Title: A Validation of a Reading Motivation Scale for Kindergarten Students (KRMS)

Background/Purpose:

There is extensive literature pointing to strong relationships between motivation and reading success (Baker, Dreher, & Guthrie, 2000; Mazzoni, Gambrell, & Korkeamaki, 1999). A number of instruments have been developed to measure reading motivation, however the majority of research targets elementary students in grades second and above (Coddington and Guthrie 2009; Mazzoni et al., 1999). The purpose of this study (nested within a larger Institute of Education Sciences-funded Goal 3 Efficacy Evaluation) is to fill this void in the research literature by establishing (1) reliability and (2) validity of an instrument created to measure reading motivation for young children, specifically kindergarten students.

Reading motivation is conceptualized using a combination of two theories: self-efficacy and expectancy-value (Bandura, 1977; Eccles & Wigfield, 2002; Stipeck, 1996). To understand reading motivation in young children this study also incorporates Cunha and Heckman's (2008) model of skill formation.

Self-efficacy theory explains behavior through an individual's cognitive understanding of his/her self-efficacy in future situations (Bandura, 1977; Stipeck, 1996). **Expectancy value theory** rationalizes that motivation is driven by an individual's expectation of successfully performing a specific task in the future, and his/her perceived value in performing the task (Bandura, 1977; Pajares, 1997; Wigfield & Eccles 2000).

Skill formation is a dynamic process where skills build on skills emphasizing the importance of early investment (Cunha, Heckman, & Schennach, 2010). Non-cognitive skills can be stable for periods of time, but are malleable (Cunha & Heckman, 2008; Guthrie et al., 2004; Unrau & Schlackman, 2006). Given reading motivation's malleable nature, rather than adopting the traditional psychological perspective of analyzing it as a trait (Kautz et al., 2014), this study considers reading motivation as an amenable skill. While scholars traditionally view motivation as composed of many sub-constructs, for young children it can be perceived as general construct or skill because young students have not yet developed nuanced understanding of their attitudes, self-efficacy, and competencies (Morgan &Fuchs, 2010).

Instrument Development Process:

The Kindergarten Reading Motivation Scale (KRMS) was developed after a thorough review of the reading motivation literature and, in consultation with literacy experts. As part of a rigorous development process (American Education Research Association, American Psychological Association, 2014) two pilot studies were conducted in Philadelphia Public Schools. The first pilot served as way to test which response method would elicit the most variation and valid responses from kindergarten students (n=47). The second pilot served to test wording of items (n=29). The final instrument consists of 20 questions (see Table 1) on a three-point Likert scale including two distractor questions

Setting/Participants/Data Collection

Trained assessors individually administered the KRMS scale to 900 Philadelphia kindergarten students across 10 schools. Administration time ranged between three and five minutes. The same assessors also administered the Woodcock Johnson Reading Mastery test (WRMT).

Research Design: Research Questions, Methods and Analysis

The purpose of this study is to examine the instrument's (1) scale reliability; and (2) validity: criterion-concurrent, construct, and discriminant validity; and. Specifically, the research questions are as follows:

- Do students' score on the reading motivation instrument correlate with reading achievement scores on the Woodcock Reading Mastery Test (WRMT)?
- What is the reliability of KRMS?
- Are teachers' ratings of students' reading motivation similar to self-reports on KRMS?
- Is KRMS correlated to math achievement scores?
- Do the scale's items hold together as one scale?
    - What are the item-total correlations for all instrument items including distractor items?
    - Is there a general factor (reading motivation) that holds the scale together?

To establish criterion validity, the relationship between WRMT (word identification and passage comprehensions section) and kindergarten reading motivation will be explored by computing pairwise correlations. The motivation score is on a scale from 1 to 3, and is calculated by an average across all scale items. For policy purposes, items that are positively related to reading achievement are of practical importance, and thus, will selected for further analysis.

To ensure the scale lends itself to reliable responses internal consistency are calculated using Cronbachs alpha for the entire instrument from the pairwise correlations between items (Knapp, 1991). The following common rule of thumb is used (George and Mallery, 2003): above .9 (excellent), between .9-.8 (good), .8-.7 (acceptable), .7-.6 (questionable), .6-.5 poor, and below .5 (unacceptable).

Teachers rated each students' reading motivation from 1 to 5 (1 being less motivated). Teachers' response to this question will be correlated to students' self-assessment of their own reading motivation on the KRMS scale.

Math achievement scores on the Kauffman standardized test will be correlated to the reading motivation scores to establish discriminant validity. As a robust check, the correlation between the reading motivation scale and distractor questions will also be explored.

