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ABSTRACT

The developmental pattern in the relationships among mothers' beliefs about structure, autonomy, control, and intelligence was studied, addressing: (1) how mothers' scaffolding beliefs and conceptions of intelligence are related; (2) the relationship of these maternal beliefs to children's age and achievement; and (3) the relationship between these maternal beliefs and children's beliefs and achievement as a function of intelligence. Subjects were 12 second graders, 18 fifth graders, and their mothers from 3 elementary schools in a metropolitan school district. Mothers completed beliefs and family background questionnaires. Children completed a perceived competence test from the Self-Perception Profile for Children and a conceptions of intelligence scale developed for the study. Correlations between mothers' intelligence theory and children's achievement were statistically different in the two grades. Mothers' scaffolding beliefs did not consistently relate to children's achievement in either grade, and structure beliefs were not significantly related to any child measures at either grade. Mothers' autonomy beliefs were only significantly related to mathematics achievement in grade 2. Control beliefs were correlated with achievement for grade 5. Results demonstrate that while the mean levels of maternal beliefs do not differ according to the child's grade, the way in which they are related does change. Implications are discussed. Five tables present study data. An appendix contains the Parental Beliefs Questionnaire Scales, and there is a 23-item list of references. (SLD)

Maternal Beliefs and Children's Learning:

A Developmental Perspective

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Maternal Beliefs and Children's Learning: A Developmental Perspective

A large body of research has shown that parental beliefs and perceptions play a critical role in the development of children's cognitive skills (for reviews see Miller,1988; Goodnow, 1988). These studies, however, have been conducted primarily with children at single ages. As children develop and enter school, their scope of social contact expands to include teachers and peers in addition to parents, families, and caretakers. They enter into different social comparison groups, encounter new task demands, and accrue performance records. These developmental changes in children's social environments suggest that the relationship between parental beliefs and children's learning may change over time as children acquire new experiences and relationships. The goal of the present research was to describe the developmental pattern in the relationships between mothers' beliefs about structure, autonomy, control, and intelligence with children's learning. These beliefs were selected on the basis of the theoretical and empirical work demonstrating their importance to children's learning (Johnson & Martin, 1985; Ryan & Stiller, 1991; Sameroff & Feil, 1985). These are important factors to examine in children's development and learning, not only because they may influence children's personal beliefs and achievement, but also because they may inform the "scaffolding" (Wood, Bruner, & Ross, 1975) parents do as they assist in their children's learning.

Vygotsky's (1986) developmental theory provides a useful theoretical framework for understanding how parental beliefs may exert a diverse influence upon children. He conceptualized the child's cognitive development as the result of the child constructing knowledge through a socially mediated process. He proposed that children did not have a single level of ability at any one time but a "zone" of abilities that could be encouraged. Emphasis is placed on the individual who mediates the social interaction to successfully access the zone in which the child currently functions and to scaffold the situation to promote the development of cognitive skills and the personal resources necessary for their utilization. Research using the scaffolding paradigm has

found that the provision of structure and control that is sensitive to the child are significant predictors of children's learning (Wood, Bruner, & Ross, 1975; Pratt, Kerig, Cowan, & Cowan, 1988). In addition, the degree of structure provided in interactions in the home, the amount of parental support for autonomy have been found to be significantly correlated with children's academic performance, classroom behavior, and perceived control (Connell, 1985; Grolnick & Ryan, 1989). To the extent that parental beliefs about structure, children's autonomy, and parental control are concerned with scaffolding, they are likely to influence the nature of parent-child interactions and children's competence. Beliefs about structure refer to the rules, guidelines, and the clarity of expectations that parents believe they need to provide children. Autonomy beliefs concern the extent to which parents think children should function independently, whereas control refers to the need for parents to be in charge and for children to be compliant.

