



Pygmalion effects in the classroom: Teacher expectancy effects on students' math achievement



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ABSTRACT

According to the Pygmalion effect, teachers' expectancies affect students' academic progress. Many empirical studies have supported the predictions of the Pygmalion effect, but the effect sizes have tended to be small to moderate. Furthermore, almost all existing studies have examined teacher expectancy effects on students' achievement at the student level only (does a specific student improve?) rather than at the classroom level (do classes improve when teachers have generally high expectations of their students?). The present study scrutinized the Pygmalion effect in a longitudinal study by using a large sample in regular classrooms and by differentiating between two achievement outcomes (grades and an achievement test) and two levels of analyses (the individual and classroom levels). Furthermore, students' self-concept was studied as a possible mediator of the teacher expectancy effect on achievement. Data come from a study with 73 teachers and their 1289 fifth-grade students. Multilevel regression analyses yielded three main results. First, Pygmalion effects were found at the individual level for both achievement outcomes. Second, multilevel mediation analyses showed that teacher expectancy effects were partly mediated by students' self-concept. Third, teachers' average expectancy effects at the class level were found to be nonsignificant when students' prior achievement was controlled.

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1. Introduction

Teachers form expectancies of their students' achievements. Teachers' expectancies are based on the knowledge they have about their students, such as previous grades and perceptions of in-class performance, but are also based on teachers' prejudices or stereotypes (Good, 1987; Jussim, Eccles, & Madon, 1996; Reyna, 2000, 2008). The expectancies teachers form about their students have been shown to impact students' future achievement, an effect that is often labeled the "Pygmalion" effect (Rosenthal, 2010). Pygmalion effects have high scientific and practical relevance due to their potentially positive or negative effects on important student outcomes. Not surprisingly, Pygmalion effects have been the subject of many empirical studies (meta-analyses and reviews see Jussim & Harber, 2005; Rosenthal & Rubin, 1978; Tenenbaum & Ruck, 2007), which have documented, by and large, the existence of expectancy effects.

However, despite the large number of studies, some of the key questions concerning expectancy effects have rarely been examined. First, there have been few studies that have examined differential effects of different achievement outcomes, namely, between standardized achievement tests and final grades, when studied simultaneously. Most studies concerning the effects of teachers' expectancies on students' achievement have reported only grades as outcomes (e.g., Freiberger, Steinmayr, & Spinath, 2012; Marsh & Köller, 2004; Marsh & O'Mara, 2008; Tiedemann, 2000) or only test scores (e.g., Marsh, Parker, & Smith, 1983).

Second, some studies have found small significant effects of students' self-concept functioning as a mediator between teachers' expectancies and students' achievement. However, empirical results have not been consistent across studies and have often relied on small sample sizes (e.g., Brattesani, Weinstein, & Marshall, 1984; Trouilloud, Sarrazin, Martinek, & Guillet, 2002). Therefore, longitudinal studies using large data sets of both teacher and student reports are needed to examine expectancy effects and possible mediation effects.

Third, the literature has yet to address whether expectancy effects are constrained to the individual student level or also affect whole classes. In his early review, Good (1987) stated that teachers'

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expectancies may concern the entire class, groups of students, or specific individuals. However, almost all studies have been interested in effects operating at the student level (within-class) only: These studies have compared students within a class for whom the respective teachers had either high or low expectations. Only a few studies have examined the expectancy effect at the between-class level (i.e., do students learn more when their teacher exhibits a high average level of expectation toward the classroom?). Smith et al. (1998) studied such teacher expectancy effects for groups of students and also classrooms that were formed according to students' ability level and showed that expectancy effects could be confirmed both for individuals and in part for whole groups and classrooms. They found significant teacher expectancy effects on students' achievement in classes that used within-class ability grouping but not for classes that used between-grouping. It is less clear whether the achievement gains of a natural class with students who are not grouped are associated with teachers' average evaluation of the academic potential of the class.

In the present study, a multilevel design was used to disentangle student-level and class-level expectancy effects on two important achievement outcomes (school grades and a standardized achievement test). Furthermore, we examined students' self-concept as a potential mediator of the expected effect of teachers' expectancies on students' progress. To do so, we were able to take advantage of a study with a fairly large sample of students in Grade 5 ($N = 1289$) and their teachers, who were examined at three measurement points.

1.1. Teachers' expectancies—Pygmalion in the classroom

The Pygmalion effect refers to “the effects of interpersonal expectancies, that is, the finding that what one person expects of another can come to serve as a self-fulfilling prophecy” (Rosenthal, 2010, p. 1398). In psychological research, the classic Pygmalion effect study dates back to the 1950s. Rosenthal and Jacobson (1968, 1992) told elementary school teachers in an experimental study that certain children were “bloomers” based on their test results and would show great improvement in their intellectual competence in the coming months. Yet, the “bloomers” were randomly selected and differed only in the expectations that teachers were told to have for them. Nevertheless, by the end of the school year, those students had gained significantly in their intellectual achievement compared to the control group. This self-fulfilling prophecy has been called the Pygmalion effect.

