Journal of Educational Psychology
2012, Vol. 104, No. 4, 1135–1148

0022-0663/12/$12.00 DOI: 10.1037/a0028115

The Roles of Competence Beliefs and Goal Orientations for Change in Intrinsic Motivation

Birgit Spinath
Heidelberg University

Ricarda Steinmayr
Philipps-University Marburg

The present study investigated 3 theoretically plausible explanations for changes in school-related intrinsic motivation. A sample of 348 German 11th-grade students was followed for 1 year. At 2 measurement occasions, students completed self-reports regarding their school-related intrinsic motivation, goal orientations, and competence beliefs. In line with previous studies, cross-lagged analyses provided little evidence for the hypothesis that prior competence beliefs affect subsequent intrinsic motivation after controlling for prior intrinsic motivation. Considering goal orientations as a moderator did not change this result. Instead, learning goals, but not performance goals, directly predicted the change in students' intrinsic motivation, but not vice versa. Findings are discussed with regard to advancing motivation theory and practical implications.

Keywords: intrinsic motivation, competence beliefs, goal orientation, cross-lagged analysis

Intrinsic motivation is not only an important prerequisite for learning but also a desired outcome of education. Therefore, there is a vital interest among researchers and educators in understanding what influences intrinsic motivation, especially with regard to school-based learning. The present study investigated the roles of competence beliefs and goal orientations for change in intrinsic motivation. Three theoretically plausible ways in which competence beliefs and goal orientations might affect intrinsic motivation were investigated. First, we tested whether competence beliefs not only are closely associated with intrinsic motivation but might also be potential causes of changes in intrinsic motivation. Second, we tested whether the association between competence beliefs and intrinsic motivation varies systematically according to students' goal orientations. Specifically, theory suggests that in the presence of learning goals, ability self-concepts should be less important for the development of task enjoyment than in the presence of performance goals. Third, the assumption that goal orientations directly predict changes in intrinsic motivation was put to a test. To this end, data from a 12-month longitudinal investigation of high-school students' motivational development were analyzed by means of cross-lagged models and latent interaction analyses.

Defining Intrinsic Motivation, Competence Beliefs, and Goal Orientation

In the present article, intrinsic motivation is defined as the degree of positive affective evaluation of an activity (i.e., liking and enjoyment) for reasons that lie within the activity itself rather than its consequences (e.g., Ryan & Deci, 2000; Wigfield & Eccles, 1992). Intrinsic motivation is a very desirable reason for performing achievement-related activities because learning comes as a by-product of engaging in an enjoyed task and learners feel self-determined. Therefore, intrinsic motivation can be considered to be an end of education in itself. In the school context, intrinsic motivation is often assessed with reference to specific subjects (e.g., "How much do you like Math?") and can also be assessed on a broader level with regard to school in general (e.g., "How much do you like going to school?").

Competence beliefs are defined in the present work as cognitive representations of one's ability level. This kind of competence belief is frequently investigated under the label of *ability self-concept* or *self-perceived abilities* (e.g., Harter, 1982; Herbert & Stipek, 2005; Wigfield et al., 1997). Typical items ask for competence self-estimates against implicit or explicit social or criterion-based standards (e.g., "How good are you at . . . ?"). Like intrinsic motivation, competence beliefs can be assessed on a subject-specific level or with regard to school in general.

Achievement goals are cognitive representations of the reasons for competence-related activities. Achievement goals were originally distinguished into learning and performance goals (e.g., Dweck & Leggett, 1988; Nicholls, 1984). Learning goals focus the person on the development of competence, whereas performance goals are aimed at the demonstration of competence relative to others (e.g., Elliot & McGregor, 2001). Later on, Elliot and others separated performance goals into performance-approach (striving to demonstrate competence) and performance-avoidance goals (striving not to demonstrate incompetence; Elliot & Church, 1997; Elliot & Harackiewicz, 1996). Researchers have pointed out that there are different ways to demonstrate competence, for example, by trying to outperform others or by evoking the appearance of competence (e.g., Elliot, 1999; Hulleman, Schrager, Bodemann, & Harackiewicz, 2010). In the conceptualization we use, performance-approach goals concern a focus on demonstrating compe-

This article was published Online First April 30, 2012.

Birgit Spinath, Department of Psychology, Heidelberg University, Heidelberg, Germany; Ricarda Steinmayr, Department of Psychology, Philipps-University, Marburg, Germany.

Correspondence concerning this article should be addressed to Birgit Spinath, Heidelberg University, Department of Psychology, Hauptstrasse 47-51, D-69117 Heidelberg, Germany. E-mail: birgit.spinath@psychologie.uni-heidelberg.de

tence relative to others (see items in the Appendix). We conceptualize achievement goals as orientations that are relatively stable over time. Goal orientations can be assessed on a level tapping specific subjects ("In math, it is important to me . . . ") or on a more general level ("In school, it is important to me . . . ").

Developmental Framework

Before looking at potential explanations for change in intrinsic motivation, it is important to clarify what kind of change is observed at a certain age. Specifically, it is important to distinguish between mean level changes and intraindividual change across time. Much prior research has been devoted to establishing characteristic mean level changes in school-related intrinsic motivation across school trajectories. On the grounds of this research, it is well-known that the majority of children start school with very high intrinsic motivation but that intrinsic motivation for school-related learning diminishes throughout elementary school and beyond (e.g., Gottfried, 1990; Gottfried, Fleming, & Gottfried, 2001; Spinath & Spinath, 2005; Spinath & Steinmayr, 2008). This development stagnates when students are about 16 years old, and afterward even an increase in intrinsic motivation can be observed in some disciplines (e.g., Fredricks & Eccles, 2002; Gottfried et al., 2001; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Watt, 2004). Although mean levels of intrinsic motivation stay constant or rise slightly after age 16, there is intraindividual change. This kind of change is visible in correlations between the same constructs over time. The present study aimed to find predictors of this intraindividual change over time at the turning point at which declining intrinsic motivation begins to stabilize (in terms of means) or even increase. Identifying these predictors might help to find ways to support the process of stabilizing and improving intrinsic motivation.

Previous studies investigating potential causes of change in intrinsic motivation have focused primarily on children in lower grades and, thus, have tried to explain the onset and continuation of the decline (e.g., Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005; Skaalvik & Valas, 1999; Spinath & Spinath, 2005; Spinath & Steinmayr, 2008). Only a few studies have assessed intrinsic motivation during the last years in school (e.g., Gottfried et al., 2001; Jacobs et al., 2002; Watt, 2004), and even fewer have investigated reasons for change at this age. This is an important developmental stage to investigate because students are then allowed to make their own decisions about their future, for example, whether to continue school, what major to choose, or what professional careers to aspire to. Therefore, the present study was designed to shed light on the mechanisms contributing to intraindividual change in intrinsic motivation in late adolescence.

Associations Between Competence Beliefs and Intrinsic Motivation

Some of the most prominent motivation theories hold that positive ability beliefs are an important prerequisite for experiencing intrinsic motivation (e.g., Ryan & Deci, 2000; Wigfield & Eccles, 2000). This idea can be traced back to White's (1959) influential work on effectance motivation postulating that individuals have an innate desire to feel competent. According to White, feeling competent and enjoying task engagement are the same. Modern motivational theories (e.g., Ryan & Deci, 2000; Wigfield & Eccles, 2000) theoretically and empirically separate beliefs about competence from intrinsic motivation. Although one could argue that prior intrinsic motivation could also have an influence on subsequent competence beliefs, there is no theory that makes a strong point for such directional effects.

Despite the high plausibility of the hypothesis that prior competence beliefs influence later intrinsic motivation, there is little empirical evidence to support this notion. Beyond medium to strong concurrent associations, longitudinal studies have found either no or only weak evidence for potentially causal influences of competence beliefs on the development of intrinsic motivation (Jacobs et al., 2002; Marsh et al., 2005; Nurmi & Aunola, 2005; Skaalvik & Valas, 1999; Spinath & Spinath, 2005; Spinath & Steinmayr, 2008). Specifically, when using cross-lagged analyses, the cross-paths reaching from prior competence beliefs to subsequent intrinsic motivation while controlling for prior intrinsic motivation have been, if significant at all, very small in size (Marsh et al., 2005; Skaalvik & Valas, 1999; Spinath & Spinath, 2005; Spinath & Steinmayr, 2008). If the magnitudes of these cross-paths are taken as estimates for potentially causal effects, these results indicate that competence beliefs have, if any, only a small influence on change in intrinsic motivation. Because all of these studies have looked at children in Grades 1 through 7, it is not clear whether these results would replicate in older children.

