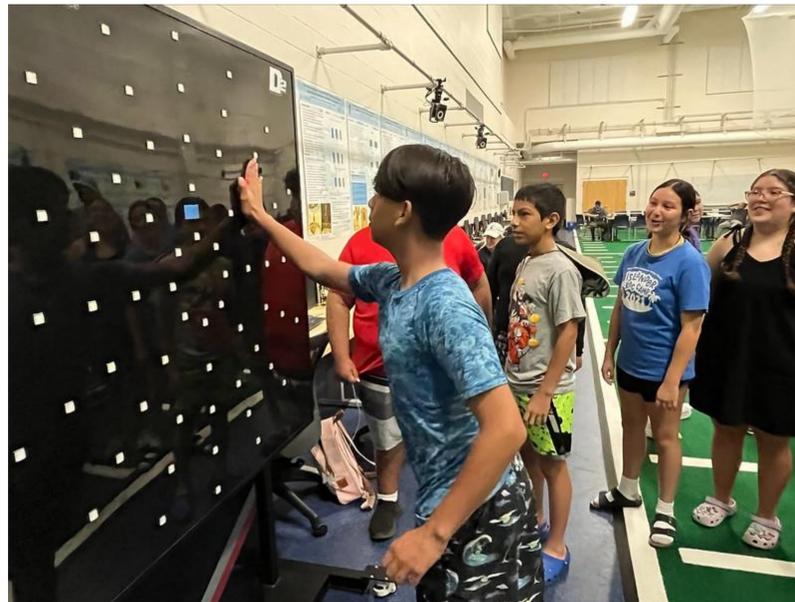# THE EFFECT OF AGE ON THE EYE-HAND COORDINATION OF ADOLESCENTS

F. Spaniol, C. Valadez, M. Kesterson, R. Munoz, A. O'Neil, L. Izuagie, R. Shaikh, J. Monrad, J. Morales, M. Thompson
Department of Kinesiology, Texas A&M University-Corpus Christi, TX

Abstract

Purpose: The purpose of this study was to investigate the effect of age on the hand-eye coordination of adolescents. **Methods:** One hundred twenty-five (125) adolescents attending a summer sports camp participated in the study, including 59 females (F) and 66 males (M). The age groups include the following: age 9, N=28 (10 F, 8 M); age 10, N=26 (16 F, 10 M); age 11, N= 27 (17 F, 10 M); age 12, N=16 (5 F, 11 M); age 13, N=9 (2 F, 7 M); age 14, N=9 (6 F, 3 M); age 15, N=6 (0 F, 6 M); age 16, N=4 (3 F, 1 M). Hand-eye coordination was measured as reaction time (RT) in seconds (s), by the Dynavision D2, a commercial assessment system that measures hand-eye coordination, visual perception, spatial awareness, and reaction time. **Results:** Descriptive statistics were calculated for reaction time. Means and standard deviations were as follows: age 9 (N=28) 1.088 ± .127 s, age 10 (N=26) 1.022 ± .130 s, age 11 (N=27) .963 ± .144 s, age 12 (N=16) .948 ± .106 s, age 13 (N=9) 909 ± .140 s, age 14 (N=9) .817 ± .088 s, age 15 (N=6) .806 ± .114 s, and age 16 (N=4) .765 ± .064 s). Means and standard deviations were also calculated for age groups as follows: age 9/10 (N=54) 1.056 ± .132 s, age 11/12 (N=43) .958 ± .131 s, age 13/14 (N=18) .863 ± .122 s, age 15/16 (N=10) .790 ± .095 s. One-way ANOVA was used to examine the mean RT of four age groups (9/10, 11/12, 13/14, and 15/16). Tukey's post-hoc analysis determined significant differences between the RT of the following age groups: 9/10 and 13/14 (p=.00003), 9/10 and 15/16 (p=.000003), and 11/12 and 15/16 (p=.00033). **Conclusions:** The results of this investigation indicate that age levels have a significant impact on the reaction time of adolescents. **Practical Applications:** This study provides valuable descriptive data that can be utilized to generate detailed normative reference values for adolescent reaction times measured by the Dynavision D2.

Purpose, Methods & Results

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Introduction
Physical activity is widely recognized for its benefits in improving motor skills, cognitive function, and overall well-being in children and adolescents. However, there is some evidence to suggest that eye-hand coordination and reaction time are inherently intertwined with age development (Gordon-Murer C, Stöckel T, Sera M, Hughes CML, 2021). Motor development and cognitive functions are intertwined, with various factors influencing fine motor behavior across different stages of childhood and adolescence (Moradi, Sadri Damirchi, Narimani, Esmaeilzadeh, Dziembowska, Azevedo, & Luiz do Prado, 2019). The studies by Piper (2010) and Gordon-Murer et al. (2021) provide insights into how age, handedness, sex, and executive functions contribute to motor performance and its developmental trajectory.

