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Determinants of Children's Self-Efficacy Beliefs in an Academic Environment[1]

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Two studies assessed the determinants of children's academic self-efficacy beliefs. First, the effects of performance accomplishments, modeling, locus of control, and their interaction were investigated on 504 children's [M *age = 11 years 7 months) self-efficacy beliefs. Contrary to theoretical predictions, performance accomplishments did not account for any of the variance in self-efficacy beliefs, although modeling was highly significant. The significant modeling* X *attributional style interaction showed that externally oriented children were more amenable to modeling effects. The second study assessed whether contextual factors together with performance accomplishments and modeling account for more of the variance in self-efficacy beliefs. Modeling was again the most significant predictor of self-efficacy beliefs. However, when performance accomplishments reflected the self-rating of continuous participation in the classroom, self-efficacy was predicted significantly. In addition, a contextual factor, Rule Specification, also predicted self-efficacy beliefs significantly. In general, theoretical predictions were supported, although the hypothesized order of the importance of performance accomplishments and modeling was reversed, and this was attributed to the age of the present sample.*

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Perceived self-efficacy, comprising efficacy and response-outcome expectations, has been proposed as the cognitive mechanism underlying all behavior change (Bandura, 1977a, 1977b, 1978a). Efficacy expectations reflect the belief that the behavior required to produce the outcome can be executed successfully, response-outcome expectations the conviction that successful task performance results in certain outcomes. Since the magnitude, strength, and generality of behavior change is influenced by perceived self-efficacy (Bandura & Adams, 1977; Bandura, Adams, & Beyer, 1977), further understanding of its determinants is essential.

Expectations of personal mastery are held to derive from four sources of information. Experiences of personal mastery arising from performance accomplishments are held to provide the most influential and reliable source of self-efficacy information, although the positive value of successful performance may be attenuated by attributional processes. While not as influential as personal mastery, vicarious experiences provide the second source of self-efficacy information and may also be mediated by attributional style. Verbal persuasion, the third source of information, is often used in influencing behavior. Finally, emotional arousal constitutes the fourth (and weakest) source of information in formulating expectations of personal efficacy. The relative importance of each source is determined by its experiential content.

Evidence for the relative influence of these four sources derives mainly from research showing that participant modeling is more effective than modeling alone in mediating the persistence, generality, and magnitude of behavior change (Bandura & Adams, 1977; Bandura, Jeffery, & Gadjos, 1975; Bandura et al., 1977). In researching the determinants of self-efficacy, however, some problems emerge. First, the importance of attribution is acknowledged (Bandura, 1977a, 1977b) but not investigated directly. Second, conclusions regarding the determinants of self-efficacy derive mainly from correlational or analysis-of-variance data. Third, in operationalizing self-efficacy beliefs, exclusive reliance has been placed on efficacy expectations (Bandura & Adams, 1977; Bandura et al., 1977), although ignoring the contribution of outcome expectancies (the incentive to perform) may provide a truncated view of self-efficacy beliefs. Finally, the possible influence of contextual factors is acknowledged (Bandura, 1977a, 1977b) but not identified precisely. Consequently, this research investigates these issues empirically.

STUDY I

This study assesses whether theoretical predictions apply to a nonclinical sample of elementary schoolchildren's scholastic self-efficacy

beliefs. In this respect, a number of differences between this and previous studies are noted. First, this study focuses on the determinants of normal elementary schoolchildren's scholastic/academic self-efficacy beliefs. Second, although previous research relied exclusively on efficacy expectations (Bandura & Adams, 1977; Bandura et al., 1977), the present study is based on the assumption that perceived self-efficacy comprises efficacy expectations (an index of anticpated mastery) and response-outcome expectations (the anticipation for subsequent reward). As the contribution of both these components is important (cf. Kazdin, 1978), they were assumed to interact multiplicatively in this study. Third, a measure of vicarious experience was provided by establishing the self-efficacy beliefs of teachers most involved with the children. Three factors prompted this approach: the fact that teacher characteristics (e.g., prestige, power, control over the child's reinforcement) facilitates vicarious learning (Bandura, 1969), the central role of the teacher in the child's experiential word (cf. O'Leary & O'Leary, 1977); and the fact that similar methods have been used successfully as an index of modeling (Windheuser, 1977). Finally, individuals emphasizing external factors rather than their own competence may gain more from vicarious experiences and less from performance accomplishments than those with a self-attributional style. Consequently, the interactions of performance accomplishments and modeling with attributional style is assessed in this study.

Method

Subjects

A sample of 504 sixth-grade pupils (*M* age = 11 years 7 months *SD* = 4.85; 265 boys, 239 girls) and their class teachers (6 males, 10 females) from six different schools in the same city participated in this study.

