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ABSTRACT

This study examined the reliability and construct validity of two types of measures of mastery motivation for elementary school children: a new version of the Dimensions of Mastery Questionnaires (DMQ) and behavioral mastery tasks. Participating were 64 mostly middle class and Caucasian 7- and 10-year-olds living in a middle-sized western city. Mothers and teachers rated children on the DMQ; the DMQ scales were also administered orally to the children. Children also completed four sets of individualized mastery tasks, each set with five difficulty levels. Mothers and children completed the scholastic, athletic, and peer acceptance scales of Harter's Self-Perceived Competence scales. Preference for challenge and independent mastery were rated by the teachers and child. Findings indicated that most of the correlations across raters between parallel DMQ persistence scales and Harter Perceived Competence Scales were significant, but modest, with higher parent-teacher correlations than for adults with child's self-reports. There were modest, significant correlations between child-report of DMQ total persistence and total persistence at the behavioral tasks and preference for challenge. Child and teacher DMQ mastery pleasure scales were correlated with observed pleasure during the tasks. Child DMQ total persistence, parent DMQ cognitive/object persistence, and the child's rating of peer acceptance as unimportant combined to predict the child's overall behavioral task persistence. Children's task behaviors and parent DMQ ratings predicted school behavior as indicated by teacher ratings, but children's DMQ ratings did not. (KB)

Assessing Mastery Motivation in 7- and 10-Year Olds

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Assessing Mastery Motivation in 7- and 10-Year Olds

The purpose of this study was to examine the reliability and construct validity of two types of measures of mastery motivation for elementary school children, the Dimensions of Mastery Questionnaire (DMQ) and behavioral mastery tasks. The study examines the relations among them and to selected scales from Harter's self-perceived competence and intrinsic motivation measures. The DMQ and Harter measures were obtained from children, mothers, and teachers.

Mastery motivation is an inherent force that stimulates a person to attempt to master a skill or task that is at least moderately challenging for them. It is important to develop good measures of this motive because indicators of such motivation may be predictors of later school success, and no doubt mastery motivation is a precursor of achievement motivation (Morgan & Yang, 1995).

Mastery motivation has been studied primarily in children from 1 to 3 years of age, and persistence at object-oriented tasks has been the main way of operationalizing the concept (see MacTurk & Morgan, 1995). However, in recent years the construct has been expanded in several ways. First, measures are now available for children as young as 6 months and as old as 12 years. Second, both behavioral mastery tasks and an adult-report questionnaire are available for this age range. A teen-age self-report measure has also recently been developed (Morgan et al. 1998).

Third, the concept has been broadened to include persistence measures in four instrumental domains (persistence at object/cognitive tasks, at social tasks with peers, at social tasks with adults, and at gross motor/athletic tasks) and an expressive aspect, mastery pleasure. Children may score high on one of these domains but low in

another. However, overall scores seem appropriate because the domain scores are moderately interrelated (Morgan et al., 1998).

In this paper we will present some data about the new school-aged versions of the Dimensions of Mastery Questionnaire (DMQ17), which is one version newer than the ones used in the other papers in symposium (Knauf, Bobadilla, & Busch-Rossnagel, 1998; MacPhee, Fritz, Miller-Heyl, & Hite, 1998). For the DMQ, we will present some new psychometric data from the other age versions (infant, preschool, and teen) to put the elementary school data in a broader context.

Method

Participants

The 64 participants were mostly middle class and Caucasian, living in a middle-sized city in the Rocky Mountain West. The sample had 31 boys and 33 girls; there were 34 7-year olds and 30 10-year olds. Three out of the 64 children were ethnic minorities. Five were from working class families; 39 were middle class; and 20 were upper middle class.

Measures

Dimensions of Mastery Questionnaire (DMQ). Mothers and teachers rated the children on the DMQ (Morgan et al., 1993, 1998). The DMQ scales were also administered orally to the children. Table 1 shows the design of the study and that the DMQ has four persistence/mastery motivation and one mastery pleasure scale which are also summed to produce total persistence and mastery motivation scales. In addition, there are general competence and negative reaction to failure scales. Internal consistency of these scales was very good for mothers and teachers of elementary

school children; alphas ranged from .76 to .93, with a median of .88. For the children's self-ratings, alphas ranged from .60 to .88, with a median of .70 (see Table 2). Note that alphas for parent ratings of infants and preschoolers and teen self-ratings are generally good.