The demonstrated importance of children's intelligence theories for their motivation and learning (Dweck & Bempechat, 1983; Dweck, 1989) prompted us to also examine these beliefs among parents. Dweck has shown that an entity theory of intelligence is associated with performance rather than learning goals and often accompanied by maladaptive approaches to learning such as "learned helplessness". She proposed that the intelligence theory that a child holds can either promote or interfere with the child's learning. We were interested in the extent to which parents and children shared these views of intelligence and whether parents may serve as sources of these beliefs. We also hypothesized that the way parents view intelligence as fixed or having the potential to be increased may be related to their beliefs about structure, control and autonomy, and in turn, to how parents provide guidance in interactions.

The work of McGillicuddy-DeLisi (1985) provides strong support for studying the direct relationship between parental beliefs and child outcomes. In an investigation of parental beliefs about child development and children's cognitive skills, the results of a path analysis showed that the direct path from parents' beliefs was stronger than the path through parents' teaching strategies in predicting children's cognitive development. She concluded that parental beliefs may affect

child outcomes in ways not readily observable in a research setting. The way that parents structure the home environment and the subtle types of messages that emerge over a history of interactions are two ways that parent's beliefs may affect children apart from any correlation between parents' beliefs and their observed behavior in a research setting. The types of toys provided in the home, the amount of freedom to explore and experiment, even the location of the home and the opportunities provided are all additional examples. Parents' beliefs about intelligence and scaffolding are likely to inform these decisions and this may demonstrate a direct influence upon children's growing competencies. Conceivably this direct effect of parents' beliefs might compound over the early years of development so that one would find a stronger relationship between parents' beliefs and academic performance in the older versus younger children. Alternatively, the effect of parents' views off parents' views of their children may weaken as children enter school and begin to develop differentiated beliefs that are influenced by other socializing agents. Thus, in either case, as children develop, these parental beliefs may have different functions at different ages.

This study addressed three questions: 1) How are mothers' scaffolding beliefs and conceptions of intelligence related?, 2) Are these maternal beliefs related to children's age and achievement?, and 3) What is the nature of the relationships between these maternal beliefs and children's beliefs and achievement as a function of development?

Method

Subjects

The subjects in this study were 12 second graders (7 females, 5 males), 18 fifth graders (12 females, 6 males) and their mothers recruited from 3 elementary schools in a metropolitan school district as part of another study. The mean age of the second graders was 98.3 months (SD = 5.9) ranging from 89-108 months. Fifth graders averaged 133.3 months (SD = 4.8) with a range of 127-143 months. Mothers ranged in age from 25-50 years with a mean of 36.3 years (SD = 5.7). The participants represented a range of ethnic groups and spanned the upper 80% of the

socioeconomic status (SES) range as assessed by the Hollingshead Four Factor Index of Social Status (Hollingshead, 1975). The sample's SES ranged from 20 to 66 with a mean of 41.75 (SD = 11.33). Children came from families having from one to seven children with children in the study ranging from first born to last. The mean number of children in the family was 2.4 (SD = 2.4) and the mean birth order of children in the study was 1.9 (SD = 1.2). Sample characteristics broken down by grade are presented in Table 1. A MANOVA revealed that there were no significant differences in the number of children in the family, child's birth order, or SES according to the child's grade.

Procedures

Mothers completed the Parental Beliefs Questionnaire (PBQ) and a Family Background questionnaire either in their home, returning them through the mail, or at the university. Children completed a questionnaire booklet at school during the spring. Reading and math composite scores on the Stanford Achievement Test administered in the spring were obtained from school records. Children were assigned to one of three achievement groups based on a composite of their reading and math achievement scores. High, moderate, and low ability groups were created by dividing the range at each grade level into thirds.

Measures

The Perceived Competence Scale (PC) consisted of the scholastic subscale from Harter's (1985) Self-Perception Profile for Children. The complete profile consists of six subscales, scholastic competence, social acceptance, athletic competence, physical appearance, behavioral conduct, and global self-worth, which have been widely used. The scholastic (academic) subscale consists of six items which present two kinds of students (e.g., "Some kids feel that they are very good at their school work but other kids worry about whether they can do the school work assigned to them"). Children first decide which type they are most like and then decide how true this description is for them. The resulting score is the average of the six items and ranges from 1 to 4.