Apparatus[3]

Children's Self-Efficacy Beliefs. As there is no relevant psychometric device (Kazdin, 1978), a scale was designed to assess children's scholastic self-efficacy beliefs. A 20-item, 5-point Likert scale covering reading, spelling, arithmetic, history, attention in class, and similar subjects was

[3]A complete listing of the items and results of the factor analyses on the children's self-efficacy scale, the teachers' self-efficacy scale, and the Classroom Environment Scale (see Study II) can be obtained from the second author on request.

constructed. Ten of the items assessed efficacy estimation (e.g., "I can pass well this year"); the remaining 10 assessed response-outcome expectations (e.g., "If I don't listen during lessons I may fail"). The construct validity of the scale was demonstrated: A principal-compoennts factor analysis with varimax rotation yielded two separate factors, representing efficacy (eigenvalue = 1.66, 32.3% of the variance) and response-outcome (eigenvalue = 1.44, 27.8% of the variance) expectations. Split-half reliabilities for each factor (invoking the Spearman-Brown formula to simulate a 20-item test) revealed adequate reliability for both factors (.71).

Performance Accomplishments. The Spelling and Arithmetic subtests of the Wide Range Achievement Test (WRAT) (Jastak & Jastak, 1965) assessed performance accomplishments. Level 1 of both subtests was used to minimize within-group variance resulting from responses to different levels. As there was a near-perfect correlation between grade-averages and WRAT scores ($r(491) = .94$), it is argued that WRAT scores alone represented a most adequate assessment of performance accomplishments.

Modeling Effects. A teacher's self-efficacy scale was constructed similar to that of the children's. However, five items assessed efficacy expectations (e.g., "I have difficulty maintaining discipline in class") and five response-outcome beliefs (e.g., "With time, patience, and insight, I can help even the slowest child improve"). The construct validity was again demonstrated: Two factors emerged from a factor analysis with varimax rotation, representing efficacy (eigenvalue = 2.77, 40.2% of the variance) and outcome (eigenvalue = 1.48, 28.8% of the variance) expectations. The reliability of the total scale was satisfactory (.79).

Locus of Control Attributions. The Crandall, Katkovsky, and Crandall (1965) Intellectual Achievement Responsibility (IAR) scale measures children's locus of control beliefs regarding academic situations and yields two subscores that describe the responsibility for positive (LOC^+) and negative (LOC^-) events separately.

Procedure

The scales were administered to the subjects in the classes during normal school hours. The testers—all graduate students in psychology—informed the children that their teachers would not have access to their responses. Instructions before each scale were read together with the children.

Results

To assess the relative import of the independent variables, a stepwise regression analysis with hierarchical inclusion of variables was computed.

Table I. Determinants of Self-Efficacy Beliefs: Performance Accomplishments, Modeling, LOC, and Their Interaction

Independent variable entering equation	Multiple R	Increase in R^2	F Entering equation	F In final equation
Main effects				
Performance accomplishments	.02	.00	.21	.25
Modeling	.15	.02	10.91[a]	1.69
Modeling^2	.38	.12	65.10[a]	90.17[a]
Modeling^3	.53	.14	90.31[a]	53.29[a]
LOC^{+2}	.54	.00	1.62	.32
LOC^{-}	.54	.00	1.98	.87
Interaction effects				
Performance X LOC^{+2}	.54	.00	.00	.15
Modeling X LOC^{+2}	.55	.02	10.90[a]	10.91[a]

[a] $p < .01$.

However, the relationship between self-efficacy and both modeling ($F(2,500) = 4.85$) and LOC^{+} ($F(1,501) = 9.82$) violated the linearity assumption. Since only the linear ($F = 11.2$), quadratic ($F = 70.59$), and cubic ($F = 97.93$) modeling components in the dependent variable were significant, they were included in the final regression analysis. The independent variables, significant polynomials, and their interactions[4] were entered into the regression in the order of the hypothesized importance; they showed that only the main effects of the three modeling terms were significant (see Table I). The quadratic and cubic modeling components were significant as they entered and in the final equation, while the linear component was only significant on entering the equation. Neither performance accomplishments nor the two LOC subscales were significant. Finally, while the performacne accomplishments X LOC^{+2} interaction was not significant, the modeling X LOC^{+2} interaction was as it entered and in the final equation.