Factor analysis for large, more diverse (in geography, age and race) groups of parents and of children/teens support the grouping of items into these five mastery domains (see Tables 3 and 4). The analysis of parent responses is especially clear and consistent with the model. The analysis for children and teens is somewhat less clear, but still provides considerable support for the factorial validity of the five domains. Note that these factor analyses fit our model better than the one from the MacPhee et al. (1998) data or our previous data using DMQ16. We will discuss below several possible reasons for this improvement.

Domain scale scores for the current sample of 7- and 10-year olds were moderately related. In general, the five persistence and pleasure scale scores were less highly correlated for the parent's self-ratings (median $\underline{r}$ = .20) than for children (median $\underline{r}$ = .41) or teachers (median $\underline{r}$ = .37). The five persistence and pleasure scales were modestly correlated with competence, except for teachers (r = .77) and parents (r =.61) who seem to view cognitive/object persistence and general competence as highly related.

Mastery tasks. Bartholomew & Morgan (1997) developed four sets of individualized mastery tasks. Scores were based on observations of the child's behaviors while attempting to solve tasks, which were presumed to be moderately challenging for them personally. The four types or sets of tasks were: (a) spatial

matching (complex puzzles), (b) goal formation (Tower of Hanoi), (c) fine motor (pinball, etc.), and (d) gross motor (ring toss). Each set had five levels of difficulty, varying from an easy level that all 7-year olds could solve in 1 minute to a very hard level that no 10-year old could solve in 5 minutes. Each child was given a task from each of the four sets that was relatively easy for them, in order to estimate their skill/competence and to provide them a sense of accomplishment. Then the child was given a level of the task too difficult for him or her to complete in 5 minutes. The children were told that they could stop working on the task whenever they wanted. This harder task was judged to be appropriately challenging if the child could solve part of it, but not all of it, in 5 minutes. Occasionally, a child successfully completed the hard task early; in that case he/she was also given the next harder task. When the child stopped working on the task or at the end of 5 minutes, the tester asked if they would now like an easier task, a harder task or continue with the same task. This was done to obtain a measure of preference for challenge. After 1 minute on the new task, the tester stopped the task and asked the child if he or she wanted to stop now, go a little longer, or spend a long time working on this task. Mastery motivation measures included the duration of the children's persistence at each hard task and ratings of their mastery pleasure. Reliability correlations for two observers scoring 10 children were .57 and .85 for pleasure on hand and easy tasks and 1.00 for all persistence measures and preference for challenge.

Perceived Competence. Mothers and children answered three of Harter's (1982) Self-Perceived Competence scales (scholastic, athletic, and peer acceptance). As with the DMQ, the Harter scales were orally administered to the child by the tester.

Intrinsic vs. Extrinsic Motivation. Two of Harter's (1981) Intrinsic versus Extrinsic Motivation in the classroom scales (preference for challenge and independent mastery) were rated by the teacher and child. Teachers were sent the DMQ and the in the classroom scales and asked to mail them to the researcher.

Procedure

The assessments were conducted in the child's home, and were done in the following order:

1. Dimensions of Mastery Questionnaire
2. Cognitive/Spatial Tasks - Puzzles
3. Harter's Perceived Competence Scales
4. Fine Motor Tasks - PinBall, etc.
5. Harter's Intrinsic versus Extrinsic Motivation In the Classroom Scales
6. Cognitive/Goal Formation Tasks - Tower of Hanoi
7. Gross Motor Tasks - Ring Toss

In addition to the persistence, pleasure, and choice for challenge scores coded during each task, overall ratings on four 5 - point scales were made by the tester after each home visit. Reliability correlations for these ratings on 10 children were mixed: .42 for competence, .65 for pleasure, .80 for negative reaction to failure, and .93 for social mastery motivation.

Results

There were few significant gender or age differences, except 10-year olds were, as expected, rated more competent at the tasks.

Correlations of DMQ Scales Across Raters

Intercorrelations among the three raters (mothers, teachers, and children) on scales of the DMQ were quite varied (see Table 5). Note that parent-teacher correlations (median r = .43) tend to be stronger than those of either parent or teacher with child self-reports (median r = .20).

DMQ Scales With Harter Scales

Table 6 shows that correlations of DMQ persistence scales with parallel Harter measures of perceived competence were .37, .46, and .33 for children's ratings of the cognitive, athletic, and social with peers domains, respectively, indicating significant overlap in the concepts but substantial differences. Parent's DMQ scores on the same three scales were correlated .62, .68, and .54 with parallel Harter competence domains, indicating more overlap between DMQ persistence and Harter perceived competence scales. Table 6 also shows moderately high correlations between child-child (.54 and .61) and teacher-teacher (.74 and .54) ratings of cognitive/object persistence on the DMQ and Harter's preference for challenge and independent mastery, respectively.