Methods
. This study employed a non-experimental research design to investigate the effects of age on eye-hand coordination among adolescents participating in the Right Start wellness program. Originally established through the National Youth Sports Program (NYSP), the Right Start program has continued beyond its initial funding expiration in 2007 through sustained community support and collaboration with the Kinesiology Department at Texas A&M University-Corpus Christi.

Descriptive Stats – Reaction Times for Ages Levels				
Age	N	Mean RT (s)	SD (s)	Median (s)
9	28	1.088	.127	1.060
10	26	1.022	.130	1.010
11	27	.963	.144	.960
12	16	.948	.106	.945
13	9	.909	.140	.850
14	9	.817	.088	.830
15	6	.806	.114	.785
16	4	.765	.064	.760
Totals	125	.973	.153	.960

Descriptive Stats – Reaction Times for Age Groups				
Age	N	Mean RT (s)	SD (s)	Median (s)
9/10	54	1.056	.132	1.030
11/12	43	.958	.131	.960
13/14	18	.863	.122	.835
15/16	10	.790	.095	.785
Totals	125	.973	.153	.960

Methods

Participants
A total of 125 adolescents, including 59 females and 66 males, participated in a four-week summer sports camp centered on fitness and wellness education. Most participants were Hispanic and came from low socioeconomic status (SES) backgrounds, as indicated by their eligibility for free or school lunch programs. The participants, ranging in age from nine to sixteen years, provided a diverse sample for examining developmental differences in eye-hand coordination within the context of a structured sports and wellness program. Participants engaged in an average of 200 minutes of physical activity per week, which included: traditional (e.g., soccer, basketball) and nontraditional sports, nature hikes and team-building exercises, swimming and pool games, and walking/running on a track.

Instruments
Assesments were conducted to measure changes in hand-eye coordination and reaction time using the Dynavision D2 Visuomotor Training and Evaluation Device (Dynavision Global Holdings, LLC, 2025). Dynavision D2 is a vision technology and training system widely utilized in hospitals, rehabilitation clinics, and athletic training programs to enhance visual and cognitive performance. The Dynavision D2 consists of a large light board that illuminates in a random sequence of lights and speeds, requiring users to respond by pressing corresponding buttons. The system records reaction times (RT) in seconds, the number of hits during a visual-motor response test, and peripheral visuomotor reaction time, measured through illuminated target responses making it an effective tool for evaluating motor response and visual-motor coordination. Participants responded to illuminated targets on the Dynavision board, adjusted for their height, within a 30-second trial, tapping the buttons as quickly and accurately as possible. Reaction time and accuracy scores were recorded, with faster RT and higher accuracy indicating improved coordination and visuomotor processing.

Results
Descriptive statistics were calculated for reaction time. Means and standard deviations were as follows: age 9 (N=28) 1.088 ± .127 s, age 10 (N=26) 1.022 ± .130 s, age 11 (N=27) .963 ± .144 s, age 12 (N=16) .948 ± .106 s, age 13 (N=9) 909 ± .140 s, age 14 (N=9) .817 ± .088 s, age 15 (N=6) .806 ± .114 s, and age 16 (N=4) .765 ± .064 s). Means and standard deviations were also calculated for age groups as follows: age 9/10 (N=54) 1.056 ± .132 s, age 11/12 (N=43) .958 ± .131 s, age 13/14 (N=18) .863 ± .122 s, age 15/16 (N=10) .790 ± .095 s. One-way ANOVA was used to examine the mean RT of four age groups (9/10, 11/12, 13/14, and 15/16). Tukey's post-hoc analysis determined significant differences between the RT of the following age groups: 9/10 and 13/14 (p=.00003), 9/10 and 15/16 (p=.000003), and 11/12 and 15/16 (p=.00033).

Conclusions
The findings demonstrate a clear age-related improvement in reaction time, with older participants exhibiting significantly faster response times than younger participants. These results align with previous research on motor and cognitive development, supporting the notion that neurological maturation, increased myelination, and enhanced sensorimotor integration contribute to improved reaction times during adolescence.

Practical Applications: This study provides valuable descriptive data that can be utilized to generate detailed normative reference values for adolescent reaction times measured by the Dynavision D2.