



Children's and parents' perceptions of parental support and their effects on children's achievement motivation and achievement in mathematics. A longitudinal predictive mediation model



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ABSTRACT

Based on Eccles et al.'s expectancy-value model, this study focused on parent- and child-perceived parental support (parental control, warmth and structure) in mathematics, and their effects on mathematics-related achievement motivation (competence beliefs and intrinsic value) and achievement, controlling for previously reported achievement, achievement motivation, intelligence, and gender. Data were analyzed of 457 children and their parents, which had been gathered in the time period from the first to the seventh grade. Structural equation analyses showed that parent-perceived control negatively predicted competence beliefs and achievement in mathematics (the latter mediated by competence beliefs). Parent-perceived warmth had an indirect positive effect on mathematics-related competence beliefs and intrinsic value (mediated by child-perceived warmth) as well as achievement (mediated by both child-perceived warmth and competence beliefs). Parent-perceived structure, mediated by child-perceived structure, positively predicted the intrinsic value of mathematics.

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1. Introduction

It is widely recognized that parental support behavior plays an important role for children's motivational and achievement-related development (Pekrun, 2001; Pomerantz, Moorman, & Litwack, 2007). Accordingly, the expectancy-value theory of achievement motivation (Eccles (Parsons) et al., 1983; Wigfield & Eccles, 2000) emphasizes the importance of parents' behaviors such as parental support for students' achievement motivation and achievement. The influence of parent-perceived parental support on a child's achievement motivation and – mediated by this – on achievement occurs, at least in part, indirectly, via the child's perception and interpretation of this support (child-perceived parental support; Eccles, 2005; Grolnick, Ryan, & Deci, 1991; Wigfield & Eccles, 2000). Parent-perceived and child-perceived parental support can therefore be seen as more distal and more proximal antecedents of children's achievement motivation and achievement, respectively.

However, to the best of our knowledge, no previous study has considered these causal relations from a longitudinal perspective. The current study intended to close this research gap. In this respect, we focused on the subject of mathematics, which is a central selection subject when students are allocated to differently tiered secondary schools

(at least in the German-speaking area in which the study was conducted).

1.1. Achievement motivation and achievement in mathematics

In the present study, achievement motivation was understood as the internal-psychological “energization and direction of behavior” (Pintrich, 2003, p. 669) relating to a “standard of excellence” (Brunstein & Heckhausen, 2006, p. 143). Eccles and colleagues developed the expectancy-value model of achievement motivation (Eccles (Parsons) et al., 1983; Wigfield & Eccles, 2000) in order to clarify the question of which influencing factors are able to explain individual differences in achievement motivation, in achievement-related actions, and in achievement. The Eccles et al. model deems *expectancies* and *values* to be important subjective components of students' learning-related achievement motivation. Both expectancies and values are represented in a domain-specific manner (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002).

Competence beliefs (for overviews of competence-related constructs, see Schunk & Pajares, 2005; Schunk & Zimmermann, 2006; Skinner, 1996) are a central facet of the expectancy component. They reflect the individual's perception of being able to master an achievement-related activity well or successfully (e.g. Wigfield & Eccles, 2000). Competence beliefs are primarily related to working on tasks in an effortful, resilient manner, and with perseverance (Schunk & Pajares, 2005). Accordingly, the expectancy-value theory of achievement motivation assumes that competence beliefs have a positive effect on achievements

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(e.g. Eccles (Parsons) et al., 1983; Wigfield & Eccles, 2000). Empirically, it has been shown that competence beliefs in mathematics are positively related to mathematics achievement, even when controlling for prior achievement or intelligence (Buff, Reusser, & Pauli, 2010; Marsh, Köller, Trautwein, Lüdtke, & Baumert, 2005; Meece, Wigfield, & Eccles, 1990; Spinath, Spinath, Harlaar, & Plomin, 2006).

The value component is composed of various facets, including the *intrinsic value* of a subject (for an overview of value-related constructs, see Eccles, 2005). Intrinsic value comprises taking pleasure in the achievement-related activity, or the subjective interest in the learning matter or subject to which the activity refers (e.g. Eccles, 2005). It is primarily a predictor of choice behavior, e.g. choice of exercises and courses (e.g. Wigfield & Eccles, 2000). Taylor et al. (2014) emphasize the unique role of intrinsic value with regard to achievement. In their study on the influence of various value-related constructs on achievement, only intrinsic value proved to be a positive predictor, and this was the case even after controlling for prior achievement. As outlined above, however, competence beliefs and intrinsic value have a differing functional meaning with regard to achievement-related action and achievement: The former are primarily related to the behavior while working on a task itself; the latter is primarily related to the decision whether a task is worked on – and if so, which. Accordingly, the positive effect of intrinsic value on achievement in the subject of mathematics, controlled for prior knowledge or intelligence, can no longer be empirically proven if competence beliefs or related constructs are also considered in the prediction model (e.g. Buff et al., 2010; Marsh et al., 2005; Spinath et al., 2006).

