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# STANDARDIZATION NEED OF THE ADAPTED DASH IN ROMANIA

Case study

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## Keywords

Speed  
Handwriting  
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## JEL Classification

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## Abstract

*Handwriting remains an important skill in school activities. Schools need handwriting assessment tools to monitor children's performance and to identify those who might need support. The Detailed Assessment of the Speed of Handwriting (DASH) is a recently developed tool with UK norms, which may be suitable for use in other countries. However, the focus of the current project is handwriting in Romania where no assessment tools are currently available. Previous study investigated construct validity by examining both age and gender. DASH was translated into Romanian and administered to 100 children from four community schools in Romania. The adapted DASH was suitable for Romanian children. Further data collection is needed to establish norms in Romania before the DASH may be usefully used in Romania.*

## Introduction

Handwriting is an important skill used in our everyday life for writing letters, filling in forms (Barnett et al., 2009), and writing down a telephone message or shopping list. Skilled handwriting is the main important occupation for school aged children when performing tasks that involve writing (Rosenblum, Weiss & Parush, 2003). Moreover, it is an activity required for communicating and recording ideas, and for demonstrating understanding in school (Ziviani & Watson-Will, 1998).

Handwriting is also a complex skill that requires different components such as cognitive skills in order to plan an idea, to plan the syntax, to spell each sentence. Handwriting is also a motor skill and is learned through practice (Graham & Miller, 1980). Furthermore, it requires kinaesthetic and perceptual-motor components to produce the text (Barnett & Henderson, 2005).

However, the skill of handwriting has to be taught before automaticity is acquired. The data have suggested that the process of automaticity of writing letters is the single best predictor of length and quality of written composition in school (Graham et al., 1997, Medwell et al., 2009). In contrast, lack of automaticity may be a problem that affects a significant number of primary and secondary aged children due to the fact that it can restrain the ability to express ideas in text (Barnett & Henderson, 2005; Medwell & Wray, 2007).

## Handwriting Features

Essentially there is a need to look at writing features that might automatize the handwriting. The most common features employed for assessing competence of handwriting have been speed and legibility (Graham, 1986). Legibility is the ability of writing to be deciphered. Consequently, a legible writing involves the characteristics of readability (size, letter formation and spacing) (Rosenblum et al., 2003). Handwriting speed involves either recording the time taken to write a specific text or recording the amount of text reproduced in a given time (Precup & Barnett, 2014). The scores of handwriting speed across studies were different maybe due to different instructions, writing activities, outcomes measured (Graham & Weintraub, 1996). Findings of studies have reported factors affecting writing speed which included age, gender, writing style, and legibility. An important point is that there is a trend for handwriting speed to improve with age and schooling (Summers & Catarro, 2003; Graham & Harris, 2000; Graham et al., 2008). At the same time, an important point is that research suggested a strong gender effect. Most studies have reported a faster writing at different levels in girls than boys (Graham et al., 1998; Ziviani & Watson-Will, 1998; Medwell et al., 2009) and research confirmed

that girls are generally better handwriters than boys (Graham & Miller, 1980). Whilst studies have suggested legibility and handwriting speed as key factors on student performance and in designing a screening tool of handwriting difficulties (Rosenblum, 2008), other studies have reported that there is variation of these features (Ziviani & Watson-Will, 1998).

## Assessment of Handwriting

Problems may occur in writing, and handwriting difficulties can be experienced by children in schools (Medwell and Wray, 2007). These difficulties may lead to low academic achievement in children (Barnett & Henderson, 2005) and to learning difficulties later (Engel-Yeger et al., 2009).

The assessment of handwriting speed may help schools in monitoring performance and occupational therapy in identifying children with handwriting difficulties. The available data supports the prediction that speed of handwriting could be assessed, and to assess it, an objective instrument of handwriting speed involving a standardized test is required (Summers & Catarro, 2003; Barnett & Henderson, 2005).

## The Detailed Assessment of the Speed of Handwriting

One recently developed test is the Detailed Assessment of the Speed of Handwriting (DASH) (Barnett et al., 2007) a standardized test with UK norms. The DASH has variants for students aged 9-16 years and 17-25 years. The test includes a range of tasks which embody different aspects of handwriting speed (four core tasks and 'Graphic Speed' as an optional task) (Barnett et al., 2009). The DASH includes two tasks (Copy Fast & Copy Best) with identical content (Sentence Copying) and time constraints (Barnett et al., 2009, Precup & Barnett, 2014). Free Writing is a task to assess speed of composition (Barnett et al., 2009). Alphabet Writing is a task employed in studies for prediction of both fluency and quality of handwriting (Graham et al., 1997). Graphic Speed is a task indicating a score for the number of correct symbols produced in one minute period. It provides a measure of perceptual motor skill (Barnett et al., 2009).

