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Validity and suitability of the Bayley-III Low Motor/Vision version: A comparative study among young children with and without motor and/or visual impairments

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ABSTRACT

The aim of the present study was to examine the validity of the Bayley-III Low Motor/Vision version, and its suitability for children with motor and/or visual impairment(s). This version contains accommodated items, that is, adaptations to minimize impairment bias, without altering what the test measures. We hypothesized that the accommodations would not affect the item scores of children without impairment, and that children with impairment(s) would benefit from the accommodations. We tested 41 children without impairment and 63 children with impairment with both the standard Bayley-III and the Low Motor/Vision versions, in randomly counterbalanced order. The test administrators filled in an evaluation form. Results showed that the accommodations did not affect the test scores of children without impairment and did improve the test scores of children with impairment on the Cognition scale, while no improvement was found for the other scales. The test administrators indicated that the vast majority of the children with impairment had been able to show their abilities on the test and that the accommodations were beneficial in 29 out of these 52 cases. For some children, the accommodated instrument appeared to be unsuitable because the impairment was too severe. The conclusion is that the accommodations improve the validity of the Bayley-III when used with children with mild to moderate motor and/or visual impairment, especially with regard to the Cognition scale.

1. Introduction

Development of children in the first few years of life usually happens relatively spontaneously when basic conditions in the environment, like appropriate sensory input and responsive relationships, are being met (Shonkoff, 2007). However, in cases of physical impairment, normal development cannot be taken for granted (Ziviani, Darlington, Feeney, Rodger, & Watter, 2013) and there is an increased risk for developmental problems (Hatton, Bailey, Burchinal, & Ferrell, 1997; McLaren,

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Edwards, Ruddick, Zabjek, & McKeever, 2011). A developmental assessment is needed in that case in order to answer questions about strong and weak areas of development (Petermann & Macha, 2008), which can then be used as a basis for early intervention to prevent secondary developmental problems (Guralnick & Conlon, 2007).

In this article we will focus on motor and visual impairments and their consequences for the developmental assessment of young children. As a consequence of the impairment(s), a child might not be able to show his or her abilities in the domain of interest during the standardized assessment of a developmental test (Hebbeler, Barton, & Mallik, 2008; Neisworth & Bagnato, 2004; Visser, Ruiter, Van der Meulen, Ruijssenaars, & Timmerman, 2012). For example, the child might not be able to manipulate the test materials, or just may need more time to deal with the material than a child without the physical impairment but with the same ability level. For the sake of objectivity, it is not advisable for test administrators to apply an unstandardized adjustment in order to overcome the influence of the impairment (Hebbeler et al., 2008). Therefore, instruments are needed that have been developed or adapted especially for children with impairment (Johnson, Wilhelm, Eisert, & Halperin-Phillips, 2001; Miller & Skillman, 2003).

The Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III, Bayley, 2006a) is a widely used and researched instrument for developmental assessment of young children. This instrument enables assessment of the levels of Cognition, Receptive Communication, Expressive Communication, Fine Motor Development, and Gross Motor Development. We have accommodated the instrument to increase the validity and suitability for use with children with motor and/or visual impairment. We have named the accommodated instrument the "Bayley-III Low Motor/Vision version" (LM/LVi version). The term "Low" refers to the number of motor and visual components in the items. Pilot research has suggested that the accommodations are advantageous for at least a subgroup of children with motor and/or visual impairment (Visser, Ruiter, Van der Meulen, Ruijssenaars, & Timmerman, 2013). We could not deduce from the results of the pilot study what the characteristics of this subgroup were. Test administrators indicated that the results on the LM/LVi version provided a good picture of the development of the children and that this was specifically due to the accommodations in the majority of cases.

The idea behind the LM/LVi accommodations is to enhance the children's opportunities to show their cognitive, language, and motor skills in a test situation. We did this by accommodating the Bayley-III: we intended to lower the amount of motor and visual components in the test items, provided that the item content and difficulty would not be changed (Alant & Casey, 2005; Thurlow, Elliot, & Ysseldyke, 2003). This would imply that the construct validity of the LM/LVi version would be higher compared to the standard Bayley-III for children with motor and/or visual impairment, because the child's competencies of interest could be estimated more precisely. In the LM/LVi version, we minimized the motor component (e.g., pointing) in items designed to measure cognitive ability (e.g., connecting similar pictures) (Visser et al., 2013). Other examples of accommodations made to the test are enlarged materials and increased contrast between the colors of the test materials and the background color. Obviously, the Fine Motor scale and Gross Motor scale items could not be accommodated for children with a motor impairment, because that would change the item content and difficulty.

The aim of the current study was to investigate whether the content and difficulty of the test have remained the same in spite of the LM/LVi accommodations, and whether the accommodations are beneficial for children with motor and/or visual impairment.

The first hypothesis was that the test results of children without impairment show invariant test content and difficulty. This hypothesis would be supported if two results are found. First, children have, on average, equal raw scores on the LM/LVi and the standard versions of each scale (Expectation 1a). Second, children have, on average, equal scores on the accommodated items of the LM/LVi version and their non-accommodated counterparts in the standard version, thereby correcting for possible differences in learning effects (Expectation 1b).

The second hypothesis was that the accommodations are beneficial for children with impairment. This hypothesis would be supported if three results are found. First, children have, on average, a higher raw score on the LM/LVi version than on the standard version of each scale (Expectation 2a). Second, children have, on average, higher scores on the accommodated items of the LM/LVi version than on their non-accommodated counterparts in the standard version, thereby correcting for possible differences in learning effects (Expectation 2b). Third, test administrators evaluate the LM/LVi version positively for children with a motor and/or visual impairment (Expectation 2c).

2. Method

2.1. Participants

2.1.1. Control group

The control group consisted of 41 children without developmental problems. We recruited the children via convenience sampling (Gravetter & Forzano, 2012): colleagues and acquaintances of the researchers and test administrators were asked whether their children might be able to participate, and sometimes a participant's parent informed one of their acquaintances about the research as well. In addition, an invitation to participate in the research was placed on the Facebook website of one of the test administrators. The reason for choosing convenience sampling was that it was the most feasible approach, given that there is no reason to expect that the subject of interest (i.e., the difference between test scores on the LM/LVi versus the standard version) would differ among children with various individual characteristics (e.g., would depend on socio-economical, geographical, or ethnic backgrounds). There were 25 girls and 16 boys with an average age of 2 years and 15 days (range from 1 month and 18 days to 3 years, 8 months, and 20 days).