Learning and Individual Differences xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Learning and Individual Differences

journal homepage: www.elsevier.com/locate/lindif

Motivation and academic performance among first-graders: A person-oriented approach

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ARTICLE INFO

Article history:
Received 2 May 2014
Received in revised form 25 May 2016
Accepted 3 June 2016
Available online xxxx

Keywords:
Intrinsic value
Self-concept of ability
Math performance
Reading performance
Person-oriented approach

ABSTRACT

The present study applies a person-oriented approach to examine the motivational *patterns* children show on the basis of their reading- and math-related intrinsic value and self-concept of ability and how these patterns are related to their reading and math performance during the first grade of elementary school. The participants were 156 first grade children. The children were examined at the beginning and at the end of their first grade of elementary school. Five groups of children showing differing motivational patterns were identified using the ISOA procedure: *Positive*, *Negative*, *Math-motivated*, *Reading-motivated*, and *Low interest but high belief*. Children's motivational patterns were associated with the level of their math and reading performance in the beginning of, as well as across, grade 1.

1. Introduction

Students' learning motivation, that is, achievement-related beliefs and attitudes, play an important role in academic environments by directing students' behavior and effort in learning situations (e.g., Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Thus far, most of the research on learning motivation has applied a variable-oriented approach by focusing on the associations of different motivation variables and learning outcomes. However, it has been suggested that when studying motivational development a person-oriented approach should be used since the associations between motivational constructs found in the variable-oriented studies are not necessarily similar or the same for all individuals (Chow & Salmela-Aro, 2011; Nurmi & Aunola, 2005; Viljaranta, Nurmi, et al., 2009), that is, different individuals may show different *profiles* or *patterns* of motivational characteristics (Bergman, Magnusson, & El Khouri, 2003). The present study examined what kinds of motivational patterns children show during their first year of elementary school with regard to their intrinsic value and self-concept of ability in reading and math. Moreover, how these patterns are related to children's academic performance in reading and math was also examined.

According to the expectancy–value model of achievement motivation (Eccles et al., 1983; Wigfield & Eccles, 2000), students' expectancies and ability beliefs and task values—including intrinsic value, which refers to the interest or enjoyment of a particular task—in a certain subject area provide the motivational basis for their achievement in that area. Previous variable-oriented research has provided support for the model by showing, first, that students' intrinsic value in reading (Ecalle, Magnan, & Gibert, 2006; Gottfried, 1990; Wigfield, 1997) and math (e.g. Aunola, Leskinen, & Nurmi, 2006, Viljaranta, Lerkkanen, et al., 2009) predicts subsequent improvement in skills at different phases of schooling and, second, that self-concept of ability contributes to subsequent academic performance (Marsh & Craven, 2006; Valentine, DuBois, & Cooper, 2004). In turn, the studies carried out using a person-oriented approach have shown that, at different phases of their school careers, students can be divided into different kinds of groups according to their motivational profiles—and these groups differ in their achievement (Chow, Eccles, & Salmela-Aro, 2012; Chow & Salmela-Aro, 2011; Nurmi & Aunola, 2005; Viljaranta, Nurmi, et al., 2009). For example, Nurmi and Aunola (2005) found that children who belonged to the Low math motivation group characterized by low intrinsic value (interest) toward math but high intrinsic value (interest) toward reading at the end of grade 1 showed less progress in math performance during the transition from grade 1 to grade 2 than other children. In the study of Viljaranta, Nurmi, et al. (2009), students who were motivated in all measured school subjects when facing the transition to secondary education at the age of 16, showed a higher level of achievement than students showing more subject-specific motivation.

The most important limitation of the previous person-oriented motivational research is that the studies carried out tend to focus on only one motivational aspect at a time (rather than a combination), such as interest (Nurmi & Aunola, 2005) or task values (Chow & Salmela-Aro, 2011; Viljaranta, Nurmi et al., 2009), when identifying different

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http://dx.doi.org/10.1016/j.lindif.2016.06.002
1041-6080/

motivational patterns. To our knowledge, there are no previous studies examining motivational patterns consisting of both intrinsic value and self-concept of ability, even though expectancy-value theory (Eccles et al., 1983; Wigfield & Eccles, 2000), as well as a large amount of empirical studies (e.g. Fredricks & Eccles, 2002; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002), have stated that these motivational aspects are highly related to each other and, in addition, they both play an important role in academic performance (e.g. Eccles, Wigfield, Harold, & Blumenfield, 1993; Fredricks & Eccles, 2002; Marsh, Trautwein, Lüdtke, Koller, & Baumert, 2005; Nurmi & Aunola, 2005). Another important limitation of previous studies is that longitudinal person-oriented studies are still rare (for an exception, see Nurmi & Aunola, 2005). Therefore, little is known about the stability of motivational patterns or about the role of motivational patterns in children's skill development. Moreover, most previous studies have focused on older students (Chow & Salmela-Aro, 2011; Viljaranta, Nurmi et al., 2009). Because the development of both intrinsic value and self-concept of ability starts at the very beginning of the school career (e.g. Bouffard, Marcoux, Vezeau, & Bordeleau, 2003, Wigfield et al., 1997), and soon after that the inter-individual differences become increasingly stable (Aunola et al., 2006), it is important to examine the development of motivation at the beginning of the school career. In the present study, the focus is on the patterns of motivation the students show in regard to both math- and reading-related intrinsic value and self-concept of ability during the first grade of elementary school and the role of these patterns on academic performance.