To summarize the need for further research, to date only a few studies have investigated effects of competence beliefs on intrinsic motivation by means of cross-lagged analyses (Marsh et al., 2005; Skaalvik & Valas, 1999; Spinath & Spinath, 2005; Spinath & Steinmayr, 2008). Previous longitudinal research has relied predominantly on samples of younger students, mainly elementary school children. The only exception is the longitudinal study by Jacobs et al. (2002), which included Grades 1 through 12 but involved no cross-lagged analysis. The present study focused on students during their last years in school to determine whether findings from research with younger students would replicate in this age group.

Goal Orientations as a Moderator for the Association Between Competence Beliefs and Intrinsic Motivation

One potential explanation for why prior studies have failed to provide evidence for the effects of prior competence beliefs on subsequent intrinsic motivation is that moderator variables might mask the effect. Specifically, it can be argued that competence beliefs in the sense of ability self-concepts should be important for experiencing task enjoyment only under a performance-goal orientation but not under a learning-goal perspective. Persons with different goal orientations have different conceptions of success as well (e.g., Dweck & Leggett, 1988; Nicholls, 1984). Under a learning-goal perspective, success depends on the perception that one has improved one's abilities. Improving one's competence and perceiving learning progress is possible at different levels of actual ability and, therefore, at all levels of ability self-concepts. Ability self-concept measures do not assess the intraindividual temporal change of competence that is important for persons with strong learning goals. Thus, under a learning-goal perspective, ability self-concepts should not influence intrinsic motivation.

By contrast, under a performance-goal orientation, success depends on the demonstration of competence relative to others. The goals of demonstrating high competence or not demonstrating low competence are more likely to be reached when ability self-concepts are positive. This is the case because the ability self-concept measures exactly the kind of competence that is necessary to demonstrate competence relative to others, namely, the concept of competence measured against social or criterion-based standards. Therefore, students with strong performance goals should enjoy task engagement more when they have more positive ability self-concepts. In the case of negative ability self-concepts, students with performance goals should lose their task enjoyment because engaging in tasks for which one has low ability self-perceptions makes goal attainment unlikely. One could argue, however, that under a performance-avoidance goal orientation, students are very unlikely to experience intrinsic motivation at all, even if the goal of not demonstrating low competence is met. Nevertheless, ability self-concepts should be essential for intrinsic motivation in the presence of performance-avoidance goals because low ability self-concepts should predict a steeper decline of intrinsic motivation than high ability self-concepts.

According to this line of argumentation, it might be expected that the association between competence beliefs and intrinsic motivation is moderated by goal orientations. In the presence of strong learning goals, competence beliefs should have no influence on the change in intrinsic motivation. In the presence of strong performance goals, however, prior competence beliefs should affect subsequent intrinsic motivation in the way that lower competence beliefs predict a decline in intrinsic motivation. To our knowledge, no prior study has investigated this moderation hypothesis.

Direct Influences of Goal Orientations on Intrinsic Motivation

A third theoretical possibility of how to explain change in intrinsic motivation is that goal orientations might exert a direct influence on intrinsic motivation. Considering that individuals with a learning-goal orientation define success in terms of increased competencies (e.g., Dweck & Leggett, 1988; Nicholls, 1984), learning goals should foster the experience of intrinsic motivation on any task that allows for learning progress. At school, many tasks offer the opportunity to learn something new. Therefore, students with strong learning goals have multiple chances to reach their primary goal (i.e., to increase their competence). This leads to the prediction that learning goals facilitate the experience of intrinsic motivation (see also Harackiewicz & Elliot, 1993; Heyman & Dweck, 1992; Rawsthorne & Elliot, 1999).

For individuals with a performance-goal orientation, success can be reached only on tasks that allow one to demonstrate competence or to hide a lack of competence. Given the typical situation at school, not all students with strong performance goals can reach these aims. Although some students with performance-approach goals might succeed in demonstrating their competence, others will not, for example, because their actual competence falls short relative to others. In a similar vein, students with performance-avoidance goals will not always succeed in hiding what they think are low competences. As a consequence of missing their goals, students with performance goals are bound to lose their task enjoyment. Note, however, that students with performance goals who reach their aims are not expected to suffer from motivational impairment. For these reasons, performance goals are not expected to predict change in intrinsic motivation (see also, e.g., Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997, Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000, Harackiewicz, Barron, Tauer, & Elliot, 2002). On the other hand, performance-avoidance goals are associated with negative feelings, such as fear of failure and test anxiety (e.g., Elliot & McGregor, 1999), which are known to be incompatible with feelings of task enjoyment. In fact, some studies have found that performance-avoidance goals were negatively associated with intrinsic motivation (e.g., Elliot & Harackiewicz, 1996). Taken together, these theoretical considerations further the expectation that performance-approach goals are not predictive of change in intrinsic motivation. Performance-avoidance goals might either fail to predict or be negatively predictive of change in intrinsic motivation.

The assumption that goal orientations affect subsequent intrinsic motivation is in line with different leading motivation theories, such as the expectancy-value model (Eccles, 2005; Wigfield & Eccles, 2000) and goal theories (Dweck, 1999; Elliot & Harackiewicz, 1996). Evidence for the predictive power of goal orientations for subsequent interest and task enjoyment comes from a set of longitudinal studies with college students in introductory psychology courses (e.g., Harackiewicz et al., 1997, 2000, 2002). These studies have consistently found that learning goals were positive predictors of subsequent interest and task enjoyment, whereas performance-approach goals were not. Performance-avoidance goals were not included in these reports. A study by Elliot and Murayama (2008) corroborated these results and found additionally that performance-avoidance goals were negative predictors of subsequent intrinsic motivation. Although these studies used longitudinal designs, none of them assessed interest, task enjoyment, or goal orientations at more than one point in time.

To our knowledge, only two studies on the subject have assessed interest and task enjoyment, but not goals, more than once (Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008; Hulleman, Durik, Schweigert, & Harackiewicz, 2008). Harackiewicz et al. (2008) found that higher initial interest positively predicted the adoption of learning goals and negatively predicted the adoption of performance-avoidance goals but was not predictive of performance-approach goals. In a model with all goal orientations, only learning goals predicted interest and enjoyment. The effect of learning goals on interest was completely mediated by prior situational interest. Hulleman et al. (2008) showed in a sample of college students that higher initial interest predicted the adoption of learning goals and, different from what Harackiewicz et al. found, of performance-approach goals as well. As was expected, both initial interest and learning goals had direct effects on interest and task values. By contrast, performance-approach goals were not predictive of subsequent interest and task values. Mediation analyses revealed that the effect of learning goals on subsequent interest was partially mediated by task values.

In the studies by Harackiewicz et al. (2008) and Hulleman et al. (2008), the results concerning learning goals converged, whereas the results concerning performance-approach goals diverged. Further studies are needed to clarify these inconsistent findings. Moreover, all previous studies have focused on college students and the subject of psychology. It is important to investigate different age groups and subjects. Investigating more than one academic subject

in one study offers the opportunity to cross-validate results. Hulleman et al.'s study, like earlier studies from this research group (e.g., Harackiewicz et al., 1997, 2000, 2002), reported no results for performance-avoidance goals; therefore, the study by Harackiewicz et al. is the only one to date that investigated performance-avoidance goals in this context. Finally, because goal orientations were assessed only once, a full cross-lagged analysis on the direction of potentially causal effects between interest or intrinsic motivation and goal orientations is still missing. Full cross-lagged analyses are needed to exclude the possibility that effects in the opposite direction (i.e., from intrinsic motivation to goals) are equally strong or even stronger.

Methodological Approach to Establish Potential Causality

The present study followed recommendations for examining reciprocal effects between two or more concepts (Marsh, 1990; Marsh, Byrne, & Yeung, 1999). To detect potentially causal relations, first, two constructs need to be shown to have a significant statistical relation (i.e., substantial path coefficients in structural equation models). Second, clear time precedence needs to be established in longitudinal studies with at least two measurement occasions. Third, theoretical models must be tested by means of statistical techniques, such as structural equation modeling, with all latent constructs inferred on the basis of multiple indicators. When these prerequisites are fulfilled, reciprocal effects can be examined in cross-lagged analyses. With these models, a researcher can test whether time-lagged paths running from the potential predictor at Time 1 to the criterion variable at Time 2 reach statistical significance while controlling for the criterion variable at Time 1. Because the opposite direction of effects can be tested at the same time, these models are called reciprocal effects models (e.g., Marsh et al., 2005).

Of course, nonexperimental longitudinal designs cannot provide unequivocal evidence for causal influences. They are, however, useful for testing for necessary prerequisites of causal influences and can give an impression of how strong such influences might be. This means that when there are no cross-lagged relations between constructs, there is no basis for further investigation of causal influences. Furthermore, the present design provides an estimation of the strength of potentially causal influences. If there are only weak relations over time, this indicates that causal influences between concepts might, at best, be weak.