The Children's Conceptions of Intelligence measure was developed for this study. It consisted of eight items assessing a student's views of intelligence (entity vs. incremental; e.g., "Some experiences can help me become smarter"). Students responded on a four-point Likert scale from "Most Like Me" to "Least Like Me". A confirmatory factor analysis eliminated two items which did not significantly contribute to the scale. The resulting scale had a reliability of .55 using Cronbach's alpha (Cronbach, 1951).

The Family Background Questionnaire was a one page questionnaire with questions concerning the parents' educational background, occupations, family structure, number of children in the home, child care arrangements, ethnicity, and average amount of time spent with the child each day. The information from this questionnaire was used to construct the demographic variables considered (i.e. SES, number of children in the home and birth order).

The Parental Beliefs Questionnaire (PBQ) was constructed for this study and consisted of 28 questions presented in a randomized order. Mothers' scaffolding beliefs were assessed by ten questions in each of two areas: 1)beliefs about structure (high versus low) and 2) beliefs about control orientation (parent- versus child-centered). Eight questions assessed theories of intelligence (entity versus incremental). Each item required a response on a 4 point Likert scale in which a 1 represents a belief "least like me" and a 4 represents a belief "most like me". The resulting scores were the mean of the items and ranged from 1 to 4. The items were counterbalanced so that in half the cases a high score represented one view, and in the remainder, it represented the opposing view. For the purposes of data analysis and interpretation, the items were transformed so that high values on the Intelligence, Structure, and Control composite scores represent an incremental theorist, provision of high structure, and an orientation toward child-centered control respectively.

Initially control was conceived as a balance between parents giving the child autonomy in a situation and parents controlling what happens (i.e. "I only offer my child help with a task if I think help is needed" vs. "I make sure my child obeys me or does what I expect"). A confirmatory

factor analysis performed using LISREL (Jöreskog & Sörbom, 1988) to verify item placement on the three scales revealed that the child autonomy and parent control items did not fit on the same scale. Therefore new Control and Autonomy scales were created. High scores on the new Autonomy scale represented a belief in children's autonomous behavior while high scores on the resulting Control scale represented a belief in parental Control. Items that contributed significantly to their respective scales were retained. This resulted in a 6 item Intelligence scale, a 4 item Structure scale, a 3 item Autonomy scale, and a 4 item Control scale. (Appendix A lists the items assigned to each of the four scales.) Reliabilities computed using Cronbach's alpha (Cronbach, 1951) yielded values of .80, .74, .62, and .66 for the Intelligence, Structure, Autonomy, and Control scales respectively. A summary of the four scales' means and standard deviations is found in Table 1.

Results and Discussion

We organized our analysis around the three questions raised at the beginning of the paper. The first question concerned the interrelationships among the parental beliefs and the second and third questions focused on the relationship between parental beliefs and children's beliefs and achievement.

The first question that we posed was how are mothers' scaffolding beliefs and conceptions of intelligence related? We had hypothesized that those beliefs concerning scaffolding, i.e. structure, autonomy, and control, would be related to conceptions of intelligence. The results of the correlational analysis among the four parental beliefs with the entire sample are shown in Table 2. Beliefs about Intelligence were significantly and positively correlated to only one area of scaffolding, that of Control ($r = .313, p < .05$). Mothers who believed more in parent-centered rather than child-centered control were more likely to have a more incremental theory of intelligence. Among the scaffolding beliefs, only one significant correlation was found and that was between Control and Structure ($r = .395, p < .05$). This suggests that mothers who believed in parent-centered control tended to believe in providing structure. Autonomy beliefs were not

correlated with the two other scaffolding beliefs or with mothers' theory of intelligence.