Most of the correlations (10/18) across raters between parallel DMQ persistence scales and Harter perceived competence scales were significant, but modest (range -.04 to .58, median .27). Again parent-teacher correlations between the DMQ and Harter perceived competence scales were higher than those were for parents or teachers with the child's self-reports.

DMQ With Task Behaviors

Table 7 shows that there were modest but significant correlations between the child's self-report of DMQ total persistence and both their total persistence at the

behavioral tasks and their preference for challenging tasks. Parent DMQ total persistence was correlated with behavioral task persistence scores but not with preference for challenge. However, teacher DMQ total persistence was not correlated with either task measure. Both child and teacher DMQ mastery pleasure scales were significantly correlated with observed pleasure during the tasks (see Table 7).

The combination of child DMQ total persistence (Beta = .28), parent DMQ cognitive/object persistence (Beta = .34), and the child's rating of peer acceptance as unimportant (Beta = -.26) predicted the child's overall behavioral task persistence ($\underline{R}$ = .51, adjusted $\underline{R}^2$ = .22).

Predictions of School Behavior

Using the teachers' rating of the child's general competence from the DMQ and intrinsic motivation (Harter, 1981) as criteria of potential for school success, we examined possible DMQ and mastery task predictors. Table 8 shows that children's task behaviors (competence and persistence at the cognitive tasks) were predictive of school behavior as indicated by teacher ratings of the child's competence and intrinsic motivation. Likewise, parent DMQ ratings predicted school behaviors, but children's DMQ ratings did not.

Discussion

The finding that child DMQ scores were not related to teacher ratings of competence or intrinsic motivation, plus lower alphas and lower child-adult correlations on the DMQ may indicate that children under 10 have trouble rating themselves, especially with regard to negative reactions to failure, competence, cognitive and social persistence with adults. However, they may just have different perceptions because

parents, teachers and children do view the child in different contexts and from different perspectives.

Nevertheless, these results provide some support for both the DMQ and task persistence as reliable and valid measures of mastery motivation for middle class elementary school children. However, data have been presented in the other two symposium papers and in other research that the DMQ may not work as well for younger children and those whose parents have lower reading levels. In this paper, we presented results of a factor analysis of the most recent version of the DMQ (17) using a large diverse sample of parents that did fit the five-domain model very well. These differences could be a result of changes in the most recent version of the DMQ, which was used in this study but not the two presented earlier. As with the Head Start sample (MacPhee et al., 1998), our past findings showed that, especially with lower SES parents, the reversed items on the DMQ caused problems. These led to somewhat lower alphas and one factor that contained only reversed items from several intended domains. In revising the DMQ, we eliminated several of these reversed items and tried to make others more clear. Now there is only one reversed item for each scale, and there is a similar positively worded item. Our intention is to develop a scoring template to identify respondents who consistently miscode the reversed items, either because they have trouble understanding them or because they are reading too fast and not paying attention. Such individual subjects might be deleted as providing invalid data. In revising the DMQ we also made an effort to simplify the reading level by shortening sentences and, where possible, using words that were common in school textbooks by

the third grade. The changes, hopefully, make the DMQ more appropriate for elementary school children and for parents who do not read well.

Although it is disappointing not to find higher correlations between the children and adults and between the DMQ and the behavioral task scores, in many ways this is not surprising. As qualitative researchers often point out, every person has their own reality or, at least, perspective. Teachers and parents see the child in different settings and neither is with the child all the time or sees things from the child's point of view. Furthermore, the tasks are a very small slice of life in a somewhat artificial situation that probably reflect, in part, both aspects of children's cooperativeness and their cognitive ability. We have tried to control for the latter by individualizing the level of difficulty of the tasks given to each child so that more skilled children receive harder tasks. We hope that each child receives tasks that are moderately challenging for them, but it is not possible to be certain this goal is achieved in all cases.

In conclusion, we think that both the newly revised, age-expanded DMQ and the individualized mastery tasks for elementary school children show promise as measures of an important area of functioning, the motivation to master challenging tasks, that is not assessed well by other available measures.