Research Questions

The present study tested three theoretically plausible ways to explain changes in high school students' intrinsic motivation. Specifically, the following questions were investigated:

1. Do prior competence beliefs predict subsequent intrinsic motivation when controlling for prior intrinsic motivation? Finding such relations would be in line with motivation theories assuming a causal influence of competence beliefs on intrinsic motivation.

2. Is the association between competence beliefs and intrinsic motivation moderated by goal orientations? According to goal theories, competence beliefs should influence intrinsic motivation especially for students who have strong performance goals, but not for students who have strong learning goals.

3. Do learning goals predict subsequent intrinsic motivation when controlling for prior intrinsic motivation but not vice versa? No effect of performance goals on subsequent intrinsic motivation was expected. Finding unidirectional effects of prior learning goals on subsequent intrinsic motivation but not vice versa would be in line with the assumption that goal orientations set a framework in which intrinsic motivation can thrive.

Method

Overview

A sample of German 11th-grade students was followed for 1 year. At two measurement occasions in March 2007 and 2008, students completed self-reports on their school-related intrinsic motivation, goal orientations, and competence beliefs. To cross-validate the results for different domains, data were collected for school in general, math, and German. Data were analyzed on a latent basis with three or four manifest indicators per latent construct and by means of cross-lagged structural equation models.

Participants

A sample of 348 11th-grade students was recruited from three German schools of the highest academic track (Gymnasium). These students represent the typical population of this type of school in Germany (i.e., the majority being Caucasian from medium to high socioeconomic status homes). At the time of the first measurement occasion (March 2007), students were on average 17.1 years old ($SD = 0.86$). As is typical for this kind of school, the sample comprised more girls ($N = 206$) than boys ($N = 142$). The investigation lasted 1 year so that students were 1 year older at the second measurement occasion (March 2008). At the first measurement occasion ($n = 323$), students were in the middle of the second term of the 11th grade, and at the last measurement occasion, they were in the middle of the second term of the 12th grade ($n = 312$; graduation from this kind of school at the time of the investigation was the 13th grade). A total of 293 students (84%) participated at both measurement occasions. Students who participated at only one measurement occasion did not differ from the rest of the sample in any measure.

Measures

Intrinsic motivation. Students' intrinsic motivation was assessed by three items per domain taken from the German Scales for the Assessment of School-Related Values (Steinmayr & Spinath, 2010). This measure relies on Eccles's theorizing about school-related values (e.g., Eccles, 2005). Students were asked to indicate on a 5-point scale (1 = *totally disagree* to 5 = *totally agree*) how they value school in general, math, and German (see items in the Appendix). Internal consistencies for different domains and measurement occasions ranged from $\alpha = .87$ to $\alpha =$

.93. The psychometric properties of the Scales for the Assessment of School-Related Values were shown to be good (Steinmayr & Spinath, 2010). Test–retest stability is satisfactory (e.g., $r_{tt} \geq .54–.76$ for a 6-month interval), and convergent and discriminate validities with related constructs (e.g., competence beliefs) are convincing. Predictive validity of values for school grades and academic choices was established.

Goal orientations. Students' goal orientations were assessed by means of the German Scales for the Assessment of Learning and Performance Goals (Spinath, Stiensmeier-Pelster, Schöne, & Dickhäuser, 2002). This measure assesses learning goals and performance-avoidance goals with eight items each and performance-approach goals with seven items in each domain (see items in the Appendix). Items were answered on a 5-point scale (1 = *totally disagree* to 5 = *totally agree*). Internal consistencies for different domains and measurement occasions ranged from $\alpha = .82$ to $\alpha = .92$. The test manual (Spinath et al., 2002) reports satisfactory values for test–retest stability (e.g., $r_{tt} \geq .60–.74$ for a 2-week interval), a clear factorial structure with partly intercorrelated scales, convincing convergent and discriminate validities with related constructs (e.g., achievement motivation, self-efficacy beliefs, and test anxiety), as well as good predictive validity of goal orientations for school grades.

Competence beliefs. Competence beliefs were assessed by four items per domain taken from the German Scales for the Assessment of School-Related Competence Beliefs (Schöne, Dickhäuser, Spinath, & Stiensmeier-Pelster, 2002). Students were asked to indicate on a 5-point scale (1 = *totally disagree* to 5 = *totally agree*) how good they thought they were at different activities in school in general, math, or German. Internal consistencies for different domains and measurement occasions ranged from $\alpha = .81$ to $\alpha = .95$. The test manual (Schöne et al., 2002) reports satisfactory values for test–retest stability (e.g., $r_{tt} \geq .59–.71$ for a 2-week interval), convincing convergent and discriminate validities with related constructs (e.g., achievement motivation, self-efficacy beliefs, and test anxiety), as well as good predictive validity of goal orientations for school grades.

Procedures

Testing took place during regular classes in schools. Tests were administered by trained research assistants and lasted about 30 min. To guarantee anonymity, students created their own four-digit code according to special instructions. The second measurement occasion took place 12 months later and followed the same procedure. Data from the two measurement occasions were matched by means of students' individual codes.

Statistical Analyses

Analysis of variance (ANOVA). To test for mean level changes in intrinsic motivation and competence beliefs across measurement occasions, one-way within-subjects ANOVAs for repeated measurements were performed. The effect size η^2, indicating the proportion of variance that can be attributed to the time effect, is reported to evaluate the magnitude of the change.

Structural equation modeling (SEM). Data were analyzed by longitudinal SEM computed with Amos 18.0. To investigate Research Question 1, cross-lagged models with competence beliefs and intrinsic motivation for each domain (school in general, math, and German) were set up (see Figure 1). To control for potential memory effects and, thus, positively overestimated stabilities between the different measurement occasions, models were set up with correlated uniqueness between all corresponding measures collected at the two measurement occasions. To investigate the second research question, latent interactions were modeled following the guidelines proposed by Marsh, Wen, and Hau (2004). We used matched pairs as product indicators and used the unconstrained approach to estimate latent interaction effects. Matched pairs were built by multiplying *z*-standardized variables from each scale (assessed at Time 1) with each other. For example, the first item of the competence beliefs scale was multiplied by the first of four parcels indicating learning goals, the second competence beliefs item was multiplied by the second parcel indicating learning goals, and so on. Parcels for the three goal orientations

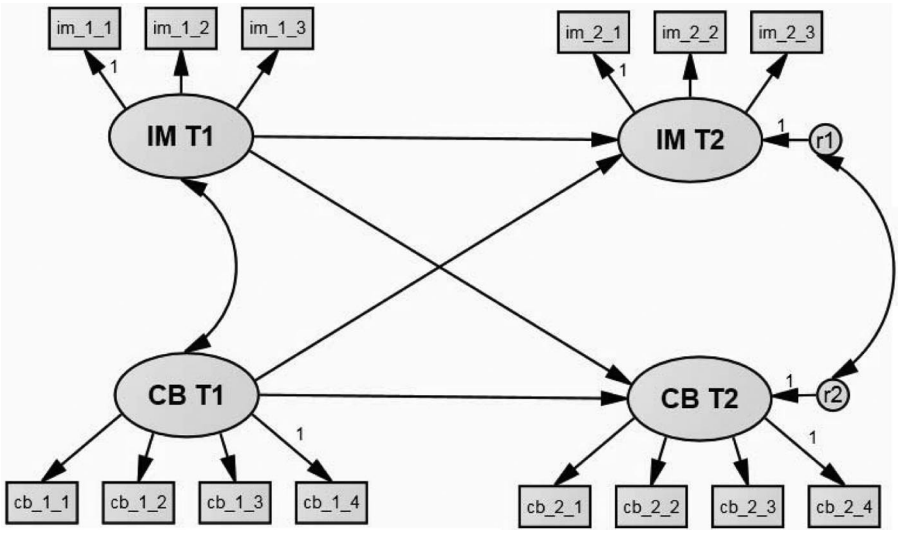

Figure 1. Cross-lagged structural equation model with intrinsic motivation (IM) and competence beliefs (CB) measured on a latent basis at two measurement occasions (Time 1 [TI] and Time 2 [T2]).

were built by summing the first and second items of each goal orientation scale, the third and fourth items, and so on (scales with eight items had four parcels with two items each; the performance-approach goals scale has seven items, so the seventh item stood alone). In each analysis, four product indicators loaded on the interaction factor indicating a possible interaction between ability beliefs and goal orientations. The goal orientation and the interaction factor (Competence Beliefs × Goal Orientation) were additionally introduced in the cross-lagged models described earlier and served as additional indicators of competence beliefs and intrinsic motivation at Time 2. All factors serving as predictors were correlated with each other. Finally, with regard to Research Question 3, cross-lagged models with intrinsic motivation and learning goals, performance-approach, and performance-avoidance goals, respectively, were tested for each domain. Again, models were set up with correlated uniquenesses between all corresponding measures.

