



The Relationship Between Video Gaming Habits and Grip Strength for Children Ages 6-17: An Exploratory Study

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Introduction

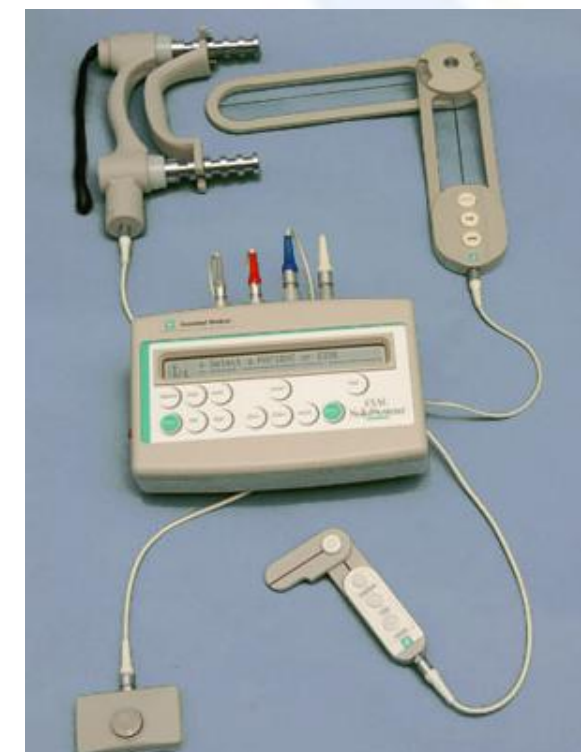
Video gaming has grown to replace the television as the primary entertainment medium of school-aged children (Roberts, Foehr, & Rideout, 2005). Researchers suggest that increased gaming may place children at a higher risk for repetitive motion injuries like tendonitis and carpal tunnel syndrome (Ramos & Bear-Lehman, 2004). Since pediatric upper extremity injuries are increasing, investigation is needed to determine the immediate and long-term effects of gaming. There is no current literature which investigates a possible relationship between video gaming and grip strength.

Background

The gaming industry reports a \$36 billion increase in revenues over the past 5 years. More than 83% of American households own at least one gaming console, and 55% of all children own at least one hand-held video gaming system. The literature suggests there is an increased incidence of repetitive motion injuries (RMI) in children. It is suspected that the rise in gaming may be a contributing factor to the increased incidence of RMI among children. The literature concludes that adults diagnosed with repetitive motion injuries often show diminished grip strength but no information is available for children. Occupational therapists use grip strength as a diagnostic tool to determine level of impairment and detect upper extremity disorders. Deficits in grip strength can greatly affect occupational performance. The Greenleaf EVAL System is a computer-based system developed in 1989 by Walter Greenleaf, which uses a sensor to assess the amount of force produced and digitally stores each score in an electronic database (Greenleaf Medical Systems, 1998). The Greenleaf dynamometer can assess upper extremity function including standard grip, sustained grip, and range of motion. Due to computerization of this tool, there is minimal risk for errors in reading, reporting and processing grip strength measurements.

Purpose

This study investigated the relationship between video game usage and grip strength in children.



Methods

Participants were required to be healthy and free of any upper extremity dysfunction within the past year. A questionnaire was used to gather demographics, hand dominance, history of injury or dysfunction, and number of hours of videogames played per week. Parental consent and child assent forms were signed and collected.

- 135 children ages 6-17 were recruited from schools and local settings in the Midwest
 - 74 were male and 61 were female
- Participants were divided into age groups:
 - young, ages 6-9; middle, ages 10-13; and older, ages 14-17.
- Participants were also divided into 'gamers' or 'non-gamers'
 - Gamers were classified as those who play more than 3 hours per week.
 - Non-gamers were those who played less than 3 hours per week.

Grip strength was measured using the Greenleaf EVAL system

- The system was calibrated and inter-rater reliability was established
- The standard position set by the American Society of Hand Therapists was used.
- Grip strength was measured using handle levels 1-3 on both the dominant and non-dominant hands.
- Grip averages with coefficient of variation greater than 20 were excluded from this study.

Results were then entered into the statistical software SPSS.

