorders (Subrahmanyam, Kraut, Greenfield, Gross, 2000). This raises concerns about the possible effect of computer workstation design on children's musculoskeletal health. Some researchers (Oates, Evans, Hedge, 1998) have suggested that children are at an even greater risk than adults because computers and peripherals are designed for adults' larger proportions.

There is a paucity of research on the incidence and prevalence of computer-related musculoskeletal discomfort in school aged children (Hedge, Morimoto, McCrobie, 1999). Harris and Straker (2000) reported that 60% of their sample of 314 students, aged 10 to 17 years, reported increased discomfort when they used their laptop computer. Most of the discomfort was reported in the neck, upper back, wrist, and knees. Jacobs and Baker (2002) reported that over 50% of their sample of 152 6th students reported experiencing musculoskeletal discomfort with computer use.

METHOD

The first year of a three-year descriptive longitudinal study, involving yearly administration of questionnaires, computer workstation analyses, and education on healthy computing to students starting in 6th or 7th grade through the completion of 8th grade, was completed.

There were three aspects to this study. At the beginning of computer technology classes in the 6th or 7th grades, the researcher sent home a letter and consent form to parents describing the study. Once the signed consent forms were received, the student was given an assent form to sign. The first phase of data collection began with the participant completing a survey asking about his or her use of interactive media at home and school and if he or she has any aches and pains with the use of interactive media. The second phase of data collection was the analysis of the student's home computer workstation. The third phase aspect of the study involved 20-30 minutes of interactive educational instruction provided by the researcher on how to use a computer correctly. Included in this instruction were computer workstation guidelines and stretch break recommendations. The education was provided during the computer technology class to all students in the class.

At the beginning of each consecutive school years, until the completion of 8th grade, the three aspects of the study will be repeated in the computer technology classes. The research questions for the first year of this three-year study were:

What is the prevalence of computer-related musculoskeletal discomfort in middle school students?

Is there a relationship between computer-related musculoskeletal symptoms and the amount of time a student uses a computer each day?

Participants

The researcher recruited all 6th grade students (male and female) enrolled in computer technology classes at two middle schools in Massachusetts and all 7th grade students enrolled in computer technology classes at one junior high school in New Hampshire. 321 students participated in the study. 86% of the students were between 12 and 13 years with an age range of 12-15 years. 54% were female and 44% were male (n=313). Approximately 70% of the participants were Caucasian.

Measures

The survey used in the study to determine the prevalence of computer-related musculoskeletal discomfort/pain was adapted from one used by Katz, Amick, Carroll, Hollis, Fossel, & Coley (2000) in their research on the prevalence of upper extremity musculoskeletal disorders in college students. A "yes" response to the question, "Have you ever experienced **pain/discomfort** in your hands, wrists, arms, shoulders or neck, during or after working on a computer?" was used to indicate the prevalence of musculoskeletal discomfort/pain.

The computer workstation assessment used in this study to evaluate the student's home computer is a public domain document that was developed by the US Army. The assessment requires a "yes" or "no" response to questions about the computer workstation set-up and was completed independently by the participant in approximately 10-15 minutes. This aspect of the study will not be report.

RESULTS

Descriptive data

Musculoskeletal discomfort/pain

42.4% of the participants (n=314) reported having experienced computer-related musculoskeletal discomfort/pain after working on a computer. Of those students reporting discomfort/pain, 16% reported first noticing it within the past year (n=307).

Computer Use

Table 1 demonstrates the amount of time that participants reported they spent on the computer. It is notable that 95.3% of the students reported spending 0-6 hours/day using a computer, with almost 2% reporting 4-6 hours/day of usage and 2.5% reporting using the computer more than 8 hours/day.

Table1: Reported Hours per Day on the Computer over a Typical One-Week Period (n=319)

Reported Hours/Day On Computer	Number of Participants (%)
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0-2	185 (57.6)
2-4	90 (28.0)
4-6	31 (9.7)
6-8	5 (1.6)
8+	8 (2.5)

Associations

The relationship between the existence of computer-related musculoskeletal discomfort/pain and time spent using a computer was made based on student's report of computer use in a "typical" day (0-2 hours/day, 2-4 hours/day, 4-6 hours/day, 6-8 hours/day or 8+ hours/day). Chi-square analysis indicated that the correlation between the frequency of symptoms and the reported number of hours per day of computer use was not significant ($p>.05$).

The relationship between the existence of computer-related musculoskeletal discomfort/pain and breaks taken from computer use was made based on the student's report of how often the student takes a break from working on the computer (never, only after 2 hours work, once every 1-2 hours, at least once an hour and more than once an hour). Of those participants reporting computer-related musculoskeletal discomfort/pain, 40% of these individuals report taking a break once an hour.

Student who reported computer-related musculoskeletal discomfort/pain also reported more difficulty performing various functional activities, such as carrying books and playing video games.

DISCUSSION

This study confirms Jacobs and Baker's (2002) research that musculoskeletal discomfort/pain associated with computer use in adults may be prevalent throughout middle school aged students. In this study, more than 40% of the participants reported that they have experienced computer-related musculoskeletal discomfort/pain. Of those students reporting discomfort/pain, 16% reported first noticing it within the past year. They also reported more difficulty with carrying their books and playing video games.

One interesting finding of this study is that 40% of those participants with computer-related musculoskeletal discomfort/pain, reported taking a break from using the computer once an hour. This finding suggests that they may be aware of the musculoskeletal discomfort/pain and take a break to relieve this discomfort. Despite 95.3% of the students reporting spending 0-6 hours/day using a computer, the amount of time spent using the computer was not associated with musculoskeletal discomfort/pain.

CONCLUSION

A great deal of further research is necessary to understand how computers are influencing the health of America's children. This study is just a preliminary examination of many questions about children and computer use. Without controls in this area, we may be raising children who are more prone to musculoskeletal disorders because they have had a longer exposure period to computer use and also, who have no idea how to protect themselves through the use of ergonomically correct computer workstations (Jacobs & Baker, 2002).

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