For the evaluation of overall model fit, three different fit indices were used (see Hu & Bentler, 1999): the chi-value, the root-mean-square error of approximation (RMSEA), and the comparative fit index (CFI). Hu and Bentler (1999) proposed the following cutoff scores for two of these indices: CFI $\geq$ .95 and RMSEA $\leq$ .05. According to Browne and Cudeck (1993), an RMSEA $\leq$ .05 indicates a very good model fit, and an RMSEA $\leq$ .09 is still an indicator for a reasonable error of approximation.

Missing data. Missing data occurred when students missed class on the day the testing took place. The main reason for absence was illness. Furthermore, there were only small amounts of missing data for individual items (less than 1%). We accounted for missing data in the SEMs by means of full information maximum likelihood estimations as this procedure was recently demonstrated to be especially effective in handling missing data when doing latent analysis (Cheung, 2007).

Results

Descriptive Statistics and ANOVAs

Means, standard deviations, and reliabilities are shown in Table 1, and intercorrelations among all scales are shown in Table 2. The means of most scales were slightly higher than the theoretical scale means and were similar to the results of previous studies that investigated comparable samples with the same measures (e.g., Steinmayr & Spinath, 2009). Mean level change was investigated by ANOVAs for repeated measurements. As typical for this age group, results indicated stabilizing intrinsic motivation (i.e., no overall change for intrinsic motivation for math and German) and an increase in intrinsic motivation for school in general, $F(1, 281) = 9.10$, $p < .01$, $\eta^2 = .04$. Moreover, performance-approach, $F(1, 281) = 5.73$, $p < .05$, $\eta^2 = .02$, and performance-avoidance goals, $F(1, 281) = 5.12$, $p < .05$, $\eta^2 = .02$, for school in general decreased slightly across time. All other variables did not change significantly.

Effects of Competence Beliefs on Intrinsic Motivation

Research Question 1 addressed whether competence beliefs predicted subsequent intrinsic motivation. Table 3 presents the results of the corresponding SEMs for the three domains. Model fit indices indicated a satisfactory to excellent fit of the models to the data. Both intrinsic motivation (β between .53 and .70) and competence beliefs (β between .65 and .83) were moderately stable over time. Inspection of the cross-lagged paths indicated that prior intrinsic motivation did not predict subsequent competence beliefs in any domain. On the other hand, prior competence beliefs did not predict subsequent intrinsic motivation in two out of three domains (school in general and math) but did so for German ($\beta = .27$, $p < .001$). Thus, only weak support was found for the hypothesis that competence beliefs affect intrinsic motivation.

Table 1
Means, Standard Deviations, and Reliabilities for Intrinsic Motivation, Competence Beliefs, and Goal Orientations in Three Domains for Two Measurement Occasions

Variable	Time 1		Time 2	
	M (*SD*)	α	*M* (*SD*)	α
Intrinsic motivation				
General	3.24 (0.83)	.88	3.40 (0.81)	.87
Math	3.17 (1.13)	.93	3.31 (1.11)	.93
German	3.45 (0.99)	.92	3.41 (0.96)	.91
Competence beliefs				
General	3.53 (0.53)	.81	3.60 (0.56)	.84
Math	3.21 (1.00)	.95	3.36 (0.98)	.95
German	3.63 (0.83)	.92	3.63 (0.75)	.92
Learning goals				
General	3.86 (0.55)	.82	3.88 (0.66)	.88
Math	3.70 (0.71)	.87	3.69 (0.81)	.91
German	3.80 (0.66)	.87	3.76 (0.76)	.91
Performance-approach goals				
General	3.27 (0.75)	.85	3.17 (0.78)	.87
Math	3.14 (0.83)	.87	3.08 (0.83)	.87
German	3.19 (0.77)	.84	3.11 (0.83)	.88
Performance-avoidance goals				
General	2.50 (0.82)	.90	2.34 (0.85)	.92
Math	2.42 (0.82)	.90	2.30 (0.85)	.92
German	2.49 (0.83)	.90	2.32 (0.86)	.92

Note. $N = 323$ students participated at Time 1, and $N = 312$ students participated at Time 2.

Effects of Competence Beliefs on Intrinsic Motivation: Moderated by Goal Orientation?

The second research question focused on goal orientations as potential moderators of the association between competence beliefs and intrinsic motivation. Results of the latent interaction analyses (see earlier description) are depicted in Table 4. Model fit of all models was at least satisfactory. Out of nine possible interaction effects, only one was significant.[1] Subsequent analyses using median splits revealed that competence beliefs for German predicted intrinsic motivation only for students scoring low on performance-avoidance goals—low performance-avoidance goals: path from competence beliefs at Time 1 to intrinsic motivation at Time 2, $\beta = .53$ ($p < .001$); high performance-avoidance goals: path from competence beliefs at Time 1 to intrinsic motivation at Time 2, $\beta = .13$ ($p = .19$); multigroup comparison: discrepancy-

[1] Additionally, tests for curvilinear effects were run. None of the curvilinear effects reached significance.

Table 2
Intercorrelations Among All Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
General																														
1. LG1	—	.36	.07	.46	.50	.58	.41	.12	.46	.48	.54	.26	.09	.04	.16	.36	.32	.14	.14	.23	.65	.32	.05	.35	.33	.45	.40	.14	.32	.34
2. P-ApG1		—	.60	.30	.27	.26	.62	.43	.34	.27	.32	.79	.60	.20	.19	.24	.51	.42	.22	.21	.20	.81	.55	.12	.11	.14	.53	.43	.16	.14
3. P-AvG1			—	.02	.04	.02	.37	.58	.01	.01	.10	.49	.91	.08	.05	.05	.30	.51	.05	.06	−.07	.46	.88	−.08	−.09	−.03	.28	.53	−.06	−.03
4. CB1				—	.48	.29	.34	.07	.62	.32	.35	.32	.07	.35	.34	.18	.24	.09	.27	.17	.31	.30	.04	.38	.24	.20	.29	.09	.39	.22
5. IM1					—	.33	.25	.04	.46	.63	.31	.19	.06	.10	.36	.22	.19	.06	.19	.29	.44	.27	.05	.29	.44	.30	.26	.05	.28	.36
6. LG2						—	.49	.12	.42	.51	.36	.18	.04	.10	.15	.57	.35	.10	.06	.25	.48	.24	−.01	.24	.21	.76	.45	.13	.31	.39
7. P-ApG2							—	.62	.32	.35	.34	.50	.36	.20	.15	.35	.83	.58	.12	.21	.33	.56	.32	.20	.12	.39	.87	.61	.22	.24
8. P-AvG2								—	.02	.05	.11	.33	.53	.08	.01	.12	.57	.93	.04	.07	.08	.35	.50	.06	−.09	.06	.53	.95	−.01	.03
9. CB2									—	.51	.29	.27	.03	.27	.30	.24	.23	.05	.32	.31	.35	.29	.02	.38	.31	.30	.27	.06	.47	.29
10. IM2										—	.32	.21	.05	.08	.23	.30	.26	.07	.16	.36	.42	.28	.01	.31	.41	.42	.33	.07	.26	.43
Math																														
11. LG1											—	.63	.24	.57	.66	.65	.52	.19	.57	.61	.28	.15	.00	−.05	−.01	.08	.18	.09	−.03	.02
12. P-ApG1												—	.62	.55	.52	.45	.61	.39	.49	.43	.04	.58	.40	−.11	−.06	−.03	.34	.32	−.04	−.03
13. P-AvG1													—	.23	.19	.18	.38	.53	.18	.18	−.10	.42	.80	−.15	−.14	−.09	.21	.46	−.13	−.11
14. CB1														—	.78	.53	.47	.19	.76	.61	−.15	.03	.03	−.26	−.25	−.13	.03	.06	−.17	−.19
15. IM1															—	.53	.41	.11	.67	.69	−.04	−.01	−.01	−.17	−.06	−.06	.01	−.02	−.10	−.08
16. LG2																—	.62	.18	.59	.69	.18	.13	.01	−.16	−.12	.29	.19	.10	−.10	−.02
17. P-ApG2																	—	.63	.46	.50	.18	.38	.24	−.06	−.08	.18	.65	.55	−.04	.01
18. P-AvG2																		—	.15	.16	.05	.31	.44	.01	−.13	.03	.48	.90	−.03	.02
19. CB2																			—	.80	−.03	.05	.03	−.21	−.14	−.15	−.07	.02	−.17	−.17
20. IM2																				—	.10	.05	.02	−.18	−.06	.06	.07	.05	−.10	.02
German																														
21. LG1																					—	.45	.04	.56	.64	.66	.49	.10	.49	.60
22. P-ApG1																						—	.57	.37	.35	.32	.63	.39	.33	.33
23. P-AvG1																							—	.00	.00	.01	.29	.48	−.04	−.02
24. CB1																								—	.65	.47	.41	.12	.77	.60
25. IM1																									—	.50	.33	−.04	.56	.65
26. LG2																										—	.59	.13	.56	.69
27. P-ApG2																											—	.57	.43	.47
28. P-AvG2																												—	.07	.09
29. CB2																													—	.69
30. IM2																														—

Note. $N = 293–323$. LG = learning goals; P-ApG = performance-approach goals; P-AvG = performance-avoidance goals; CB = competence beliefs; IM = intrinsic motivation; suffix 1 = Time 1; suffix 2 = Time 2. For rs $\geq |.12|$, $p < .05$; for rs $\geq |.15|$, $p < .01$; and for rs $\geq |.20|$, $p < .001$.