The second question that we raised was whether parents' scaffolding beliefs and intelligence theory were related to children's age and achievement. We analyzed the scaffolding beliefs using MANOVA despite the absence of a significant statistical relationship among all three of these beliefs because of our assumption that they are conceptually linked. A series of one-way MANOVAs were performed to determine the effect of children's age and academic achievement on parent's scaffolding beliefs. No significant differences were found among mothers' scaffolding beliefs due to these factors (Age, $F = 1.35$, $p = .279$; Achievement, $F = 1.98$, $p = .144$). We also performed a series of MANOVAs to control for the effects of SES, child's sex, child's birth order and number of children in the family on maternal beliefs. Mothers' scaffolding beliefs did not significantly differ according to any of these demographic variables providing support for us to pool the data across these variables.

We analyzed the mothers' beliefs about Intelligence with a a six-way ANOVA (Child's Age x Achievement x Sex x Birth Order x SES x # of children). Significant differences were found due to child's achievement ($F = 7.87$, $p = .005$) and child's sex ($F = 6.34$, $p = .024$). Subsequent post-hoc comparisons using the Student-Newman-Keuls procedure revealed a significant difference ($p = .05$) between mothers of high achieving children and mothers of moderately achieving children (See Table 3 for a summary of means). Mothers of high achieving children were significantly more entity oriented than mothers of moderately achieving children. Mothers of boys were found to have a more incremental theory of intelligence than mothers of girls.

The third question we raised concerned the nature of the relationships between these parental beliefs and children's beliefs and achievement as a function of development. In contrast to the results of correlations computed for the total sample, the correlational analysis by grade revealed striking differences in the relationships by grade (see Table 4). Although the MANOVAs and ANOVA showed no difference in the means of mothers' beliefs as a function of children's

age, the pattern of relationships among beliefs and their relationship with children's achievement did demonstrate developmental differences. Specifically, the relationship between parents' and children's Intelligence theory and children's academic achievement presented a dramatically different pattern in the two grades. Whereas mothers' conception of Intelligence was consistently positively correlated with children's achievement in second grade (reading, $r = .50$, $p < .05$), it was negatively correlated with children's achievement in the fifth grade sample (reading, $r = -.48$, $p < .05$; total achievement, $r = .-48$, $p < .05$). The findings with regard to the relationship between mothers' and children's intelligence theories revealed a positive correlation in the second grade sample and a negative correlation in the fifth grade, but neither of these correlations were significant. In both grades children's intelligence theory appeared to be positively related to their achievement, but only significantly correlated with reading achievement in the fifth grade ($r = .44$, $p < .05$).

Fisher's Z transformation was performed on all the correlations and subsequent z tests were computed to determine which of the correlations differed significantly in the two grades. Table 5 gives the resulting z statistic for each pair of correlations. The correlations between mothers' Intelligence theory and children's reading and total achievement were statistically different in the two grades. Thus, mothers having a more incremental theory tended to have higher achieving children in the second grade sample, but lower achieving children in the fifth grade sample.

Contrary to our expectations, mothers' scaffolding beliefs as a group did not consistently relate to children's achievement in either grade. Mothers' Structure beliefs were not significantly related to any of the child measures at either grade level. Mothers' Autonomy beliefs were only significantly related with one of the children's measures in the second grade sample: children's Math achievement ($r = -.55$, $p < .05$). Mothers' Control beliefs were fairly consistently correlated with children's achievement but these results were significant for the fifth grade sample only ($r = -.50$, $-.41$, and $-.50$ for Reading, Math, and Total Achievement respectively; $p < .05$).

One possible explanation for the dramatic change in the direction of the relationship between mothers' Intelligence theory and children's achievement may be the cumulative set of experiences mothers have had with their children's performance. By the fifth grade, mothers may have developed rather stable expectations of their children's achievement in school. For mothers with high assessments of their children's abilities, an entity view is consistent with the expectation that their children will continue to do well, i.e., once smart, always smart. Such a static view of their child's abilities may emerge out of their repeated experiences with their child's successes. Furthermore, such successful performance may be viewed as approaching the upper limits of ability and may indicate a ceiling effect in the mothers' perceptions of their children's abilities. They may believe that their children can't get much smarter and thus appear to be entity thinkers. Mothers of children who do poorly, however, may be more likely to maintain or adopt an incremental view as a means of coping with their child's difficulties. These differential views of Intelligence may in fact be adaptive by sustaining the optimism of mothers of low achievers as well as maintaining the expectations of mothers of higher achievers.

