

Reaction Time in Individuals With Down Syndrome: A Systematic Review

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PURPOSE: According to the Centers for Disease Control and Prevention, Down Syndrome (DS) occurs in 1 out of every 700 babies, making it the most common chromosomal condition (Facts about Down Syndrome, 2019). In this particular condition, babies are born with extra genetic material on their twenty-first chromosome. Because of this extra chromosome, there are common mental and physical features in individuals with DS. However, there is still great variability in intelligence and level of functioning amongst the population of those with DS. Individuals with DS take significantly longer than typically developing individuals to reach motor development milestones. One of the deficits often noted in children with DS is decreased, or slower, reaction time to a stimulus. The goal of this review is to review the causes of the delay in reaction time in those with DS, strategies for improving reaction time, and to understand the overall relationship between DS and reaction time in fine motor tasks.

DESIGN: A search of MEDLINE complete, SPORTDiscus, PsycINFO, and CINAHL complete was conducted in order to gather articles for the systematic review. We included main criteria when selecting studies to examine for this review. The criteria included: studies published in English, studies had to be published in full text, studies published in 2000 and beyond, and studies pulled from academic journals. Search terms for the databases used included “Down Syndrome” AND “reaction time,” “Down Syndrome,” “bilateral limb training,” and “Down Syndrome” AND “bilateral limb training.” While combing through each database, we employed the same search terms and filtered articles through our established criteria. The resulting articles from each database were as follows: 8 articles from SPORTDiscus, 53 articles from MEDLINE complete, 48 articles from PsycINFO, and 37 articles from CINAHL complete. It is important to note that many articles appear on multiple databases. Once the articles were collected, they were read and evaluated by the researchers to determine if they were appropriate and beneficial to include in the systematic review.

RESULTS: Interventions compared in this systematic review included bilateral limb training, table tennis training, assisted cycling therapy (ACT) and voluntary cycling, and serial reaction time tasks. Those who participated in table tennis significantly improved their reaction time after a 12 week intervention. Assisted cycling therapy improved cognitive planning and reaction time after 8 weeks of intervention for adults with DS. Common themes showed increased neuroplasticity and prefrontal cortex stimulation resulting from interventions. The 4 week bilateral limb training intervention concluded reaction time can be improved and trained for children with DS. The SRT task includes motor and cognitive components. The task requires motor responses to visual stimuli appearing in patterned or random sequence. The SRT task improved RT for all subjects, including the children with DS.

CONCLUSION: Individuals with DS do have slower reaction times than TD individuals. Researchers believe hypotonia and cognitive processing to be common rate limiters. However, there are a variety of interventions to improve reaction time for all ages of individuals with DS. Overall, motor task trainings are effective methods to boost reaction time and fine motor skills in individuals with DS. Future studies are required to better understand the dose-response relationship necessary for improvements.

IMPACT STATEMENT: This review is clinically relevant as it provides occupational therapists with important information that can be applied to developing plan of care and treatment interventions for patients with Down syndrome.

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