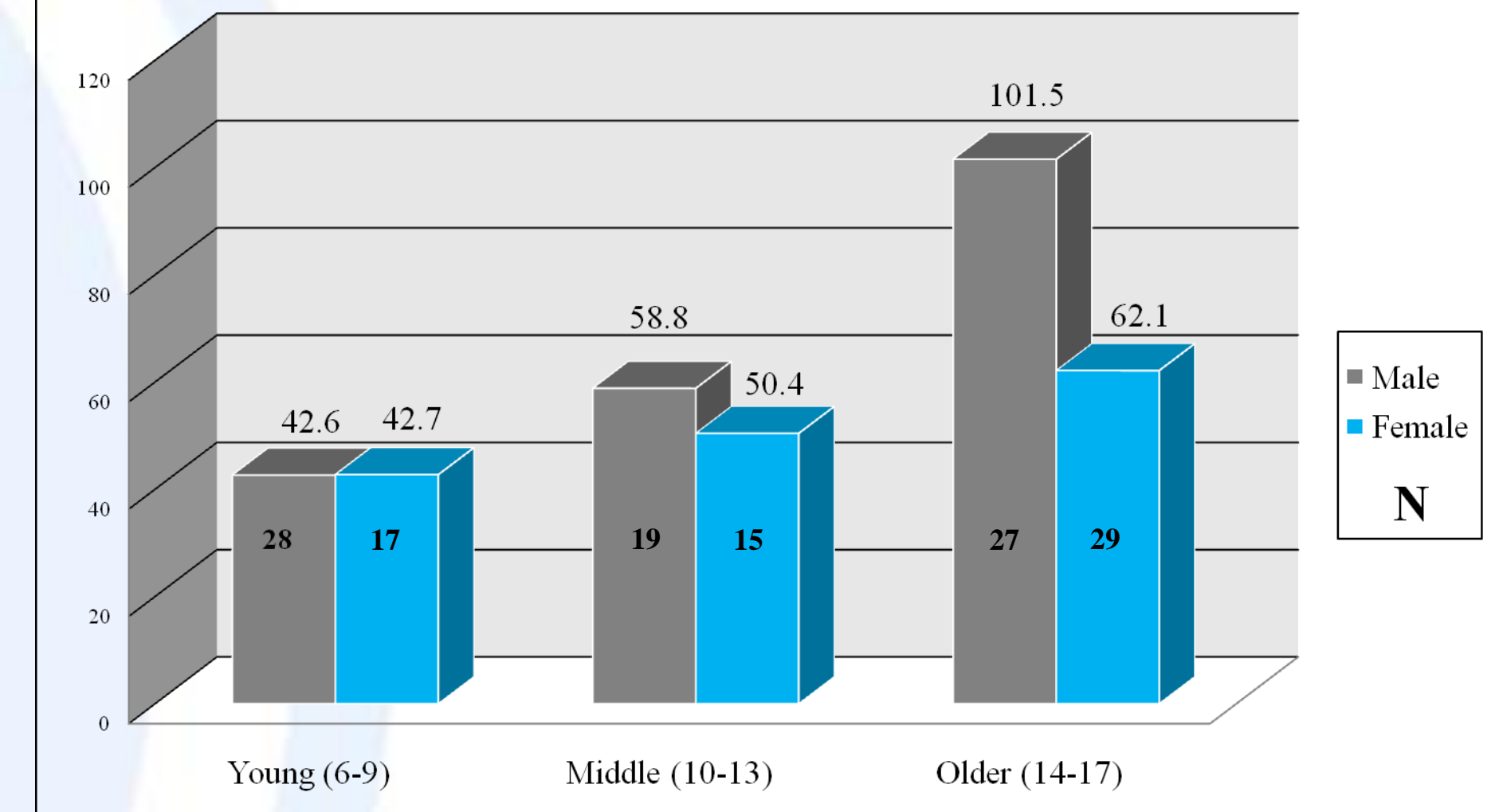
Results

Grip strength increased with age. The dominant hand was significantly stronger than the non-dominant. Males had a stronger grip than females, but for young children, there was no difference in grip strength between males and females. Male non-gamers were significantly stronger than male gamers. However, female non-gamers were not significantly stronger than female gamers.

Gender	Hand Dominance	Gamer vs. Non-gamer	Grip Strength
Male	Dominant	Non-gamer	75.6
Male	Dominant	Gamer	65.1
Male	Non-Dominant	Non-gamer	68.9
Male	Non-Dominant	Gamer	61.0
Female	Dominant	Non-gamer	52.9
Female	Dominant	Gamer	55.3
Female	Non-Dominant	Non-gamer	49.6
Female	Non-Dominant	Gamer	49.3

Age	Grip Strength	N Number of Participants
Young (6-9)	42.7	45
Middle (10-13)	54.6	34
Older (14-17)	81.1	56

Grip Strength Average (in pounds): Age vs. Gender



Discussion

This study found a significant difference between grip strength in male non-gamers and male gamers ($p < .05$), but revealed no significant difference between female gamers and female non-gamers. One possible explanation for this phenomenon is that relatively few females reported heavy video game usage compared to their male counterparts. Of all participants, 36% were male gamers while only 14% were female gamers. Also, the females who did meet the criteria for our operational definition of *gamer* reported less than half the hours of actual play time than their male counterparts.

Conclusions

Due to the increased popularity of gaming among children, it is necessary for the occupational therapist to be knowledgeable about safe video game usage. An increased understanding of the relationship between this popular occupation and grip strength may help develop evidence-based cautionary advice which occupational therapists could provide to young gamers and their parents. Further investigation is needed to more closely examine the relationship between grip strength and video gaming habits in school-aged males, and to further investigate both the differences between males and females and the relationship of age to usage.