Table 3
Results of Cross-Lagged Models With Intrinsic Motivation and Competence Beliefs

	Fit index			Standardized coefficient			
Model (*df*)	χ^2	CFI	RMSEA	IM1 → IM2	CB1 → CB2	IM1 → CB2	CB1 → IM2
General (64)	106.68	.98	.04	.70***	.65***	.13	.02
Math (64)	103.94	.99	.04	.63***	.68***	.15	.12
German (64)	116.23	.99	.05	.53***	.83***	.03	.27***

Note. $N = 348$. CFI = comparative fit index; RMSEA = root-mean-square error of approximation; IM = intrinsic motivation; CB = competence beliefs; suffix 1 = Time 1; suffix 2 = Time 2.
*** $p \leq .001$.

between-groups index $CMIN(df = 1) = 5.34$, $p = .02$. Taken together, the results of the latent interaction analyses and multigroup comparisons provided no support for the assumption that goal orientations moderated the association between competence beliefs and intrinsic motivation.

Effects of Goal Orientation on Intrinsic Motivation

The third research question addressed the theoretical assumption that goal orientations might have direct effects on intrinsic motivation. Cross-lagged models for the three domains were set up for intrinsic motivation and learning goals, for intrinsic motivation and performance-approach goals, as well as for intrinsic motivation and performance-avoidance goals. Results of the nine cross-lagged models are depicted in Table 5. Model fit of all models was at least satisfactory. The temporal stability of the three goal orientations across the three domains was moderate (β between .53 and .73). In all three domains, prior learning goals predicted change in intrinsic motivation (β between .21 and .35) but not vice versa. None of the performance goals predicted change in intrinsic motivation in either domain or vice versa. Taken together, the results of the cross-lagged analyses are in line with the hypotheses that learning goals but not performance goals directly affect change in intrinsic motivation.

Discussion

The main aim of the present study was to illuminate the reasons for change in students' intrinsic motivation near the end of their school careers at the age of 17. This is an important age because the decline in intrinsic motivation typically stagnates at the age of 16, and afterward, even an increase in intrinsic motivation can be observed in some disciplines (e.g., Fredricks & Eccles, 2002; Gottfried, Fleming, & Gottfried, 2001; Jacobs et al., 2002; Watt, 2004). Therefore, it is important to investigate potential causal mechanisms responsible for this turning point. Our study is the first to investigate effects of competence beliefs and goal orientations on change in intrinsic motivation in this age group by means of a cross-lagged design. Cross-lagged designs are especially valuable for investigating potential causal influences among two variables (e.g., Marsh, 1990; Marsh et al., 1999). In line with previous studies, little evidence was found that competence beliefs affected change in intrinsic motivation. This was also true after considering goal orientations as potential moderators of the relation between competence beliefs and intrinsic motivation. Instead, it could be shown that learning goals, but not performance goals, directly predicted the change in students' intrinsic motivation but not vice versa. In the following, these main results are discussed with

Table 4
Results of Models Testing for Latent Interaction Effects of Competence Beliefs With Each Goal Orientation

	Fit index			Standardized coefficient	
Model (*df*)	χ^2	CFI	RMSEA	CB1 × GO1 → IM2 (*p*)	CB1 × GO1 → CB2 (*p*)
Learning goals					
General (187)	295.04	.96	.04	.08 (.29)	.05 (.47)
Math (187)	408.41	.96	.06	−.02 (.66)	−.06 (.21)
German (187)	325.41	.97	.05	−.01 (.84)	.01 (.87)
Performance approach					
General (187)	310.16	.96	.04	−.05 (.42)	−.06 (.32)
Math (187)	325.78	.98	.05	−.04 (.48)	−.04 (.40)
German (187)	339.66	.97	.05	−.08 (.20)	−.05 (.32)
Performance avoidance					
General (187)	250.11	.98	.03	−.06 (.38)	−.03 (.67)
Math (187)	289.32	.98	.04	−.02 (.73)	.07 (.15)
German (187)	293.84	.98	.04	−.15 (.008)	−.04 (.35)

Note. $N = 348$. CFI = comparative fit index; RMSEA = root-mean-square error of approximation; IM = intrinsic motivation; CB = competence beliefs; GO = goal orientations; suffix 1 = Time 1; suffix 2 = Time 2.

Table 5
Results of Cross-Lagged Models With Intrinsic Motivation and Three Goal Orientations

Model (*df*)	Fit index			Standardized coefficient			
	χ^2	CFI	RMSEA	IM1 → IM2	GO1 → GO2	IM1 → GO2	GO1 → IM2
Learning goals							
General (64)	113.54	.98	.05	.56***	.67***	.04	.21**
Math (64)	127.96	.98	.06	.51***	.67***	.07	.30***
German (64)	132.71	.98	.06	.47***	.73***	.02	.35***
Performance approach							
General (64)	109.73	.98	.05	.66***	.71***	.03	.10
Math (64)	125.25	.98	.06	.68***	.63***	.08	.09
German (64)	177.23	.96	.07	.69***	.68***	.10	.10
Performance avoidance							
General (64)	81.36	.99	.03	.69***	.65***	.03	.02
Math (64)	140.50	.98	.06	.72***	.56***	.00	.06
German (64)	114.44	.98	.05	.73***	.53***	.02	.01

Note. $N = 348$. CFI = comparative fit index; RMSEA = root-mean-square error of approximation; IM = intrinsic motivation; GO = goal orientations; suffix 1 = Time 1; suffix 2 = Time 2.
** $p \leq .01$. *** $p \leq .001$.

regard to their implications for the further development of motivation theories and their practical implications.

Why Competence Beliefs Are Not Predictive of Change in Intrinsic Motivation

Many motivational theories posit that competence beliefs are an important prerequisite for experiencing intrinsic motivation in task engagement (e.g., Harter, 1978, 1981; Ryan & Deci, 2000; Wigfield & Eccles, 2000). The first evidence in support of this assumption can be seen in the positive correlations among the two constructs that are typically found in cross-sectional and longitudinal studies (e.g., Wigfield et al., 1997) as well as in the parallel developmental trajectories (e.g., Watt, 2004). Although such correlations and parallel trajectories are important preconditions for the existence of causal influences, few studies have used designs to test whether competence beliefs also predict change in intrinsic motivation (Jacobs et al., 2002; Marsh et al., 2005; Nurmi & Aunola, 2005; Skaalvik & Valas, 1999; Spinath & Spinath, 2005; Spinath & Steinmayr, 2008). The majority of these studies found either no or only weak support for an influence of prior competence beliefs on change in intrinsic motivation (e.g., Skaalvik & Valas, 1999; Spinath & Spinath, 2005; Spinath & Steinmayr, 2008). The present study replicated these findings in a cross-lagged design with students at the end of their school trajectories. In two out of three domains (school in general and math), no effects emerged, whereas in German, competence beliefs predicted change in intrinsic motivation (we discuss this finding in more detail later). Only the study by Marsh et al. (2005) also reported small effects of prior competence beliefs on subsequent intrinsic motivation. If the magnitude of the cross-lagged paths serves as an estimate for potential causal effects, then the influence of competence beliefs on intrinsic motivation seems to be small at best.

The assumption that feelings of competence are essential for the development of intrinsic motivation is highly plausible. Nevertheless, several theoretical considerations can explain why it might not be the level of ability as typically measured by ability self-concept scales that is responsible for feelings of success and, therefore, for intrinsic motivation. For example, Harter (1978, 1981) argued that feelings of competence can arise from tasks at different levels of normative difficulty. According to Harter, experiencing success on an optimally challenging task is most important for task enjoyment. Following this line of reasoning, future research needs to measure the degree of challenge or the fit between tasks and competence beliefs. These aspects are not captured by typical ability self-concept items.