In subsequent years, Pygmalion effects received tremendous research interest. In their meta-analysis, Rosenthal and Rubin (1978) summarized 345 studies about expectancy effects and found effect sizes of 0.14 to 1.73 (depending on the area of research) between expectancies and achievement. However, the methodology of these early studies (e.g., Rosenthal & Jacobson, 1968, 1992) was criticized as these studies used small samples, ignored the clustering of data, and had unknown ecological validity as they were conducted mainly as experimental studies in the laboratory setting. Nevertheless, later research in ordinary classrooms using nonexperimental research designs found smaller but still significant effects of teachers' expectations on students' academic achievement, accounting for a maximum of 5–10% of students' achievement (e.g., Brophy, 1983; Cooper, 1979; Jussim & Eccles, 1992, 1995; Madon, Jussim, & Eccles, 1997). For instance, Jussim and Eccles examined the effect of math teachers' expectancies on the achievement of their sixth-grade students (Jussim & Eccles, 1992). In line with the self-fulfilling prophecy hypothesis, teachers' expectancies predicted changes in student achievement even when effects of previous achievement and motivation were controlled. However, effects in naturally occurring field studies are often smaller than in strict laboratory settings with experimental manipulation. The

smaller coefficients are not surprising given that teachers' expectancies were not pervasive and enduring per se, but rather flexible and open to change as soon as more information about individual student achievement was available (Brophy, 1983).

Which mechanisms account for teachers' expectancy effects? Brophy and Good (1970) described a possible mechanism behind teachers' expectancies in a comprehensive model: (a) Teachers form differential expectancies for their students. (b) Teachers' beliefs about those students begin to lead to different treatment such as providing more attention and support (climate), offering more challenging learning materials (input), interacting more often and longer (output), and being more responsive to the work (feedback) of the students for whom they hold high expectations (Rosenthal, 1974). (c) Students in turn recognize the teachers' high expectancies and react to them: They may work more and harder and develop higher motivation and interest in schoolwork. (d) This more engaged student behavior will, in the long run, improve their academic achievement. Those changes may also affect students' self-concept and motivation (Harris & Rosenthal, 1985). (e) The teacher recognizes the positive changes in the students' behavior, feels supported in his/her former expectancies and the self-fulfilling cycle is complete and reinforced. To conclude, there seems to be reasonable theoretical support for the effects of teachers' expectancies on students' achievement. However, longitudinal field studies concerning teacher expectancy effects have thus far rarely taken into account different achievement outcomes.

1.1.1. The role of different achievement outcomes

Accurate evaluations of students' achievement and progress in school are essential for students' learning. Grades and standardized achievement tests are both common indicators of student achievement. On the one hand, grades are central in many school systems as they are used for schooling-related decisions such as acceleration or remediation or the counseling of parents. Grades incorporate achievement assessments of several occasions in written and verbal form over a whole school year and are therefore less influenced by one-time situational events. Moreover, grades assess rather general achievement across different specific topics within one subject.

On the other hand, standardized tests are common in many school systems including the American school system, and studies have confirmed their predictive validity for various student outcomes (e.g., Kuncel, Hezlett, & Ones, 2001; Kuncel, Wee, Serafin, & Hezlett, 2010). In particular, tests have the advantage of allowing comparisons across classes or schools as test results are assumed to be less influenced by the class as a reference standard than grades (e.g., Kimball, 1989).

Theoretically, the so-called perceptual bias hypothesis claims that teachers' expectancies of students' competence should predict their own judgments of students' grades more than an independent achievement test (Jussim & Eccles, 1992; Smith et al., 1998). Indeed, Jussim and Eccles (1992) found those results in their longitudinal study of sixth graders. However, some researchers have found the opposite results in which teachers' expectancies predicted students' test scores more strongly than they predicted final grades (e.g., Trouilloud et al., 2002).

So far, most studies concerning expectancy effects on students' achievement have relied on only test scores (e.g., Marsh et al., 1983) or only grades (e.g., Freiberger et al., 2012; Marsh & Köller, 2004; Marsh & O'Mara, 2008; Tiedemann, 2000). Just a few studies have reported effects on tests and grades simultaneously (e.g., Jussim & Eccles, 1992). As more and more researchers recommend using both tests and grades to profit from the strengths of both methods (Brennan, Kim, Wenz-Gross, & Siperstein, 2001), both measures were included in the present study.

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