DASH norms were obtained by administering the test to a sample of people and obtaining the distribution of scores for that sample (Kaplan & Saccuzzo, 2001). The stratification sampling has used data from the 2001 census. Therefore, the sample was representative for each age year (9-16), parental educational level, ethnic group and geographic region. It is worth highlighting that normal distributions were obtained for raw scores for each age group, and the

scores were used to obtain the standard scores for each task (Barnett et al., 2009).

The DASH has shown sensitivity at age differentiation and significant main effects for gender were revealed on each of the core tasks (Barnett et al., 2009).

### **Handwriting in Romania**

Handwriting is an important aspect of language learning and communication in Romania, and is a core part of the Romanian primary school curriculum. Writing correct letters, syllables, words and copying correct and legible short sentences are some reference objectives of writing in Romanian primary school (Ministerul Educatiei, 2003). Overall, although in the language and literature syllabus one of the objectives is development of written communication ability, there is not an objective assessment of handwriting speed (Precup & Barnett, 2014). Moreover, the DASH has been considered suitable for children in primary and secondary school (Barnett et al., 2009), and an adapted form has been administered in Romania. Therefore, the adapted DASH in Romania could be a tool for schools to monitor children's performance and identify those with handwriting difficulties. Mention should also be made that the DASH may be of assistance to teachers, therapists and researchers in deciding the benefits that children may have from handwriting intervention (Precup & Barnett, 2014).

### **Aim**

The purpose of this study was to emphasize the need to establish norms of the adapted DASH in Romania analyzing the first study that used the DASH in Romania (Precup & Barnett, 2014).

### **The adapted DASH in Romania**

The urgent call for research in handwriting to address the need for an objective assessment of handwriting speed in Romania has led to the research questions of the previous study. Firstly, whether an adapted DASH is suitable for children in Romania. Secondly, whether the test demonstrates good validity in a Romanian sample, being sensitive to changes in both age and gender.

The study adapted and translated the DASH and examined construct validity of the test for Romanian children (Precup & Barnett, 2014).

### **Methods**

**Translation.** Parts of the manual and test instructions were translated after permission was obtained from the test publishers 'Pearson Assessment'. All of the materials were translated in Romanian, including the instructions from the test manual (Precup & Barnett, 2014).

**Adaptation.** The DASH includes two tasks in which a sentence containing all letters of the

English alphabet ('The quick brown fox jumps over the lazy dog.') is copied. For the Romanian adaptation, a sentence that included the majority of the letters of the alphabet ('Fixa in cos castravetii si un kilogram de branza', 'He/She laid cucumbers and a kilogram of cheese in a basket') was chosen. For both tasks (Copy Best & Copy Fast) the sentence and timing were identical. (Precup & Barnett, 2014).

Alphabet Writing task did not require changes for administration in Romanian. The alphabet was written out in the correct sequence for 1 minute.

Graphic Speed task required just translation of the instructions in Romanian. Children were required to draw Xs in circles for 1 minute.

Free Writing task required translation of the diagram and prompts but timing and marking remained the same (Precup & Barnett, 2014)

**Pilot study.** A pilot study was conducted with 2 adults, and 2 children between 9-11 to examine the use of the revised sentence for copying in both cases of the task Sentence Copying (Copy Best and Copy Fast). Marking was performed after the first minute of writing. The tasks were performed with no issues.

**Participants.** The study was conducted in the county of Hunedoara in the west part of Romania. One hundred children aged between 9 and 11 were recruited from four schools, representing diverse socioeconomic backgrounds. Each of the schools contributed 20, 20, 28, 32 children to the study. Fifty-four children were between 9 and 10 years, and forty-six children were aged between 10 and 11 years. A total of 49 boys and 51 girls (mean age  $\pm$  SD was  $9.06 \pm .03$  and  $10.05 \pm .03$  years) constituted the study sample.

**Procedure.** All tasks of the adapted DASH were administered and scored as recommended in the test manual. The data were collected in classrooms. The measure of handwriting speed was established by respecting the DASH scoring criteria for each task (Precup & Barnett, 2014).