The research questions are:

(1) What patterns of motivation, defined by intrinsic value and self-concept of ability in reading and math, do first-graders show? How stable are these patterns during the first school year? Because it has been found that motivation in different school subjects is high and children's self-concept of ability is optimistic in the beginning of school (e.g. Gottfried, Fleming, & Gottfried, 2001; Jacobs et al., 2002), we expected to find a relatively large group of children that showed high intrinsic value and self-concept in both mathematics and reading. However, because the emergence of individual differences in motivation (e.g., Nurmi & Aunola, 2005) can be seen already during the first school years, we also expected to find subject-specific motivational groups.

(2) To what extent are children's patterns of motivation associated with their performance in reading and math across the first year of elementary school? We expected that children's motivational patterns characterized by both high intrinsic values and self-concept of ability in a certain subject would predict higher performance in that subject in contrast to other motivational patterns (e.g., Nurmi & Aunola, 2005).

2. Method

2.1. Participants

The sample comprised of 156 children (153 children at the first measurement point, and 156 children at the second measurement point) in regular classrooms (79 girls, 77 boys). At the baseline, the children's ages ranged from 6 years and 9 months to 8 years and 8 months (M_{age} = 7.5 years). The schools participating in the study were situated in three medium-sized towns in Finland. The families were fairly representative of the general Finnish population (for more information about the sampling procedure and demographic information, see Authors (Aunola et al., 2013a, 2013b). The children who participated in the study completed a large variety of achievement tests twice during the first grade of elementary school, in October or November (T1) and in April (T2). At the same time points, the children were interviewed concerning, for example, their intrinsic values and self-concepts of ability. These individual testing situations occurred at T1 in two separate test sessions (each lasting 1 hour) on two consecutive days at the school premises, and at T2 in only one test session, lasting one hour on one single day.

2.2. Measures

2.2.1. Children's intrinsic value in math and reading

Children's intrinsic value was measured in an interview, using the Task-Value Scale for Children (TVS-C; Nurmi & Aunola, 1999; see also Aunola et al., 2006) based on the ideas of Eccles et al. (1983). The scale consists of three items measuring children's intrinsic value (i.e., "liking" of a particular subject) in mathematics, and similarly, three items measuring children's intrinsic value in reading (*How much do you like mathematics/reading? How much do you like doing mathematics-related/reading-related tasks at school? How much do you like doing mathematics-related/reading-related tasks at home?*). The items were rated (see Aunola et al., 2006 for a detailed description of the ratings and procedure) on a 5-point Likert scale (1 = *I do not like it at all/I dislike doing those tasks*; 5 = *I like it very much/I really enjoy doing those tasks*). A sum score for subject-related intrinsic value was created by calculating the mean of the three scores for the three items. The Cronbach's α reliabilities at the two measurement points were 0.70 and 0.88, respectively, for intrinsic value in math, and 0.78 and 0.72 for intrinsic value in reading.

2.2.2. Self-concept of ability

Children's self-concept of ability in regard to math and reading was measured using a modified version of the scale developed by Wigfield et al. (1997). The scale consisted of three items for both subjects (i.e., *How good are you in math/reading?*; *How good are you in math/reading compared to other students in your class?*; *How difficult is math/reading for you?*). The children were first read the question. Then, they were shown a set of pictures of five squares of different sizes and asked to point out the picture that best described their feeling of how good they are in a particular subject or how difficult a particular subject is (rating 5, picture of a big square = *very good/very difficult*; rating 1, picture of a small square = *not good at all/very easy*). Before administering the test, the procedure was carefully explained to each child. A sum score for subject-related self-concept was created by calculating the mean of the three items after reversing the third item. The Cronbach's α reliabilities at the two measurement points were 0.55 and 0.66, respectively, for self-concept of ability in math, and they were 0.70 and 0.53 for self-concept of ability in reading.

2.2.3. Math performance

Children's math performance was measured by two tests:

(1) *Knowledge of Cardinal Numbers and Basic Mathematical Concepts* was measured by 11 tasks. In each task, a picture with a set of dots was presented to the child, and the child was asked to draw a specific number of dots in the space given (e.g., *Draw as many dots as there are in this picture*; *Draw five dots less than there are in this picture*). The tasks became progressively more difficult. One point was given for each correct answer. The test is part of the *Diagnostic Test for Basic Mathematical Concepts* (Ikäheimo, 1996).

(2) *Basic Skills in Arithmetic* were assessed using a set of addition (e.g., $9 + 3 = ?$; $86 + ? = 93$) and subtraction (e.g., $11–2 = ?$; $57 - ? = 48$) problems. The test included 20 tasks that were presented on a sheet of paper, and the children wrote their answers down with a pencil. Each child was asked to complete as many of the tasks as he or she could. One point was given for each correct answer.

A total score for the children's performance in mathematics was created by calculating a sum score from the *Knowledge of*

Please cite this article as: Viljaranta, J., et al., Motivation and academic performance among first-graders: A person-oriented approach, *Learning and Individual Differences* (2016), http://dx.doi.org/10.1016/j.lindif.2016.06.002