Discussion

Contrary to theoretical predictions, performance accomplishments did not predict self-efficacy beliefs, although modeling explained a signi-

[4]The three significant modeling components, and the LOC^{+} and LOC^{-} alternatives for attributional style, provided a large range of possible variations to assess the performance accomplishments X LOC and modeling X LOC interactions. However, Cohen (1968) advises against the use of a large number of interactions, which increases the degrees of freedom and thus brings about an increased risk of spuriously significant results. Consequently, the quadratic component of LOC^{+2} and the cubic component of modeling were chosen to reflect LOC and modeling when assessing any interactions, as these terms explain more variance in the self-efficacy data than their alternatives.

ficant amount of variance. The immediate issue is the reason for the difference between the present and previous findings (Bandura & Adams, 1977; Bandura et al., 1977). Such differences may be accounted for by the present subjects' age. First, younger children may imitate more than their older counterparts (Kirkland & Thelen, 1978). Second, successful performance may be more influential as a source of information for older children (Rubin, 1978). Third, teachers trained to serve as models for self-rewarding behavior are a most powerful predictor of children's self-concept (Brady, Figgueres, Felker, & Garrison, 1978). Related to this is the fact that models with control over resources valued by children elicit a high rate of imitative behavior (Grusec & Mischel, 1966).

Neither of the two LOC main effects was significant. This is predictable as attributional style is important as a moderator variable. However, the performance accomplishments X LOC^{+2} interaction did not predict self-efficacy: This may be a result of the fact that performance accomplishments themselves were of no value in predicting self-efficacy. On the other hand, the modeling X LOC^{+2} interaction was significant. The influence of attributions here may be explained as follows: Children who evidenced an external LOC orientation were more susceptible to modeling effects.

Finally, only 28% of the variance in children's scholastic self-efficacy beliefs was explained, although it is essential to account for as much variance as possible. Consequently, other possible determinants of children's self-efficacy beliefs are examined.

STUDY II

Contextual variables (e.g., classroom climate) were investigated as a possible determinant of children's self-efficacy beliefs for a number of reasons. First, within the framework of reciprocal determinism (Bandura, 1978b), situational factors are of some import. Indeed, expectations of personal mastery cannot act independently of contextual factors (Bandura, 1977a). Second, the relative import of modeling and performance accomplishments in the development of self-efficacy beliefs may be mediated by specific sample characteristics and the nature of the dependent variable (see Study I). It may be argued, therefore, that contextual variables are of some consequence, but not accorded a specific position among the determinants of self-efficacy beliefs. Third, the impact of classroom environment on academic performance is receiving increasing attention (Moos, 1978). Finally, Bandura (1977a) suggests that alternative determinants of self-efficacy be investigated. Consequently, this study assesses the contribution of contextual factors together with performance accomplishments and modeling so that their relative influence might be ascertained.

Method

Subjects

The same subjects were used in both studies, and their biographical data will not be presented again.

Apparatus and Procedure

Information about those scales used in Study I will not be presented again here. Three additional scales were now administered to assess aspects of classroom climate. The 36-item, shortened form of the Classroom Environment Scale (Form S) (Moos & Trickett, 1974) assessed perceptions of classroom climate. A principal-components factor analysis with varimax rotation of this scale revealed three factors with eigenvalue greater than unity, explaining 21.2%, 14.6%, and 12.6% of the variance, and were labeled Student Participation, Teacher Participation, and Rule Specification, respectively. In addition, the Arlin and Hills (1974) 14-item Attitude to Learning Processes and 15-item Attitude Toward Teachers scales were administered; these assess the preference for open or formal teaching and regard for the teacher.

The procedure was the same as for Study I. However, these three questionnaires were now included for analysis.

Results

The use of hierarchical inclusion of variables in a regression analysis (Overall & Spiegel, 1969) necessitated various categories of independent variables being created. Student Participation and Attitude to Learning were combined together with the WRAT scores as performance accomplishments; Attitude to Teacher and Teacher Participation were included together with the three modeling components; while Rule Specification, reflecting contextual factors, was entered as the third step in the analysis.[5] The linearity of the independent variables not assessed in Study I was first investigated: All satisfied the linearity assumption and were represented by their linear component in the analysis. Although neither the WRAT scores nor the Attitude to Learning were significant, Student Participation was significant as it entered and in the final equation

[5]Attributional style was not used as an independent variable here as its conceptual value resides in its mediating effect, rather than any direct influence on self-efficacy beliefs, which was confirmed in Study I.