### **Data analysis**

First, a two-way Analysis of Variance two age group (9-10 years, 10-11 years) and gender (girls, boys) was performed on each task. Then, Pearson product moment-correlation was calculated to evaluate inter-correlations between the adapted DASH tasks. (Precup & Barnett, 2014).

### **Results**

The normality of the distribution was investigated and a good spread of scores was found in both age groups. The adapted DASH was found suitable for children in Romania.

The construct validity of each of the DASH tasks was tested by examining group differences in age and gender. Whilst Table 1 contains the

descriptive statistics: means and standard deviations of handwriting speed for both age groups across each of the DASH tasks, Table 2 illustrates the gender differences found between girls and boys for each task of the adapted DASH (Precup & Barnett, 2014).

The Pearson product-moment correlation coefficients revealed that copying and writing tasks were substantially correlated (Table 3). Range is reported for the two different age groups.

Results of the study revealed a normal distribution in the test scores across each task. There was a good spread of scores within any group of children. Therefore, the results show that the DASH is good at differentiating between children in the Romanian sample, as in the UK sample.

On the question of validity of the test, the results of this study emphasized a significant difference between age groups. As expected, significant differences were found between the children 10-11 years old and children 9-10 years old, older children wrote faster compared with younger children. Some evidence for this comes from all of the tasks involved in the test (Table 1.) (Precup & Barnett, 2014).

The mean scores showed that for each task there was an increase at least two words in the older children. The copying tasks does not involve creativity and the memory demands were minimised due to the fact that the sentence was always present (Barnett et al., 2009). As expected, for 'Free Writing' task where more writing processes (planning, reviewing) are involved, the speed of handwriting was lower for both age groups. Although the copying tasks and free writing require the ability to generate letters of the alphabet, letter writing as part of the DASH shows how fast a sequence of the over-learned letters can be generated (Barnett et al., 2009). Contrary to expectations, although this study did not find a significant difference between groups for 'Alphabet Writing' task, the difference did approach the significance (Precup & Barnett, 2014). Therefore, the findings of the study corroborated with previous evidence showing that age is an important factor that influences written performance and also that girls have faster handwriting than boys .

It should be highlighted that the adapted DASH showed similar evidence of validity as that reported by Barnett et al., (2009) in the UK (Precup & Barnett, 2014).

In summary, the findings of the study have served to indicate that the adapted DASH supports the robust psychometric properties of the DASH. Moreover the results of the study emphasized: First, the test demonstrated suitability for Romanian children. Second, the examination of validity indicated age and gender differentiation (Precup & Barnett, 2014).

## Conclusion

The benefit to establish norms of the test in Romania would lead further to the benefit of assessing handwriting speed for the identification of children with handwriting difficulties, and for monitoring academic performance in schools. The adapted DASH may be usefully used as the objective instrument of handwriting speed needed in Romania.

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Table 1.  
*Handwriting speed for the two age groups for all DASH tasks*

Measure	9-10years n = 54		10-11years n = 46		Age effect	
	M	SD	M	SD	F	p
Copy Best/wpm	11.85	2.60	13.66	3.32	9.494	.003
Copy Fast/wpm	14.36	2.98	15.79	3.27	5.650	.019
Free Writing/lpm	11.35	2.62	13.23	3.55	9.124	.003
Alphabet Writing/lpm	24.85	10.50	29.58	12.50	3.456	.066
Graphic Speed/spm	26.37	7.43	30.33	8.90	5.680	.019

(Precup & Barnett, 2014)

Table 2 *Handwriting speed for gender*

Measure	girls n = 51		boys n = 49		gender effect	
	M	SD	M	SD	F	p
Copy Best/wpm	13.50	3.08	11.84	2.85	8.230	.005
Copy Fast/wpm	15.63	3.12	14.38	3.15	4.713	.032
Free Writing/wpm	12.86	3.10	11.55	3.21	4.383	.039
Alphabet Writing/lpm	28.53	12.58	25.47	10.48	.855	.357
Graphic Speed/spm	29.47	8.45	26.85	8.08	2.743	.101

(Precup & Barnett, 2014)

Table 3.  
*Pearson correlation coefficients between the adapted DASH tasks for both age groups*

	Copy Best	Copy Fast	Free Writing	Alphabet Writing
Copy Fast	.81 - .85			
Free Writing	.62 - .62	.63 - .72		
Alphabet Writing	.54 - .59	.36 - .52	.25 - .58	
Graphic Speed	.35 - .38	.33 - .46	.26 - .40	.37 - .41

(Precup & Barnett, 2014)