

PARENTAL SUPPORT OF STUDENT LEARNING AND THE DEVELOPMENT OF LEARNING MOTIVATION IN MATHEMATICS

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Abstract. Whereas the influence of the school learning environment on students' motivational development has been the subject of much empirical research, the role of the home environment has been somewhat neglected. As part of a longitudinal project initiated to identify opportunities for enhancing self-determined forms of learning motivation at home and in school, this study with a sample of $N = 137$ students tested how parental support of student learning influences the development of learning motivation in mathematics. At three points of measurement (grades 5, 6, and 7), students were surveyed on four dimensions of their parents' learning-related attitudes and behavior: autonomy support, emotional support, domain-specific structure, and achievement pressure. In addition, their learning motivation was assessed by scales measuring external vs. identified motivation, interest vs. aversion, and willingness to exert effort. Findings confirmed that parental autonomy support and emotional support were conducive to learning, whereas controlling behaviors had dysfunctional effects. Similar—though somewhat weaker—patterns of results emerged from the longitudinal analyses and when mathematics achievement and social background were controlled.

Zusammenfassung. Anders als die Rolle der schulischen Lernumwelt wurde die Rolle des Elternhauses für die Motivationsentwicklung von Schülern bisher etwas vernachlässigt. Im Rahmen einer längsschnittlich angelegten Studie zur Förderung selbst bestimmter Formen der Lernmotivation in Elternhaus und Schule wurde an $N = 137$ Schülern überprüft, wie sich das elterliche Instruktionsverhalten auf die Entwicklung der Lernmotivation im Fach Mathematik auswirkt. Dazu wurden die Schüler zu drei Messzeitpunkten (in der 5., 6. und 7. Klasse) bezüglich verschiedener Einstellungs- und Verhaltensmuster ihrer Eltern befragt, die sich den vier Dimensionen Autonomieunterstützung, emotionale Unterstützung, bereichsspezifische Struktur und leistungsorientierter Druck zuordnen lassen. Die Lernmotivation der Schüler wurde über Skalen zur externalen vs. identifizierten Motivation, zu Interesse vs. Abneigung und zur Anstrengungsbereitschaft erfasst. Zusammenfassend stützen die Ergebnisse die Vorteile einer elterlichen Autonomie- und emotionalen Unterstützung und weisen ein kontrollierendes Instruktionsverhalten der Eltern als dysfunktional aus. Dies gilt – etwas abgeschwächt – selbst im Längsschnitt und bei Kontrolle der Leistungsfähigkeit und der sozialen Herkunft der Schüler.

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1. INTRODUCTION

In recent years, motivation research in educational psychology has increasingly begun to examine not only quantitative differences in the *level* of learning motivation, but also qualitative differences in the *form* of learning motivation (Wild, Hofer, & Pekrun, 2006). The present study was conducted to investigate how specific dimensions of parental support influence different forms of student learning motivation in the context of mathematics. The analyses reported are based on data from the last three points of measurement (grades 5, 6, and 7) of the Bielefeld-based project “Fostering self-determined forms of learning motivation at home and in school” (see Wild, Rammert, & Siegmund, 2003).

Forms of Learning Motivation. We distinguished different forms of learning motivation on the basis of two theoretical approaches: self-determination theory (e.g., Deci & Ryan, 2002; Ryan & Deci, 2000) and the person–object theory of interest (e.g., Krapp, 1999). Notably, both approaches focus on *self-determined forms* of learning motivation, as distinguished from other-determined forms of learning motivation.

Based on recent self-determination research, moreover, we drew a decisive distinction between *identified regulation*, a more self-determined form of learning motivation, and *external regulation*, a more other-determined form. In the case of identified regulation, people engage in learning activities because it is important for them personally to develop their knowledge and skills in the domain. These learning activities are associated with high perceived levels of autonomy, and are thus clearly distinguishable from externally regulated learning, which entails a strong sense of other-determination. Because learning activities motivated by identified regulation are also instrumental in nature, however, they must likewise be considered “extrinsic.”

From the perspective of person–object theory, *interests* can be conceived as being directly related to intrinsic motivation. In contrast to identified regulation, interest-driven engagement with an object is always experienced as pleasant and done “for its own sake”; the object is of high personal importance. Apart from interest in mathematics, the present study also considers *aversion* to mathematics. Although self-report data (e.g., Eccles et al., 1993) suggest that students’ attitudes to school become increasingly negative over the school career, little is yet known about the role of aversion.

The Influence of Parental Support of Student Learning. To date, most empirical studies based on self-determination theory have examined the school context and the student–teacher relationship. It is only in recent years that research has also begun to consider the home learning environment (see Wild, 2004, for an overview); however, few of these studies have yet examined learning motivation in specific subjects or taken a longitudinal approach (see also Exeler & Wild, 2003).