Task-specific competence beliefs that allow for comparisons with task-immanent standards are another type of competence beliefs not captured by ability self-concept measures. Whereas ability self-concept measures are typically domain specific, items used to assess self-efficacy are more task specific (cf. Bong & Clark, 1999; Bong & Skaalvik, 2003). Measuring one's competence against such task-immanent mastery standards could lead more directly to feelings of competence in the sense of White's (1959) initial theorizing and, thus, elicit task enjoyment.

From the perspective of self-determination theory, feelings of competence are necessary but not sufficient prerequisites for experiencing intrinsic motivation (Ryan & Deci, 2000). According to self-determination theory, feelings of competence will not enhance intrinsic motivation unless accompanied by a sense of autonomy or an internal perceived locus of control. As in the present investigation, this might be the case in adolescents in particular because, at this developmental stage, important decisions about one's future have to be made, and the extent to which such decisions are perceived to be made autonomously is crucial for a person's well-being. Therefore, taking a self-determination theory perspective, future research should take into account both competence beliefs and perceived autonomy or locus of control when investigating change in intrinsic motivation.

Moreover, for persons with different goals, different aspects of competence are important (cf. Dweck & Leggett, 1988; Nicholls, 1984). For persons with ability-demonstration goals, measuring competence relative to others or relative to certain criteria is important. For persons with ability-development goals, it is important to measure one's own competence against intraindividual

temporal standards (i.e., observing the growth of one's own competence over time). This aspect is typically not assessed by ability self-concept measures and could be included in future studies. For this purpose, scales should be used that systematically vary the standards against which competence is measured (e.g., Schöne et al., 2002). The present study provided no evidence for the hypothesis that ability self-concept predicts change in intrinsic motivation in persons with performance goals (see discussion later) but did not test whether task-specific or intraindividual temporal competence beliefs measures predict intrinsic motivation in persons with learning goals.

Whereas goal orientations were investigated in the present study, implicit theories are a promising candidate for future research. The work of Dweck and her colleagues (cf. Dweck, 1999) shows that implicit theories about the malleability of ability are largely independent of ability self-concepts. It can be expected that children who are convinced that their ability is not a fixed entity but can be increased should be more intrinsically motivated to learn and, thus, actually increase their competence. To corroborate these theoretical assumptions, future studies should include measures of implicit theories about the malleability of abilities when investigating influences on intrinsic motivation (see also Spinath & Spinath, 2005).

Taken together, the way in which competence beliefs are typically operationalized might be the reason for the failure to establish a causal relation between competence beliefs and change in intrinsic motivation. A main conclusion from the present and previous studies (e.g., Spinath & Spinath, 2005; Spinath & Steinmayr, 2008) is that other competence beliefs and competence- and autonomy-related constructs should move into the focus of motivational research on the causal influences of intrinsic motivation. At the same time, motivation theories need to argue more precisely about which kind of competence belief can actually be expected to have causal influences on intrinsic motivation and under what conditions.

Implications of Constructs' Temporal Stability on Findings

Cross-lagged analysis is a means for identifying predictors of change in constructs that are measured at more than one point in time. The results of this method depend on the amount of change that is observed (i.e., on the constructs' temporal stability). If constructs are highly stable over time, chances are small that any predictor can explain significant portions of variance. In the following, we discuss how this methodological aspect impacts the results and their interpretation.

In the present study, intrinsic motivation showed moderate to high temporal stabilities across a 1-year period. Nevertheless, even the maximum temporal stability ($\beta = .73$) was not too high, so sufficient change remained to be explained by other predictors. This is shown by the fact that learning goals were able to explain change in intrinsic motivation across all three domains. Therefore, the failure of competence beliefs and performance goals to predict change in intrinsic motivation cannot be explained by the moderate to high temporal stabilities of intrinsic motivation. Comparing different predictors, as was done in the present study, is a means to rule out the possibility that temporal stability makes it impossible to detect predictors of change.

Comparing the temporal stabilities of intrinsic motivation across the three domains showed noticeable differences. The temporal stability of intrinsic motivation in German was the lowest, and at the same time, the temporal stability of competence beliefs in German was the highest. This might be responsible for the finding that only in German did a significant cross-path from prior competence beliefs to subsequent intrinsic motivation emerge. This result is specified by the moderator analyses showing that prior competence beliefs predicted subsequent intrinsic motivation only for students with low learning and performance goals. It is not easy to explain why students' intrinsic motivation for German was less stable than motivation for math and school in general. If this had to do with changes in the contents that were taught in class, this should have also affected students' competence beliefs. However, instead of showing lower stability than the other domains, competence beliefs for German were the highest. This result is not in line with previous studies that showed no marked differences between temporal stabilities in German compared with other domains (e.g., Spinath & Steinmayr, 2008). The most important question is whether the results found in the present study for German are a methodological artifact or whether there actually are different mechanisms that explain change in intrinsic motivation for German. This question cannot be answered on the grounds of the present data but needs to be investigated in future studies.

To investigate whether the development of intrinsic motivation underlies different influences in different domains, future studies should compare different domains and different age groups. Including different ages in the picture is important as temporal stabilities of constructs might vary because of children's developmental stages and because of changes in the environment. With regard to developmental changes in temporal stability, both higher measurement reliability and firmer consolidation of interindividual differences contribute to higher temporal stabilities in older children and adults for most psychological constructs. Nevertheless, studies with elementary school children show that intrinsic motivation and competence beliefs for school domains have a considerable temporal stability even in the earliest school years when measured on a latent basis (e.g., Gottfried, Fleming, & Gottfried, 2001; Guay, Marsh, & Boivin, 2003; Spinath & Steinmayr, 2008). If the differences in temporal stability between age groups are negligible, then comparisons of different age groups can provide evidence for the same or different mechanisms at different ages. With regard to environmental influences on temporal stability, researchers must consider that changes in class topics, teachers, or social reference groups can all be sources of instability in the constructs relevant for the present research. Future studies might use such environmentally induced changes to investigate phases of instability and change in intrinsic motivation in interventional instead of purely observational studies. Systematic interventions might be a means for shaking temporal stability to see which predictor enters through this door.

The Role of Goal Orientations for Change in Intrinsic Motivation

Goal orientations might play a role for change in intrinsic motivation either because they moderate the relation between competence beliefs and intrinsic motivation or because they directly affect intrinsic motivation. The present results provide no

evidence for the hypothesis that competence beliefs predict change in intrinsic motivation only for students with a strong performance-goal orientation. Out of nine possible interaction effects, only one was significant. Competence beliefs for German predicted intrinsic motivation only for students scoring low on performance-avoidance goals but not for students scoring high on performance-avoidance goals. As was discussed earlier, it might be that this result in German was due either to a methodological artifact or to different mechanisms in this domain. Because the present study was the first to investigate the moderation hypothesis, more studies are needed to clarify these questions and to replicate the findings (e.g., with different age groups).

One reason for not finding moderation effects of goals might be that goals rarely appear in their pure form. The amount of overlap between students who score high or low, respectively, in each goal orientation can be estimated from the intercorrelations (see Table 2). These correlations indicate, for example, that stronger learning goals often come along with stronger performance-approach goals. This overlap makes it difficult to detect effects predicted for strong learning goals but not for strong performance goals and vice versa. Nevertheless, the overlap between different goals does not per se prevent empirical corroboration of predictions from goal theory. This can be concluded from the present results pertaining to the third hypothesis regarding direct effects of goal orientations on change in intrinsic motivation. As was predicted, these direct effects were found only for learning goals but not for performance goals. As a conclusion, we would like to stress that investigating predictions for each pure form of goal orientation is always a simplification. Simplifications can be helpful up to a certain point but need to be modified by more complex theories when the problems that come along with the simplifications are understood. The fact that the dichotomy between learning and performance goals is still valuable is to be seen in the present results regarding our third explanation for change in intrinsic motivation.

Our study provides strong evidence for a direct influence of learning goals on intrinsic motivation. This result is in line with prior findings (Harackiewicz et al., 2008; Hulleman et al., 2008). The present study goes beyond prior research in that it is the first on the matter to (a) investigate high school students near the end of their school trajectory, (b) cross-validate results from different domains, and (c) use a cross-lagged design. As was hypothesized, no effect of performance goals on subsequent intrinsic motivation was found. This is an important finding because previous studies either did not investigate performance-avoidance goals (e.g., Harackiewicz et al., 1997, 2000, 2002; Hulleman et al., 2008) or produced inconsistent findings with regard to performance-approach goals (e.g., Harackiewicz et al., 2008, vs. Hulleman et al., 2008). On the basis of the present results, we would like to stress that performance goals are not incompatible with intrinsic motivation for all students so that no overall association can be expected. Some students with performance goals will reach their goals (e.g., demonstrate competence to others) and might develop intrinsic motivation for tasks that they initially did for extrinsic reasons. However, there will also be students with performance goals who will not reach their goals of demonstrating or hiding competencies and, as a consequence, might lose their intrinsic motivation. Further research will have to differentiate more closely among students with performance goals and might distinguish certain subgroups with characteristic changes in intrinsic motivation.