Table II. Determinants of Self-Efficacy Beliefs: Performance Accomplishments, Modeling, and Contextual Factors

Independent variable entering equation	Multiple R	Increase in R^2	F Entering equation	F In final equation
Step 1: Performance accomplishments				
WRAT scores	.02	.00	.17	.46
Attitude to learning	.03	.00	.13	.05
Student participation	.16	.03	12.21[a]	9.76[a]
Step 2: Modeling				
Modeling	.55	.01	4.86[a]	4.89[a]
Modeling^2	.25	.03	151.85[a]	148.54[a]
Modeling^3	.54	.24	78.95[a]	77.62[a]
Attitude to teacher	.54	.00	.02	.12
Teacher participation	.54	.00	.00	.01
Step 3: Contextual factors				
Rule specification	.56	.01	5.18[a]	5.18[a]

[a] $p < .01$.

(see Table II). The modeling components were entered into the equation next, and the linear, quadratic, and cubic components were significant on entering and in the final equation. Finally, the Rule Specification variable was also significant on entering and in the final equation.

Discussion

In general, these results support those of Study I. Modeling still significantly predicted children's self-efficacy beliefs. This is to be expected, however, as this information was obtained from the same sample in both studies. Yet the two environmental variables in the modeling component, i.e., Attitude to Teacher and Teacher Participation, did not predict self-efficacy beliefs. This is not surprising: Although they reflect the quality of the teacher-pupil relationship, they convey no information regarding self-efficacy beliefs.

Unlike Study I, one aspect of Performance Accomplishments—Student Participation—significantly predicted children's self-efficacy beliefs. Consequently, rather than assume that performance accomplishments are not important determinants of scholastic self-efficacy beliefs, a more parsimonious explanation may be that the exact nature of the independent variable(s) should be identified and operationalized carefully. In Study I, information regarding performance accomplishment from the WRAT would be delayed and intermittent in the normal classroom. In contrast, Student Participation in the typical class might elicit immediate

and continuous feedback regarding performance mastery. The implication for modifying behavior through self-efficacy beliefs is that continuous rather than delayed or intermittent feedback regarding the adequacy of performacne could be more influential.

That Rule Specification was significant is to be expected as classroom climate influences subsequent success in the classroom (Moos, 1978). However, an analysis of the items contributing to the factor (e.g., "The teacher explains what will happen if a student breaks the rules") shows that it reflected the relevant classroom rules, thereby facilitating the predictability of outcomes within the classroom. Rather than a clear set of rules being aversive to the child, it may provide him/her with clear and consistent behavioral parameters. The belief that certain behaviors produce specific, predictable outcomes is the basis of response-outcome expectations and is thus crucial to the development of academic self-efficacy beliefs. However, Rule Specification did not account for a substantial increase in the amount of variance explained.

GENERAL DISCUSSION

Both studies concerned the determinants of children's self-efficacy beliefs, and deviations from the original theoretical proposals were yielded. However, two issues should be assessed in this regard, i.e., the measurement and conceptualization of the dependent and independent variables. First, the dependent variable used in these two studies comprised a multiplicative combination of efficacy and outcome expectations. This deviation was motivated by successful coping behavior being viewed as dependent not only on mastery expectations but also on the incentive to perform (cf. Kazdin, 1978). Consequently, it is argued that this reflects a more comprehensive perspective of self-efficacy beliefs and does not account for the differential importance attributed to performance accomplishments and modeling.

The way the independent variables were assessed also differed from previous research. First, scores on the WRAT reflected performance accomplishments but did not predict self-efficacy beliefs. However, self-reported student participation explained a significant amount of variance in self-efficacy beliefs. That a self-report rather than an objective measure of performance accomplishments predicted self-efficacy may be expected, as they reflect the *subjective* experience of task mastery. However, this may be a function of the correlation between two self-report measures (Kazdin, 1978). The cogence of this argument is reduced, however, as not all self-report variables predicted self-efficacy beliefs. Another procedural deviation arose in the way in which modeling was

characterized. Bandura (1977b) views the value of vicarious experience in the individual seeing another perform the task successfully. In the class, though, the teacher is *expected* to possess complete mastery over the relevant academic material. Consequently, the present studies were predicated on the belief that teachers' self-efficacy would provide an adequate index of modeling, as it would permeate lesson presentation, maintenance of discipline, and so forth.

Thus it is argued that the children's age accounted for the influence of modeling in the present studies. Younger children rely more on modeling as a source of information regarding their self-efficacy beliefs. On the other hand, performance accomplishments may attain more influence as a source of self-efficacy information as the children become older; and the import of assessing age as a moderator variable in this regard is indicated. Simultaneously, it would be instructive to assess whether modeling, performance accomplishments, and contextual factors influence the two components and overall self-efficacy beliefs differently. Finally, it may be interesting to use bevioral measures of performance accomplishments and modeling, as well as specific self-efficacy measures, and assess whether similar results are still obtained.

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