The Trajectories of Intelligence and Memory in Adolescence and Adulthood of People with Intellectual Disability, Compared to those with Typical Development in Three Possible Trajectories: The Impaired, the Parallel and the Continuing

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Abstract

The main purpose of the current study was to examine the trajectories of intelligence (crystallized and fluid), and memory (working and episodic) among individuals with non-specific intellectual disability (NSID), compared to individuals with typical development (TD) in three age cohorts: young adolescence (10-16), older adolescence (17-21) and young adulthood (23-40). The cognitive trajectories were examined in light of three possible trajectories (Fisher & Zeaman, 1970): the impaired trajectory, the parallel trajectory and the continuing trajectory. These trajectories are based on the traditional theories of intelligence in the general population (Kauffman, 2001) in which intelligence peaks around age 20, followed by an asymptote (resulting from an increase in crystalized abilities and a decrease in fluid abilities) until decline begins between ages 50 and 60. According to the impaired trajectory, the intelligence of individuals with ID (intellectual disability) develops for a shorter period than the general population, with their intelligence reaching its peak at approximately age 10, followed by asymptote and a decline beginning in the second decade. According to the parallel trajectory, the intelligence of individuals with ID develops similarly to that of individuals with TD, with the peak at approximately age 20, followed by an asymptote and a decline beginning in the sixth decade. In this model, the difference between the two groups lies in the baseline IQ level, which in individuals with ID is two standard deviations below the norm in the general population. According to the continuing trajectory, there is a delay in the development of individuals with ID in their early years, but also compensation for that delay in later years, so their intelligence might develop into their 40s, followed by asymptote, and a decline beginning between ages 50 and 60. This trajectory is supported by the Compensation Age Theory (Lifshitz-Vahav, 2015), which contends that chronological age influences the development of individuals with ID and their cognitive ability continues to develop in adulthood.

The participants in the present study were individuals with mild to moderate NSID (*N*=102, IQ=50-70), who were compared to individuals with TD (*N*=102, IQ=85-115) in four age groups (10-16, 17-21, 23-29, 31-40). Intelligence and memory were examined using sub-tests from the Wechsler battery (1997b, 2001, 2010), Raven Matrices (1956, 1958), Verbal fluency (Kavé, 2005), and Rey Verbal Learning (Vakil

& Blachstein, 1993) tests. Our findings show that crystallized intelligence develops along the parallel trajectory. The achievements in both research groups were higher in adulthood than in adolescence. Conversely, measures of fluid intelligence followed the continuing trajectory. On these measures, the development of individuals with ID continued longer than it did in those with TD. In the three components of working memory, individuals with ID were found to follow an asymptote trajectory, with no differences in their abilities in adolescence and adulthood. Measures of episodic memory follow a parallel trajectory, with neither research group showing differences between age groups. However, regression analysis found that while the relationship of age to learning ability and long-term memory (measures of episodic memory) increases linearly among individuals with ID, whose ability to learn and remember improves with age, the relationship is not linear for those with TD (it increases up to age 25, and decreases after age 30). In addition, crystallized intelligence contributes to explaining the variance in learning ability and long-term memory in individuals with ID, while fluid intelligence contributes to explaining these variances in individuals with TD.

Our findings support the Compensation Age Theory (Lifshitz-Vahav, 2015) regarding the contribution of chronological age to the cognitive ability of individuals with ID. This study, conducted without any intervention, indicates that individuals with ID are able to derive benefit from life experience and exposure to the environment to continue developing at an later age. These findings contradict the definition of ID included in DSM-V (Tassé, 2013), which states that individuals with ID are unable to learn from experience. The dependence of individuals with ID on crystallized abilities for long-term memory and learning ability might be indicative of the importance of environment for developing their abilities.