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Table 1
Measures Used to Assess the Construct Validity of the Children's Dimensions of Mastery Questionnaire (DMQ)
(N = 34 7-year olds and 30 10-year olds)

Child Motivation Questionnaire (DMQ) Rated by Child, Mom & Teacher	Harter Perceived Competence Scale (SPCS) Rated by Child & Mom	Harter Intrinsic vs. Extrinsic Orientation in the Classroom Rated by Child & Teacher	Behavioral Mastery Tasks Rated or Scored by Tester

• Cognitive/Academic Persistence	• Scholastic Competence & Importance	• Preference for Challenge
		• Independent Mastery
			• Cognitive Persistence
			  • Puzzles
			  • Tower of Hanoi
			• Preference for challenge

• Athletic Persistence	• Athletic Competence & Importance		• Motor Persistence
			  • Ring Toss
			  • Pinball

• Social Mastery Motivation with Adults			• Rating of Overall Social Mastery Motivation
• Social Mastery Motivation with Peers	• Peer Acceptance & Importance		
• TOTAL PERSISTENCE (sum of above)		• Intrinsic Motivation (sum of above)	• Computed Total Persistence
• Mastery Pleasure			• Score and Overall rating of Mastery Pleasure
• TOTAL MASTERY MOTIVATION (sum)		• Intrinsic Motivation (sum)	• Computed Total MM
• General Competence	• Scholastic Competence		• Rating of Overall Competence
• Negative Reaction to Failure			• Rating of Overall Negative Reaction

Table 2
Internal Consistency and Stability
of the Dimensions of Mastery Questionnaire (DMQ 17) Scales

DMQ Scales	Items in Scale	Parent Ratings			Child Ratings		Teacher Ratings	
		Infant	Pre School	Elem School	Elem School	High School	Pre School	Elem School
N =	-	66	104	79	71	106	52	42
Objective Persistence	9	.74	.82	.84	.69	.75	.91	.90
Gross Motor Persistence	8	.81	.87	.92	.81	.87	.88	.91
Social Persistence with Adults	6	.79	.73	.84	.70	.74	.88	.84
Social Persistence with Children	6	.82	.85	.82	.61	.70	.93	.82
TOTAL Persistence	29	.81	.89	.87	.86	.89	.94	.91
Mastery Pleasure	6	.84	.87	.88	.74	.87	.69	.90
TOTAL Mastery Motivation	35	.86	.91	.89	.88	.91	.94	.93
General Competence	5	.71	.73	.76	.60	.62	.89	.90
Negative Reaction to Failure	5	.64	.80	.78	.63	.59	.82	.88

Table 3
Factor Analysis of DMQ 17 Mastery Motivation Items (N= 254 Parents)

Item		Gross Motor Persist	Cognitive/ Object Persistence	Mastery Pleasure	Social Persist Child	Social Persist Adults
	Gross Motor Persistence					
26	Repeats jumping or running skills to do well	.811				
16	Likes sports and tries to do well	.801				
40	Tries to do well at athletics	.773				
27	Tries hard to throw well	.765				
36	Repeats motor skills, such as climbing	.672				
45	Gets involved trying to catch objects	.671				
12	Tries hard to do well in physical play	.660				
3R	Gives up easily if can't master physical skills	-.473				
	Cognitive/Object Persistence					
23	Works a long time putting things together		.837			
14	Tries to complete things		.709			
29	Will work a long time to get something open		.695			
9R	Stops quickly if toy challenging		-.661			
7	Likes to try hard problems		.529			
17	Explores all parts of objects		.528			
31	Tries to finish puzzles even if hard		.524			
1	Repeats a new skill until does it well		.467			
24	Attempts to master cause & effect toys		.441			
	Mastery Pleasure					
41	Smiles when makes something happen			.788		
2	Smiles after finishing something			.736		
18	Gets excited when figures something out			.706		
21	Is pleased when solves a hard problem			.674		
43	Claps when succeeds			.660		
11R	Smiles only a little			-.569		
	Social Persistence w/children					
30	Likes pretend w/children				.842	
28	Tries to make friends w/children				.761	
32	Tries to get children to play				.757	
35	Tries to keep play w/child going				.736	
39R	Avoids games w/children				-.731	
25	Involved in pretend w/children				.456	
	Social Persistence - Adults					
15	Tries to get adults to continue					.829
22	Tries to get adults to play					.768
8	Enjoys talking with adults					.695
19	Likes to play with adults					.628
37	Enjoys pretend w/adults					.550
33R	Dislikes make believe w/adults					-.453

Note. Principal components factor analysis with Varimax rotation. Eigenvalues = 8.05, 3.57, 2.72, 2.41, and 1.85. These five factors account for 53.1% of the variance. Items marked with an R were reversed. Loadings less than .40 are omitted.