Whereas under a performance-goal perspective, not all students will reach their goals, a learning-goal orientation provides all students with opportunities for goal attainment. Under a learning-goal perspective, success is defined as growing more competent over time (e.g., Dweck & Leggett; 1988; Nicholls, 1984). Because most tasks in school provide the opportunity to enhance one's competencies, students with a strong learning-goal orientation will experience much progress in reaching their goals and are likely to develop intrinsic motivation for many school-related tasks. Under such a learning-goal framework, competence beliefs might give hints as to where to learn the most but will not undermine intrinsic motivation.

With regard to motivational theory building, the present study clearly supports the notion that goal orientations set the framework in which intrinsic motivation thrives. Because our study was the first to put both directions of possible influences to a test, more studies are needed to replicate this result. For example, some researchers have argued that the relation between interest and goal orientations is reciprocal (e.g., Hidi & Harackiewicz, 2000): Initial interest might foster a learning-goal perspective, and a learning-goal perspective might, in turn, foster subsequent interest. It would be interesting to investigate whether interest, as has been theorized, predicts change in achievement goals, whereas intrinsic motivation might not.

Implications for Educational Practice

The present study provides further evidence that it is not the level of self-perceived ability in the sense of ability self-concepts that stimulates task enjoyment and sustained motivation. Instead, the goal frame under which learning takes place and achievement outcomes are interpreted is important for the development of intrinsic motivation. This means that even in the face of realistically held low ability self-concepts, learners can develop an optimistic, learning-oriented perspective in which they view low competencies as learning opportunities and learning as an end in itself.

For educational practice, it might be followed that educators should put an emphasis on creating a learning-oriented environment when they want to foster intrinsic motivation. This can be achieved by choosing methods that let students experience their learning progress. For example, educators can encourage students to intraindividually compare their work results and competencies over time and see the learning progress. This technique requires an honest appraisal of initial competencies because only a realistic appraisal allows for perceiving learning progress. On the grounds of the present findings, educators need not fear that confronting students with initial competence deficits might undermine their intrinsic motivation, as long as a learning-goals framework is set.

Moreover, learning goals can be highlighted by evaluating students' performance in terms of task-immanent, criterion-based standards and individual progress instead of social norms (e.g., Butler, 2006). Offering information about individual progress and the degree to which task-inherent criteria were met leads students' attention to learning goals. By contrast, comparing students' performance with a social norm distracts attention from individual learning progress. Although it will not always be possible to avoid evaluations according to social norms, criterion-based and individ-

ual feedback can counterbalance a predominant social comparison perspective.

Limitations of the Present Study

One shortcoming of the present study is that it relied on only two measurement occasions. More measurement occasions are desirable to cross-validate findings over time. To a certain extent, the present study compensated for the lack of more measurement occasions by cross-validating findings across three domains. A third desirable ways to cross-validate the results is to investigate different age groups (see also earlier discussion).

Another shortcoming might be seen in the time interval of 1 year that was chosen for the present study. This interval might be considered to be too short to show effects of competence beliefs on intrinsic motivation. On the other hand, the interval might be considered too long, and the detection of causal effects might need a more fine-grained analysis. To clarify these issues, it would be desirable to design studies using different time intervals between measurements to see how time affects cross-lagged paths. Future studies should also investigate larger samples because the sample size of the present study enabled us to find moderate to strong but not small interaction effects.

Another direction for future research is to experimentally investigate potential causal relations between competence beliefs, goal orientations, and implicit theories on intrinsic motivation. Experimental approaches can help to clarify whether longitudinal reciprocal effects, such as those detected in the present study, are actually causal effects.

References

Bong, M., & Clark, R. E. (1999). Comparison between self-concept and self-efficacy in academic motivation research. *Educational Psychologist, 34,* 139–153. doi:10.1207/s15326985ep3403_1

Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational Psychology Review, 15,* 1–40. doi:10.1023/A:1021302408382

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Beverly Hills, CA: Sage.

Butler, R. (2006). Are mastery and ability goals both adaptive? Evaluation, initial goal construction and the quality of task engagement. *British Journal of Educational Psychology, 76,* 595–611. doi:10.1348/000709905X52319

Cheung, M. W. L. (2007). Comparison of methods of handling missing time-invariant covariates in latent growth models under the assumption of missing completely at random. *Organizational Research Methods, 10,* 609–634. doi:10.1177/1094428106295499

Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development.* Philadelphia, PA: Taylor & Francis.

Dweck, C. S., & Leggett, E. L. (1988). A social–cognitive approach to motivation and personality. *Psychological Review, 95,* 256–273. doi:10.1037/0033-295X.95.2.256

Eccles, J. S. (2005). Subjective task values and the Eccles et al. model of achievement related choices. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 105–121). New York, NY: Guilford.

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34,* 169–189. doi:10.1207/s15326985ep3403_3

Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72,* 218–232. doi:10.1037/0022-3514.72.1.218

Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70,* 461–475. doi:10.1037/0022-3514.70.3.461

Elliot, A. J., & McGregor, H. A. (1999). Test anxiety and the hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 76,* 628–644. doi:10.1037/0022-3514.76.4.628

Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology, 80,* 501–519. doi:10.1037/0022-3514.80.3.501

Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: Critique, illustration, and application. *Journal of Educational Psychology, 100,* 613–628. doi:10.1037/0022-0663.100.3.613

Fredricks, J. A., & Eccles, J. S. (2002). Children's competence and value beliefs from childhood through adolescence: Growth trajectories in two male-sex-typed domains. *Developmental Psychology, 38,* 519–533. doi:10.1037/0012-1649.38.4.519

Gottfried, A. E. (1990). Academic intrinsic motivation in young elementary school children. *Journal of Educational Psychology, 82,* 525–538. doi:10.1037/0022-0663.82.3.525

Gottfried, A. E., Fleming, J. S., & Gottfried, A. W. (2001). Continuity of academic intrinsic motivation from childhood through late adolescence: A longitudinal study. *Journal of Educational Psychology, 93,* 3–13. doi:10.1037/0022-0663.93.1.3

Guay, F., Marsh, H. W., & Boivin, M. (2003). Academic self-concept and academic achievement: Developmental perspectives on their causal ordering. *Journal of Educational Psychology, 95,* 124–136. doi:10.1037/0022-0663.95.1.124

Harackiewicz, J. M., Barron, K. E., Carter, S. M., Lehto, A. T., & Elliot, A. J. (1997). Predictors and consequences of achievement goals in the college classroom: Maintaining interest and making the grade. *Journal of Personality and Social Psychology, 73,* 1284–1295. doi:10.1037/0022-3514.73.6.1284

Harackiewicz, J. M., Barron, K. E., Tauer, J. M., Carter, S. M., & Elliot, A. J. (2000). Short-term and long-term consequences of achievement goals: Predicting interest and performance over time. *Journal of Educational Psychology, 92,* 316–330. doi:10.1037/0022-0663.92.2.316

Harackiewicz, J. M., Barron, K. E., Tauer, J. M., & Elliot, A. J. (2002). Predicting success in college: A longitudinal study of achievement goals and ability measures as predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology, 94,* 562–575. doi:10.1037/0022-0663.94.3.562

Harackiewicz, J. M., Durik, A. M., Barron, K. E., Linnenbrink-Garcia, L., & Tauer, J. M. (2008). The role of achievement goals in the development of interest: Reciprocal relations between achievement goals, interest, and performance. *Journal of Educational Psychology, 100,* 105–122. doi:10.1037/0022-0663.100.1.105

Harackiewicz, J. M., & Elliot, A. J. (1993). Achievement goals and intrinsic motivation. *Journal of Personality and Social Psychology, 65,* 904–915. doi:10.1037/0022-3514.65.5.904

Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development, 21,* 34–64. doi:10.1159/000271574

Harter, S. (1981). A model of mastery motivation in children: Individual differences and developmental change. In W. A. Collins (Ed.), *Aspects on the development of competence: The Minnesota Symposia on Child Psychology* (Vol. 14, pp. 215–255). Hillsdale, NJ: Erlbaum.

Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development, 53,* 87–97. doi:10.2307/1129640

Herbert, J., & Stipek, D. (2005). The emergence of gender differences in children's perceptions of their academic competence. *Journal of Applied*

Developmental Psychology, 26, 276–295. doi:10.1016/j.appdev.2005.02.007

Heyman, G. D., & Dweck, C. S. (1992). Achievement goals and intrinsic motivation: Their relation and their role in adaptive motivation. *Motivation and Emotion, 16,* 231–247. doi:10.1007/BF00991653

Hidi, S., & Harackiewicz, J. M. (2000). Motivating the academically unmotivated: A critical issue for the 21th century. *Review of Educational Research, 70,* 151–179.

Hu, L.-T., & Bentler, P. M. (1999). Cut-off criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1–55. doi:10.1080/10705519909540118

Hulleman, C. S., Durik, A. M., Schweigert, S. B., & Harackiewicz, J. M. (2008). Task values, achievement goals, and interest: An integrative analysis. *Journal of Educational Psychology, 100,* 398–416. doi:10.1037/0022-0663.100.2.398

Hulleman, C. S., Schrager, S. M., Bodemann, S. M., & Harackiewicz, J. M. (2010). A meta-analytic review of achievement goal measures: Different labels for the same constructs or different constructs with similar labels? *Psychological Bulletin, 136,* 422–449. doi:10.1037/a0018947

Jacobs, J. E., Lanza, S., Osgood, D. W., Eccles, J. S., & Wigfield, A. (2002). Changes in children's self-competence and values: Gender and domain differences across grades one through twelve. *Child Development, 73,* 509–527. doi:10.1111/1467-8624.00421

Marsh, H. W. (1990). Causal ordering of academic self-concept and academic achievement: A multi-wave, longitudinal panel analysis. *Journal of Educational Psychology, 82,* 646–656. doi:10.1037/0022-0663.82.4.646

Marsh, H. W., Byrne, B. M., & Yeung, A. S. (1999). Causal ordering of academic self-concept and achievement: Reanalysis of a pioneering study and revised recommendations. *Educational Psychologist, 34,* 155–167. doi:10.1207/s15326985ep3403_2

Marsh, H. W., Trautwein, U., Lüdtke, O., Köller, O., & Baumert, J. (2005). Academic self-concept, interest, grades, and standardized test scores: Reciprocal effects models of causal ordering. *Child Development, 76,* 397–416. doi:10.1111/j.1467-8624.2005.00853.x

Marsh, H. W., Wen, Z., & Hau, K.-T. (2004). Structural equation models of latent interactions: Evaluation of alternative estimation strategies and indicator construction. *Psychological Methods, 9,* 275–300. doi:10.1037/1082-989X.9.3.275

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91,* 328–346. doi:10.1037/0033-295X.91.3.328

Nurmi, J.-E., & Aunola, K. (2005). Task-motivation during the first school years: A person-oriented approach to longitudinal data. *Learning and Instruction, 15,* 103–122. doi:10.1016/j.learninstruc.2005.04.009

Rawsthorne, L. J., & Elliot, A. J. (1999). Achievement goals and intrinsic motivation: A meta-analytical review. *Personality and Social Psychology Review, 3,* 326–344. doi:10.1207/s15327957pspr0304_3

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55,* 68–78. doi:10.1037/0003-066X.55.1.68

Schöne, C., Dickhäuser, O., Spinath, B., & Stiensmeier-Pelster, J. (2002). *Die Skalen zur Erfassung des schulischen Selbstkonzepts (SESSKO)* [Scales for the Assessment of School-Related Competence Beliefs]. Göttingen, Germany: Hogrefe.

Skaalvik, E. M., & Valas, H. (1999). Relations among achievement, self-concept, and motivation in mathematics and language arts: A longitudinal study. *Journal of Experimental Education, 67,* 135–149. doi:10.1080/00220979909598349

Spinath, B., & Spinath, F. M. (2005). Longitudinal analysis of the link between learning motivation and competence beliefs among elementary school children. *Learning and Instruction, 15,* 87–102. doi:10.1016/j.learninstruc.2005.04.008

Spinath, B., & Steinmayr, R. (2008). Longitudinal analysis of intrinsic motivation and competence beliefs: Is there a relation over time? *Child Development, 79,* 1555–1569. doi:10.1111/j.1467-8624.2008.01205.x

Spinath, B., Stiensmeier-Pelster, J., Schöne, C., & Dickhäuser, O. (2002). *Die Skalen zur Erfassung von Lern-und Leistungsmotivation (SELLMO)* [Scales for the Measurement of Learning and Achievement Motivation]. Göttingen, Germany: Hogrefe.

Steinmayr, R., & Spinath, B. (2009). The importance of motivation as a predictor of school achievement. *Learning and Individual Differences, 19,* 80–90. doi:10.1016/j.lindif.2008.05.004

Steinmayr, R., & Spinath, B. (2010). Konstruktion und Validierung einer Skala zur Erfassung subjektiver schulischer Werte (SESSW) [Construction and validation of a scale for the assessment of school-related values]. *Diagnostica, 56,* 195–211. doi:10.1026/0012-1924/a000023

Watt, H. M. G. (2004). Development of adolescents' self-perceptions, values, and task perceptions according to gender and domain in 7th- through 11th-grade Australian students. *Child Development, 75,* 1556–1574. doi:10.1111/j.1467-8624.2004.00757.x

White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review, 66,* 297–333. doi:10.1037/h0040934

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12,* 265–310. doi:10.1016/0273-2297(92)90011-P

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25,* 68–81. doi:10.1006/ceps.1999.1015

Wigfield, A., Eccles, J. S., Yoon, K. S., Harold, R. D., Arbreton, A. J. A., Freedman-Doan, C., & Blumenfeld, P. C. (1997). Change in children's competence beliefs and subjective task values across the elementary school years: A 3-year study. *Journal of Educational Psychology, 89,* 451–469. doi:10.1037/0022-0663.89.3.451

(*Appendix follows*)

Appendix

Complete List of Items

Intrinsic Motivation: Scales for the Assessment of School-Related Values

1. I like school/math/German.
2. I enjoy doing things in school/math/German.
3. I find school in general/math/German interesting.

Answer scale: 1 = *totally disagree* to 5 = *totally agree.*

From "Konstruktion und Validierung Einer Skala zur Erfassung Subjektiver Schulischer Werte (SESSW)" [Construction and Validation of a Scale for the Assessment of School-Related Values] by R. Steinmayr and B. Spinath, 2010, *Diagnostica, 56,* p. 211.

Competence Beliefs: Scales for the Assessment of School-Related Competence Beliefs

1. I am good in school in general/math/German.
2. It is easy to for me to learn in school in general/math/German.
3. In school in general/math/German, I know a lot.
4. Most assignments in school/math/German are easy for me.

Answer scale: 1 = *totally disagree* to 5 = *totally agree.*

From *Die Skalen zur Erfassung des schulischen Selbstkonzepts (SESSKO)* [Scales for the Assessment of School-Related Competence Beliefs] (p. 14), by C. Schöne, O. Dickhäuser, B. Spinath, and J. Stiensmeier-Pelster, 2002, Göttingen, Germany: Hogrefe.

Goal Orientations: Scales for the Assessment of Learning and Performance Goals

"In school/math/German, I . . ."

Learning Goals

1. . . . want to get new ideas.
2. . . . want to learn something interesting.
3. . . . want to learn to solve difficult problems.
4. . . . want to understand difficult things.
5. . . . want to see that what I learn makes sense.
6. . . . want to be made to think about things.
7. . . . want to learn as much as possible.
8. . . . want to really understand what is taught.

Performance-Approach Goals

1. . . . want to show that I am good at things.
2. . . . want to do my work better than others.
3. . . . want to get better grades than others.
4. . . . want others to think that I am smart.
5. . . . want to show that I can do things.
6. . . . want to show what I can do and know.
7. . . . want others to notice when I did well on a test.

Performance-Avoidance Goals

1. . . . don't want the other students to think I am stupid.
2. . . . don't want to embarrass myself (e.g., by wrong answers or stupid questions).
3. . . . don't want others to notice when I don't understand things.
4. . . . don't want to show that I am less smart than others.
5. . . . want to hide when I know less than others.
6. . . . don't want to give wrong answers to the teachers' questions.
7. . . . don't want to call attention to myself by asking stupid questions.
8. . . . don't want to show when I have more difficulties with tasks than others.

Answer scale: 1 = *totally disagree* to 5 = *totally agree.*

From *Die Skalen zur Erfassung von Lern-und Leistungsmotivation (SELLMO)* [Scales for the Measurement of Learning and Achievement Motivation] (p. 14), by B. Spinath, J. Stiensmeier-Pelster, C. Schöne, and O. Dickhäuser, 2002, Göttingen, Germany: Hogrefe.

Received November 3, 2010
Revision received February 24, 2012
Accepted March 14, 2012 ■