Wild and Remy (2002) examined the motivational orientations, goal orientations, and attitudes of third graders in mathematics, and found high interest in mathematics and identified learning motivation when parents' homework supervision was perceived to be autonomy-supportive and process-oriented. In contrast, they observed high aversion and external motivation when parents' homework supervision was perceived to be controlling, directive, and product-oriented. Exeler and Wild (2003) found a similar pattern of results for 7th grade Gymnasium students for the "minor" subject of chemistry and—to a certain extent—in longitudinal analyses (of up to 6 months).

Following up on this previous work, the present study examined whether parental attitudes and behaviors were also found to influence specific dimensions of students' learning motivation at *secondary level* in the context of *mathematics*—and whether effects were observable over a period longer than 6 months.

2. METHOD

The present analyses are based on data obtained from $N = 137$ students surveyed at three points of measurement, namely in grades 5, 6, and 7. The students' mean age at the first point of measurement (grade 5) was 10.78 years; 56% of participating students were female. Some 64% of participants were enrolled in the academic *Gymnasium* track, 18% in the intermediate *Realschule* track, and the others in comprehensives. The vast majority of families were either upper middle class (46.2%) or lower middle class (46.9%); only 6.9% of participating students came from working-class backgrounds. Students reported that they were most likely to turn to their parents for help with homework (83.0%), followed by classmates (7.4%) and siblings (5.2%).

With the exception of parental occupational status, the present analyses are based exclusively on student reports. Established scales assessing students' learning motivation and perceptions of their parents' learning-related attitudes and behaviors were administered by written questionnaire; confirmatory factor analyses of these data have been reported elsewhere (for details, see Wild & Remy, 2002). Specifically, students' learning motivation was assessed by five scales tapping external vs. identified motivation, interest vs. aversion, and willingness to exert effort in mathematics. Parental attitudes and behaviors were measured (as in our previous studies) in terms of four dimensions: autonomy support, emotional support, domain-specific structure, and achievement pressure (see Wild, 2004, for an overview; see Appendix for sample items).

Autonomy-supportive parents encourage their children to solve problems independently, to study on their own initiative, and to develop the necessary study skills. They provide only as much support as their children require at any point in time. Parents scoring high on *emotional support* (responsiveness) are sensitive to their children's feelings, provide consolation and encouragement when difficulties arise, and show an interest in school-related matters. The *structure* (transparency) dimension reflects whether or not parents advocate and implement rules and standards consistently, thus providing the kind of predictable framework that is thought to help students to focus their energy on learning activities and to pursue their goals successfully (but see also the Discussion). The *pressure* dimension (control) is often seen rather simplistically as the opposite of autonomy support. The defining feature of controlling parental behavior is an authoritarian response to negative learning outcomes.

The dimensions of parental support of student learning and the different forms of learning motivation showed satisfactory internal consistencies ($.72 < \text{Cronbach's } \alpha < .89$) and moderate to high stability ($.34 < r_{tt} < .75$) in almost all cases, even across the 2-year period from the first to the third point of measurement.

3. RESULTS

We begin by reporting the correlations between the variables under investigation at the first point of measurement (grade 5). Next, we present partial correlations between the dimensions of parental support at the first point of measurement (grade 5) and students' learning motivation at the second (grade 6) and third points of measurement (grade 7; see Exeler & Wild, 2003, on the plausibility of this approach). Social status (operationalized as the parents' highest occupational qualification) and mathematics achievement (operationalized as the mathematics grade on the last report card) were entered as control variables in all analyses. Finally, we report findings from regression analyses.

Correlations at the First Point of Measurement. As expected, the dimensions of parental support that self-determination theory identifies as favorable were associated with higher levels of the self-determined forms of learning motivation (see Table 1). Parental autonomy support was positively related to student interest and—like parental emotional support—to identified motivation and willingness to exert effort, but not to external motivation or aversion. Structure was found to be associated not only with identified motivation and willingness to exert effort, but also with external motivation. In other words, students exposed to consistent rules and standards reported higher levels of identified *and* external motivation and willingness to exert effort.

On the other hand, controlling parental behaviors that undermined students' feelings of autonomy and competence (pressure) were associated with lower levels of the self-

Table 1: Correlations Between Dimensions of Parental Support of Student Learning and Forms of Learning Motivation at the First Point of Measurement (Grade 5)

	Forms of Learning Motivation				
	Interest	Aversion	Identified motivation	External motivation	Willingness to exert effort
Autonomy support	.17 *	-.11	.30 **	-.01	.39 **
Emotional support	.09	-.11	.21 *	-.11	.40 **
Structure	-.05	.04	.23 **	.22 *	.25 **
Achievement pressure	-.16 ⁺	.23 **	-.15 ⁺	.30 **	-.29 **

⁺ $p < .08$ * $p < .05$ ** $p < .01$

Table 2: Partial Correlations Between Dimensions of Parental Support of Student Learning at the First Point of Measurement (Grade 5) and Forms of Learning Motivation at the Second Point of Measurement (Grade 6), Controlling for SES and Mathematics Grade

	Forms of Learning Motivation				
	Interest	Aversion	Identified motivation	External motivation	Willingness to exert effort
Autonomy support	.16 ⁺	-.16 ⁺	.27 ^{**}	-.05	.28 ^{**}
Emotional support	.09	-.13	.19 [*]	-.22 [*]	.26 ^{**}
Structure	.05	-.03	.25 ^{**}	.25 ^{**}	.25 ^{**}
Achievement pressure	.09	.15	-.02	.38 ^{**}	-.07

⁺ p < .10 ^{*} p < .05 ^{**} p < .01

determined forms of motivation, but with higher levels of external regulation and higher aversion to mathematics.