Table 4

Factor Analysis of DMQ 17 Mastery Motivation Items (N= 175 Children and Teens)

Item		Cognitive/ Object Persistence	Social Persist Child	Gross Motor Persist	Mastery Pleasure	Social Persist Adults
	Cognitive/Object Persistence					
23	Works a long time	.758				
29	Will work a long time to solve school problem	.732				
17	Explores all ways to solve a problem	.652				
14	Tries to complete school work	.641				
7	Likes to try hard problems	.632				
31	Tries to complete puzzles even if hard	.508				
1	Repeats a new problem until does it well	.424				
	Social w/children + Gross Motor					
28	Tries hard to make friends		.694			
36	Repeats motor skills, such as climbing (GM)		.671#			
35	Tries to keep play w/kids going		.605			
45	Tries to get better at catching (GM)		.549#			
32	Tries to get included in play with kids		.508			
25	Involved in pretend w/children		.480			
	Gross Motor Persistence					
16	Likes sports and tries to do well			.736		
40	Tries to do well at athletics		.408	.703		
3R	Gives up easily if can't do physical skills well			-.689		
26	Repeats sports skills to do well			.635		
12	Tries hard to do well in physical activities			.626		
27	Tries hard to throw well		.468	.534		
9R	Stops quickly if tasks challenging (C/O)			-.506#		
39R	Avoids getting involved w/children (SC)			-.406#		
	Mastery Pleasure					
2	Smiles after finishing something				.773	
41	Smiles when makes something happen				.730	
11R	Smiles only a little				-.698	
43	Gets excited when succeeds	.415			.664	
18	Gets excited when figures something out				.606	
21	Is pleased when solves problem	.408			.600	
	Social Persistence - Adults					
8	Enjoys talking with adults					.749
37	Enjoys discussing things w/adults					.720
19	Likes to play with adults					.671
15	Tries to interest adults in joint activity					.554
22	Tries to get adults to understand					.522

Note. Principal components factor analysis with Varimax rotation. Eigenvalues = 9.75, 2.83, 2.23, 1.76, and 1.63. These five factors account for 52.0% of the variance. Items marked with an R were reversed. Loadings less than .40 are omitted. Number sign (#) indicates that item loads on incorrect factor. Three items, 22, 33R, and 30 did not load above .40 on any factor/component so are omitted from the Table.

Table 5
Correlations between Raters on the Dimensions of Mastery (DMQ 17) Scales

DMQ Scales		Elementary School		
		Child-Parent	Child-Teacher	Parent-Teacher
N =	-	71	50	50
Cognitive/Objective Persistence	9	.06	.14	.59**
Gross Motor Persistence	8	.41**	.39**	.30*
Social Persistence with Adults	6	.19	.04	.20
Social Persistence with Children	6	.35**	.28*	.42**
TOTAL Persistence	29	.28**	.15	.41**
Mastery Pleasure	6	.43**	.30*	.43**
TOTAL Mastery Motivation	35	.37**	.21	.43**
General Competence	5	.17	.10	.45**
Negative Reaction to Failure	5	-.01	-.04	.38**

*p <.05
** p < .01

Table 6
Correlations Between DMQ Cognitive, Athletic and Social Mastery With Peers Scales and the Corresponding Harter Scales

	Appropriate Child DMQ Persistence Scale	Appropriate Parent DMQ Persistence Scale	Teacher DMQ Cognitive Persistence Scale
Harter			
Scholastic Competence	.37 **	.62 **	
Athletic Competence	.46 **	.68 **	
Peer Acceptance	.33 **	.54 **	
Harter			
Preference for Challenge	.54 **		.74 **
Independent Mastery	.61 **		.54 **

** p < .01

Table 7
Correlations of Child's Task Directed Behaviors/Persistence with DMQ and Harter Scales

	Total Task Persistence	Total Preference for Challenge	Pleasure During Hard Tasks
DMQ			
Child Total Persistence	.29 **	.30 **	
Child Mastery Pleasure			.30 **
Parent Total Persistence	.23 *	.11	
Parent Mastery Pleasure			.10
Teacher Total Persistence	.10	.03	
Teacher Mastery Pleasure			.33 **

* p < .05, one tailed
** p< .01, one tailed

Table 8
Predictions of Teacher Ratings of School Behavior from Mastery Tasks and Parent and Child DMQ Scale Scores

	Teacher DMQ Competence	Teacher Harter Intrinsic Motivation
Tasks		
Persistence at Cognitive Tasks	.39**	.35**
Overall Competence Rating	.24*	.31**
Parent DMQ		
Cognitive/Object Persistence	.48**	.40**
General Competence	.43**	.27*
Negative Reaction to Failure	-.28*	-.34**
Child DMQ		
Cognitive/Object Persistence	-.02	.03
General Competence	.11	.16
Negative Reaction to Failure	.04	.15

*p<.05, one-tailed
**p<.01, one-tailed

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