1.2. Parental support and children's achievement motivation and achievement in mathematics

The expectancy-value theory of achievement motivation postulates that contextual characteristics influence children's achievement motivation and achievement (Wigfield & Eccles, 2000). These contextual characteristics can be rather distal (e.g. cultural milieu, socializers' beliefs and behaviors) or rather proximal (e.g. child's perception of socializers' beliefs and behaviors; see Eccles, 2007). Thus, an important component is parental support in the sense of parental behavior with respect to their children's learning: Children's achievement motivation and achievement is influenced by how parents behave towards and support their children – and how children perceive this support – in learning situations.

In this study, parental support was understood as “the dedication of resources by the parent to the child within a given domain” (Grolnick & Slowiaczek, 1994, p. 238) such as the child's education, which concerns learning at home in the subject of mathematics. Thus, while parental support is often conceived of in more general terms, the present study addressed a specific subdomain: parental support which first, takes place primarily at home (Pomerantz et al., 2007, pp. 374–375) and second, refers to a specific school subject (Jullien, 2006, pp. 22–24), namely mathematics. Pomerantz et al. (2007) as well as Eccles and colleagues postulate that achievement motivation is of central importance with respect to the effect of parental support on students' achievements, and that it acts as a mediator of this influence (see also Grolnick et al., 1991). Accordingly, it is pointed out that effects of parental support on achievement should, as far as possible, be examined under consideration of the children's motivation (e.g. Hoover-Dempsey et al., 2001; Patall, Cooper, & Robinson, 2008).

The question arises of which characteristics of parental support have a positive or negative effect on achievement motivation and achievement. Eccles and colleagues (Eccles, Arberton, et al., 1993) emphasize that with regard to children's competence beliefs and intrinsic value as well as children's achievement, “the right match of control and structure in a warm and supportive environment with positively motivated role models” (p. 151) seems to be very important. Accordingly, central facets of parental support are addressed, which lead to satisfaction

(provision of structure, autonomy support, warmth) or to frustration (lack of structure, control, rejection) of the child's basic psychological needs for competence, autonomy, and relatedness (Connell & Wellborn, 1991; Skinner, Johnson, & Snyder, 2005). The present study focused on three of the aforementioned central dimensions of parental support, which were predominantly developed in the tradition of the self-determination theory (Deci & Ryan, 1985): parental control, parental warmth, and parental structure.

Parental control (e.g. Barber & Harmon, 2001; Grolnick, 2003; Soenens & Vansteenkiste, 2010) is understood as parental behaviors which show “pressure, intrusion, and dominance” (Pomerantz & Grolnick, 2009, p. 166) as common features. Parental control is aimed at influencing children's thoughts, feelings, and/or behavior in the parents' desired direction, without taking into account the children's needs. In particular, parental control impedes or prevents the satisfaction of the need for autonomy, and thereby primarily has a negative impact on intrinsic value (Connell & Wellborn, 1991; Skinner et al., 2005). Negative effects of parental control are also expected with regard to competence beliefs, as this behavior offers little or no possibility for children to solve learning-related problems themselves (Grolnick & Pomerantz, 2009, p. 169; cf. also Pomerantz, Grolnick, & Price, 2005). In line with this, it is assumed that parental control is also negatively related to achievement (Connell & Wellborn, 1991). With regard to the subject of mathematics, the postulated negative relationships of parental control with competence beliefs (Jullien, 2006) and with achievement have been empirically confirmed (e.g. Aunola & Nurmi, 2004; Karbach, Gottschling, Spengler, Hegewald, & Spinath, 2013; Silinskas, Kiuru, Aunola, Lerkkanen, & Nurmi, 2015).²

Parental warmth manifests itself in emotional responsiveness as well as in empathetic, appreciative, respectful and loving treatment (e.g. Skinner et al., 2005). It is postulated that parental warmth particularly promotes the satisfaction of children's psychological need for relatedness and has a positive effect on competence beliefs, intrinsic value and achievement (Connell & Wellborn, 1991). Jullien (2006) reported a positive relationship of parental warmth and competence beliefs in mathematics. With regard to mathematics achievement, the study by Karbach et al. (2013) found no statistically significant effect of a latent factor which besides parental warmth, also comprised parental autonomy support.

Parental structure (e.g. Farkas & Grolnick, 2010) encompasses behaviors such as providing guidance and clear expectations in combination with appropriate limit setting (Grolnick & Pomerantz, 2009; Skinner et al., 2005). It is assumed that parental structure particularly promotes the satisfaction of the psychological need for competence, and therefore has a positive impact primarily on competence beliefs, but also on intrinsic value and achievement (Connell & Wellborn, 1991). A study by Grolnick, Raftery-Helmer, Flamm, Marbell and Cardemil (2014) reported a statistically significant positive relationship of parental structure measured in the sixth grade with competence beliefs in the seventh grade, but not with intrinsic value or mathematics achievement. Karbach et al. (2013) reported a negative effect of a construct involving both parental control and parental structure on mathematics achievement.

1.3. Parent- versus child-perceived parental support

Analogously to findings from other research areas such as instructional research (see, for instance, Clausen, 2002), which drew on various sources of information (including students and teachers) regarding behaviors or characteristics of parents, relationships between parent-perceived and child-perceived parental support – if both perspectives

² Karbach et al. (2013) modeled two second-order factors which, besides the children's general cognitive ability and parental education, had an effect on mathematics achievement: a second-order factor with the two first-order factors autonomy and responsivity, and a second-order factor with the two first-order factors control and structure.

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