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Writing abilities in intellectual disabilities: A comparison between Down and Williams syndrome

Cristiana Varuzza [1], Paola De Rose [1], Stefano Vicari, Deny Menghini *

Neuroscience Department, "Children's Hospital Bambino Gesù", Research Hospital, Rome, Italy

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ABSTRACT

Writing is a complex task that requires the integration of multiple cognitive, linguistic, and motor abilities. Until now, only a few studies investigated writing abilities in individuals with Intellectual Disability (ID). The aim of the present exploratory study was to provide knowledge on the organization of writing in two populations with ID, Down syndrome (DS) and Williams syndrome (WS), trying to disentangle different components of the process.

A battery tapping diverse writing demands as low-level transcription skills as well as high-level writing skills was proposed to 13 individuals with WS, 12 individuals with DS and 11 mental-age-matched typically developing (TD) children.

Results showed that the two groups with genetic syndromes did not differ from TD in writing a list of objects placed in bedroom, in the number of errors in the text composition, in a text copying task and in kind of errors made. However, in a word dictation task, individuals with DS made more errors than individuals with WS and TD children. In a pseudoword dictation task, both individuals with DS and WS showed more errors than TD children.

Our results showed good abilities in individuals with ID in different aspects of writing, involving not only low-level transcription skills but also high-level composition skills.

Contrary to the pessimistic view, considering individuals with ID vulnerable for failure, our results indicate that the presence of ID does not prevent the achievement of writing skills.

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1. Introduction

Writing is a complex task that requires the integration of multiple cognitive, linguistic, and motor abilities.

Writing involves both low-level transcription skills (e.g. handwriting) as well as high-level composition skills (e.g. planning and revision). Specifically, three distinct language levels have been pointed out in writing (Wendling & Mather, 2009): letter formation (handwriting), word formation (spelling), and text formation (composition).

The evolution of writing (Frith, 1985) begins with an early *logographic phase* in which child uses the word as a picture. Children's writing then evolves toward the *alphabetic* principle, where the child learns the relationship between verbal and

* Corresponding author at: Child Neuropsychiatry Unit, Department of Neuroscience, Children Hospital Bambino Gesù, Piazza Sant'Onofrio 4, I-00165 Rome, Italy. Tel.: +39 06 68592875; fax: +39 06 68592450.
E-mail address: deny.menghini@opbg.net (D. Menghini).
[1] These authors equally contributed to this work.

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written form of words. In this phase is activated the conversation phoneme–grapheme. Then the *orthographic phase* appears while the main regularities and the most frequent irregularities are taken into account. Finally, in the *lexical phase* the child create a lexical storehouse and retrieve directly the words. At this point, the activity of writing has become automatic and fast. The child is still able to use the mode of the previous stages, for example, to write new words, which does not know the meaning, or writing words meaningless (pseudowords). In essence, the complete acquisition of the first three phases takes place through phonological way. While, the achievement of the fourth stage (lexical) allows the child to properly use the lexical way and write known words without phoneme-to-grapheme conversion.

To date it is unclear which level of writing skill children with Intellectual Disability (ID) attain. The broad heterogeneity, combined with all sorts of other variables influencing their learning and development, such as extremely varied socio-cultural family backgrounds or further medical diagnoses, does not allow establishing how many students with ID read or write at all or the writing level achieved (Dworschak, Kannewischer, Ratz, & Wagner, 2012).

Recent data derived from the study by Ratz and Lenhard (2013) investigating reading and writing stages of 1629 school-aged students with ID regardless of etiology (age 6–21) in Bavaria. Results documented that about a third of the students with ID did not read or write at all. The alphabetic and orthographic stages in reading were each achieved by a third of the students with ID (alphabetic = 31.9%; orthographic = 32.0%). The number of students with ID writing at a logographic stage was higher (16.9%) than the orthographic stage (13.5%). More than one third reached the alphabetic level (37%).

By studying genetic syndromes causing ID we can limit the phenotypic high heterogeneity and clarify how specific genotypes can affect complex processes, as academic skills.