These results demonstrate that while the mean levels of the maternal beliefs do not differ according to the child's grade, the way in which they are related to their children's achievement does appear to change. This changing pattern of relationships suggests several possible interpretations. The first is that mothers' beliefs are not personal "traits" but ideas which may be affected by the interactions with significant others. The second is that the meaning of these beliefs as well as, perhaps, the way in which they find expression may change as the child develops. The factors considered by a mother in forming intelligence beliefs about her second grade child may be quite different from the ones considered for a fifth grader. Considerations of intelligence for a second grader may involve more basic skills and day to day matters such as following directions, printing neatly, and social relations while those involving a fifth grader may be more academic issues involving grades, other measures of school performance as well as a child's interest in various academic domains. This proposed developmental difference in mothers' intelligence

theory is similar to the cross-cultural differences that have been found by others (Okagaki & Sternberg, 1991).

Several limitations of this study prompt us to be cautious in the interpretation of the results. The correlational nature of the study precludes causal inferences. In fact, as noted in our discussion it makes sense to understand the relationships between mothers' beliefs and children's outcomes to be reciprocal at several points. In addition, the small sample size limits the power of the statistical tests utilized. A brief comparison of the fifth and second grade correlations suggests that the difference in the number of significant correlations may be due more to the smaller size of the second grade portion of the sample than to the strength of the correlations. It would be preferable to have a sample at each grade level at least as large as this study's entire sample in order to draw more reliable inferences about the change in the relationships among the observed variables from the younger to the older grade level. However, this limitation may also be considered a strength since it is widely known that significant correlations are more difficult to obtain with small sample sizes (Hays, 1973).

One theoretical consideration involves the rather global nature of the items on each of the scales. Although an attempt was made to have these items reflect mothers' beliefs in key learning situations for their children, recent theory and research has drawn attention to the situation specific nature of people's beliefs (e.g. Bandura, 1986). More specific belief constructs are better able to predict behavior and other beliefs than are global constructs. This led Harter (1982, 1983) to develop and utilize in her research measures of self-competence in specific domains rather than the global construct of self-esteem. In this study, control was initially conceived as a balance between parents giving the child autonomy in a situation and parents controlling what happens (i.e. "I only offer my child help with a task if I think help is needed" vs. "I make sure my child obeys me or does what I expect"). The factor analysis indicated that mothers responded to these as separate issues so the original control scale was divided into an autonomy and a control scale. Future work will need to identify the specific beliefs involved in various "scaffolding" situations.

Related to the specificity of beliefs is the idea that differences exist in the way people apply or implement their beliefs. For example, the amount of structure provided in a learning situation may be a very important variable but the way this belief is implemented could differ among those holding similar beliefs. Preliminary analyses in a related study lends support to this idea. In a problem-solving task in which mothers were to help their children to learn to do the problem on their own, mothers who held similar structure beliefs varied considerably in their provision of structure while interacting with their child (Oka & Cogan, 1991). This seems to suggest that either the assessment of structure beliefs has not been sensitive enough to the subtle differences in people's beliefs or that structure beliefs are interacting with other beliefs or factors in determining how structure will be provided in a given context. Future research is needed to more fully explicate how parent's scaffolding beliefs may impact children's academic achievement.

This study demonstrates the complex and significant relationships among specific parental beliefs and between these beliefs and children's learning. The difference in the patterns of relationships among these variables at two different grade levels suggests that parental beliefs may operate differently as a function of the child's age. The significant correlations found despite the small sample sizes suggest that further research is needed to identify which parental beliefs foster learning and achievement in children at various grade levels.