In line with expectations, significant intercorrelations were also found within each set of variables. *Learning motivation*: As expected, there were strong positive intercorrelations among interest, identified motivation, and willingness to exert effort, but all three variables were negatively related to aversion. Identified motivation and willingness to exert effort were both positively related to external motivation. *Parental support*: Likewise, there were strong positive intercorrelations among autonomy support, emotional support, and structure. Achievement pressure was positively related to structure, but negatively related to achievement pressure, autonomy support, and emotional support.

Partial Correlations Controlling for SES and Mathematics Grade. When students’ mathematics achievement and socioeconomic background were controlled, the pattern of relations observed between parental support at the first point of measurement and students’ learning motivation at the second and third points of measurement was still largely in line with theoretical expectations (see Table 2 with learning motivation at the second point of measurement—i.e., after 1 year—as the criterion). Notably, external motivation was now more closely related to structure and achievement pressure, and the negative relationship with parental emotional support was now also significant. The correlations between control (achievement pressure) and the other motivational variables were otherwise weaker (and nonsignificant). In the Exeler and Wild (2003) study, by way of comparison, most of the relationships observed for the “minor” subject of chemistry were no longer significant after just 6 months.

When learning motivation at the third point of measurement (i.e., after 2 years) was taken as the criterion, the correlation coefficients were still in the predicted direction, but almost all somewhat lower, and in some cases (e.g., autonomy support) below the level of statistical significance. The effects of the dimensions of parental support on students’ external motivation proved particularly stable. Moreover, structure was still strongly associated with the self-determined forms of learning motivation (identified motivation and willingness to exert effort).

Standardized Regression Coefficients Controlling for SES, Mathematics Grade, and Baseline Motivation. When baseline motivation was controlled, the overall pattern of results was somewhat weaker, a finding attributable to the high stability of learning motivation. Inspection of the analyses predicting change from grade 5 to grade 6 or 7 showed that several of the relationships were no longer statistically significant (although the trend was in the same direction). Nevertheless, dimensions of parental support still had marked effects on students' learning motivation after 2 years, especially with respect to external motivation: the more emotional support they felt from their parents, the more likely students were to report decreased levels of external regulation ($\beta = -.23, p < .01$), along with slight increases in identified regulation. In contrast, students whose parents imposed consistent rules and standards ($\beta = .23, p < .01$) reported increasing levels of external regulation.

4. SUMMARY AND CONCLUSIONS

In summary, most of the relationships observed between the specific dimensions of parental support of student learning and the forms of student learning motivation were consistent with our theoretical expectations. In particular, the results supported the hypothesis that secondary students who perceive their parents as providing emotional support and autonomy support report high levels of the self-determined forms of learning motivation (i.e., interest, identified motivation, and willingness to exert effort). In contrast, students whose parents exert high levels of control over their learning are more likely to be externally motivated and to develop high levels of aversion.

Our results showed similar patterns of relations between the transparency of rules and standards (structure), on the one hand, and both self- and other-determined forms of learning motivation, on the other. Specifically, students whose parents imposed consistent rules and standards reported higher identified motivation and willingness to exert effort as well as higher external motivation. Drawing on Grolnick and Slowiaczek (1994), who suggest that the effects of this kind of parental involvement are largely dependent on how they are interpreted by students—the same interventions may be interpreted as either controlling or supportive—these results are quite plausible (see also Wild & Remy, 2002).

We interpret the finding that most relationships persisted when mathematics achievement and social background were controlled as highlighting two important points: first, parents play a major role in homework supervision; second, parents may continue to influence their children's learning directly at secondary level. The latter result is especially noteworthy in view of previous findings (e.g., Fend, 1997) suggesting that parents tend to be more involved in school-related matters at elementary than at secondary level.

From the longitudinal perspective, we can conclude that parental attitudes and behaviors may contribute—at least in part—to explaining change in students' learning motivation over time (in this case, over 1 to 2 years). Interestingly, the effects were particularly pronounced with respect to other-determined forms of learning motivation (here, external regulation). After 2 years, effects on the more self-determined forms of learning motivation were much weaker. We can thus conclude that efforts to foster the support and maintenance of these important forms of learning motivation on the long term are especially warranted (Wild & Müller-Kalthoff, 2005).

APPENDIX

The Four Dimensions of Parental Support: Sample Items

If I get a bad grade ...

- (1) Autonomy support
... my parents ask me how they can help.
- (2) Emotional support
... my parents encourage me that I'll do better next time.
- (3) Domain-specific structure
... I know how my parents are going to react.
- (4) Achievement pressure
... my parents make life difficult for me.

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