Down syndrome (DS) or Williams syndrome (WS) are two genetic disorders that are both characterized by ID and that are often compared in literature to better understand if a neuropsychological deficit is just a consequence of ID or, alternatively, it is syndrome-specific (Vicari et al., 2004). The well documented neuropsychological profile is characterized for individuals with WS by a relative strength in language skills, but weakness in visuo-spatial skills. However, individuals with DS show more reduced language expressive abilities in phonology and syntax than visuo-spatial skills (e.g. Kent & Vorperian, 2013; Martin, Klusek, Estigarribia, & Roberts, 2009; Vicari, Bellucci, & Carlesimo, 2001).

While some data are available in reading in individuals with DS and WS, there is very little information available on writing (Conners, Moore, Loveall, & Merrill, 2011; Menghini, Verucci, & Vicari, 2004; Verucci, Menghini, & Vicari, 2006).

1.1. Reading and writing in DS

There is evidence found that shows that many individuals with DS learn to read (Bochner, Outhred, & Pieterse, 2001) although children with DS need exposure to academic activities of about three or four years longer than typically developing (TD) children (Vianello, 2006). Actually, in only a few cases, children with DS younger than 9 years were able to read and write at a level of the first grade. However, students with DS attending secondary school showed a reading and writing level two years higher than children of the same mental age (MA) (Sestili, Moalli, & Vianello, 2006). Moreover, writing skills in DS are lower than those in reading and only slightly higher than expected on the basis of MA (about one year) (Vianello, 2006).

Regarding reading abilities, more studies (Boudreau, 2002; Buckley, 1985; Hulme et al., 2012; Laws & Gunn, 2002) identified that reading accuracy in DS is a relative strength area in comparison to general cognitive ability and reading comprehension. While word reading is generally preserved (Boudreau, 2002; Roch & Jarrold, 2008; Verucci et al., 2006), pseudoword reading is compromised, probably due to their poor phonological awareness (Lemons & Fuchs, 2010; Næss, Melby-Lerva, Hulme, & Lyster, 2012; Steele, Scerif, Cornish, & Karmiloff-Smith, 2013). Difficulties in pseudoword reading and in phonological awareness and preserved abilities in word reading suggest individuals with DS recruit compensatory strategies to read words as lexical strategy or lexical access to read the word (Boudreau, 2002; Buckley, 1985; Hulme et al., 2012; Kay Raining Bird, Cleave, White, Pike, & Helmkay, 2008; Mengoni, Nash, & Hulme, 2014).

As previously said, only a few non-systematic study has been conducted on writing abilities in DS (Kay Raining Bird et al., 2008; Lavra-Pinto & Lamprecht, 2010). Although a significant positive association between syllabic phonological awareness and writing abilities in individuals with DS was observed (Lavra-Pinto & Lamprecht, 2010), phonemic awareness seemed to emerge only when written skills were acquired (Cardoso Martins & Frith, 2001). However, vocabulary comprehension was found the best predictor for written narrative skills in individuals with DS, underlining the importance of the connection between vocabulary and literacy (Kay Raining Bird et al., 2008). Moreover, in writing, individuals with DS made more orthographic errors than TD children matched for reading a level (Kay Raining Bird et al., 2008). Concerning handwriting abilities, difficulties were found in adults with DS compared with TD individuals matched for chronological age (CA) and interpreted as a difficult in controlling the movement chain necessary to the process of writing (Tsao, Fartoukh, & Barbier, 2011).

1.2. Reading and writing in WS

Reading skills in adolescents with WS have been reported as strong relative to IQ (Pagon, Bennett, LaVeck, Stewart, & Johnson, 1987). However, a large-scale study with adults identified relatively low reading plateaus (Howlin, Davies, & Udwin, 1998), and a longitudinal study reported little or no reading improvement between adolescence and adulthood (Udwin, Howlin, Davies, & Mannion, 1998). When individuals with WS were compared to a group of TD children matched for MA, particular difficulties in reading were found in passage comprehension and in pseudoword reading (Menghini et al., 2004) while word and text reading seemed to be more preserved.

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