Table 1 - Sample Characteristics--Means (SD)

	Sample	2nd Grade	5th Grade
Birth Order	1.9 (1.2)	2.0 (0.7)	1.8 (1.4)
# of Children	2.4 (0.7)	2.5 (0.7)	2.4 (0.8)
SES	41.8 (11.3)	44.7 (10.2)	39.8 (11.9)

Table 2 - PBQ Scale Correlations

	I	S	A	C
I	1.000			
S	0.112	1.000		
A	-0.055	0.207	1.000	
C	0.313*	0.395*	0.155	1.000

* $p < .05$

Table 3 - PBQ Scale Means (SD)

	Intelligence	Structure	Autonomy	Control
Sample	3.594 (.532)	3.658 (.438)	3.400 (.521)	3.183 (.500)
Grade				
2nd	3.681 (.435)	3.583 (.504)	3.250 (.605)	3.000 (.477)
5th	3.537 (.593)	3.708 (.395)	3.500 (.447)	3.306 (.489)
Sex				
Female	3.439 (.602)	3.632 (.444)	3.316 (.527)	3.066 (.533)
Male	3.864 (.208)	3.705 (.445)	3.546 (.501)	3.386 (.377)
Achievement				
Low	3.648 (.510)	3.611 (.470)	3.556 (.471)	3.361 (.546)
Moderate	3.864 (.180)	3.864 (.259)	3.424 (.424)	3.227 (.454)
High	3.278 (.682)	3.417 (.500)	3.185 (.669)	2.944 (.497)

Table 4 - Correlations for Sample by Child's Grade

	Intell	Struct	Auton	Contrl	C's Int	P. C.	Read	Math	T. Ach.
I		-.07	-.15	-.07	.37	.26	.50*	.33	.47
S	.26		.15	.38	-.07	-.23	-.07	-.03	-.06
A	.04	.22		.24	-.34	-.38	-.09	-.55*	-.31
C	.57**	.37	-.01		-.26	-.33	.27	-.16	.10
CI	-.18	.34	-.17	-.01		.31	.45	.32	.43
PC	-.19	.06	.09	-.30	.36		.01	.22	.10
R	-.48*	.07	-.09	-.50*	.44*	.54*		.66**	.94**
M	-.39	-.26	-.32	-.41*	.21	.70*	.62**		.88**
TA	-.48*	-.11	-.23	-.50*	.36	.73**	.90**	.90**	

5th Grade Below Diagonal * $p < .05$ ** $p < .01$ 2nd Grade Above Diagonal

Table 5 - Z Statistics for Correlation Differences

	Intell	Struct	Auton	Contrl	C's Int	P. C.	Read	Math	T. Ach.
I									
S	-.81								
A	-.44	-.18							
C	-1.72	.01	.60						
CI	1.36	-1.00	-.44	-.60					
PC	1.04	-.66	-1.12	-.05	-.12				
R	2.53*	-.34	-.01	1.93	.02	-1.37			
M	1.76	.54	-.67	.65	.28	-1.47	.17		
TA	2.43*	.11	-.21	1.54	.20	-1.86	.64	-.26	

* $p < .05$ ($z = 1.96$, $p = .05$)

APPENDIX A

PARENTAL BELIEFS QUESTIONNAIRE SCALES

INTELLIGENCE

1*. If my child tries hard s/he will not become smarter.

2*. How smart my child is will always stay the same.

3. Some experiences can help my child become smarter.

4. It is possible for my child to become smarter.

5*. Little can be done to change how smart my child is.

6. If my child tries hard s/he can become smarter.

STRUCTURE

1. I have rules and guidelines for my child's time outside of school.

2. When a decision must be made, I try and give my child options to choose from.

3. I often discuss behavior guidelines with my child.

4. I try to be sure my child knows what I expect when given a job.

AUTONOMY

1. I feel it is important for my child to be included in decisions that affect him/her.

2. I only offer my child help with a task if I think help is needed.

3. It is all right for my child to disagree with me.

CONTROL

1*. When we play together it is important that my child be the person in control.

2. I encourage my child to explain her/his behavior if I don't approve of it.

3. I think it is my responsibility to make the decisions that affect my child.

4. I make sure my child obeys me or does what I expect.

*Reverse coded

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