Item-total correlations are calculated between each individual item of the instrument and the overall score. The item-total correlation approach allows a scale to be constructed by identifying groups of items that can be combined together into a scale. This approach allows items to vary together, and allows no individual item to be weakly related to the average of the other items (Churchill, 1979). A small item-correlation (below .2) will indicate that an item is not measuring the same construct as the other items, and should be dropped (Everitt, 2002; Field, 2005)

The general structure of the scale will be examined using a scree plot and Very Simple Structure (VSS) criterion to explore how many factors are in the structure of KRMS (Revelle, 2017). A scree plot is a line segment that displays the fraction of total variance represented by both principal component analysis and factor analysis. The horizontal axis displays number of factors and the vertical axis shows eigenvalues. All scree plots show a line segment that has a downward curve, and the largest drop or break indicates the number of factors that should be expected (Revelle, 2017). VSS is a goodness of fit for factor solutions. The number of factors that maximize the VSS criterion is considered the optimal number of factors (Revelle and Rocklin, 1979). I will then conduct conduct exploratory factor analysis using McDonald's (1999) omega as an estimate of general factor saturation of a test. This is appropriate because I hypothesize that reading motivation is one general construct. Omega is a hierarchical coefficient, which means that in addition to the general factor saturation test it conducts factor analysis to examine if there are subgroups within that

factor. Omega is calculated by conducting factor analysis to the original dataset, rotating the factors obliquely, and a transformation of higher order factor analysis (Revelle, 2017)

Findings:

Particular items (see Table 2) of the scale exhibit significant correlations with both the WRMT Word Identification section and WRMT Passage Comprehension section even after Bonferroni adjustments: correlations ranged from .04-.17. These eleven items were selected to be final items of the KRMS scale. The Cronbach alpha reliability coefficient is modertae $\alpha = .70$, which is considered acceptable/good.

Math achievement scores were negatively (near zero) related to the KRMS -.04. The two distractor items, which serve as evidence of discriminant validity, have low inter-item correlations .024 and .074. However, teacher ratings of each student were not correlated with student self-report average KRMS scores, but it was related to students' response to the question "Do you like to read?"

All items, with the except of one, have item-total correlations higher than .2 ranging from .26- .64; this suggests that the scale holds together as one. The scree plot suggests two factors, while the VSS criterion suggests one. The Omega criterion limited to two factors suggests that there is a general saturation factor with all 11 items loading above .3. Two factors emerge both in line with this study's conceptualization of reading motivation: (1) Can I be good reader and (2) Do I want to be a good reader? Items loaded (.2 and above) on factors that answered either of the two aforementioned questions (see Table 3).

The instrument including the 10 final items will be assessed to 800 more students in Philadelphia in Spring of 2018.

Conclusion:

The instrument can provide educational institutions, evaluation researchers, teachers, and other stakeholders with a tool to help support students by assessing and tracking their motivation to read. Unexpectedly, the reading motivation scale is a low burden for teachers, assessors, and students as it takes less than three minutes to administer per student. Given the recent policy interest in non-cognitive skills, the instrument can also help researchers measure reading motivation as a secondary outcome and/or mediator in reading program evaluations.

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Table 1. All Items Administered

• Do you like to read? (MRS- Enjoyment)
• Do you like it when someone reads to you?
• Do you like to look at books by yourself?
• Do you like to go to your classroom reading area?
• Is reading time in school boring?
• Do you like it when the teacher reads stories?
• Would you like it if someone gave you a book?
• Can you learn new things from books
• Can you use books to find answers to questions
• Can you read as many words as other kids in your class?
• When the teacher reads books, can you answer questions about the stories?
• Can you help other kids with reading?
• When your teacher reads stories, can you retell the stories?
• Is reading by yourself hard?
• Are you a good reader?
• Is there someone you like to read books with?

- Do you like to read books with your teacher?

Table 2. Correlation Between KRMS and WRMT

Item	Correlation	
	WRMT- Word Identification	WRMT-Passage Comprehension
Do you like to read?	.11$^+$	.08
Can you learn new things from books?	.04	.04
Would you like it if someone gave you a book?	.03	.01
Is reading by yourself hard?	.17***	.14***
Is reading in school boring?	.07*	.07*
Do you like to talk to people about books you read?	.13**	.11*
Can you read as many words as other kids in your class?	.10	.12*
Are there books in your class that you can read by yourself?	.17***	.15***
Can you help other kids with reading?	.06$^+$	.05
Do you like it when your teacher reads stories to the class?	.04	.05
Can you retell stories?	.04	.04
n= 845		

Table 3 Omega Hierarchical Results

Items	Overall Saturation "g"	Factor 1: " Can I be a good reader?	Factor 2: " Do I want to be a good reader"
Do you like to read?	.3	-------	.2
Can you learn new things from books?	.3	-------	.3
Would you like it if someone gave you a book?	.2	-------	.2
Is reading by yourself hard?	.3	.2	-------
Is reading in school boring?	.3	-------	.5
Do you like to talk to people about books you read?	.4	.5	-------

Can you read as many words as other kids in your class?	.4	.5	-------
Are there books in your class that you can read by yourself?	.4	.6	-------
Can you help other kids with reading?	.4	.4	-------
Do you like it when your teacher reads stories to the class?	.2	.2	-------
Can you retell stories?	.3	.3	-------