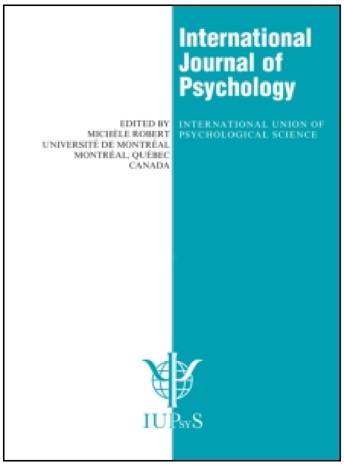

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Exploring the motivation jungle: Predicting performance on a novel task by investigating constructs from different motivation perspectives in tandem

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Exploring the motivation jungle: Predicting performance on a novel task by investigating constructs from different motivation perspectives in tandem

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Different theoretical viewpoints on motivation make it hard to decide which model has the best potential to provide valid predictions on classroom performance. This study was designed to explore motivation constructs derived from different motivation perspectives that predict performance on a novel task best. Motivation constructs from self-determination theory, self-regulation theory, and achievement goal theory were investigated in tandem. Performance was measured by systematicity (i.e. how systematically students worked on a problem-solving task) and test score (i.e. score on a multiple-choice test). Hierarchical regression analyses on data from 259 secondary school students showed a quadratic relation between a performance avoidance orientation and both performance outcomes, indicating that extreme high and low performance avoidance resulted in the lowest performance. Furthermore, two three-way interaction effects were found. Intrinsic motivation seemed to play a key role in test score and systematicity performance, provided that effort regulation and metacognitive skills were both high. Results indicate that intrinsic motivation in itself is not enough to attain a good performance. Instead, a moderate score on performance avoidance, together with the ability to remain motivated and effectively regulate and control task behavior, is needed to attain a good performance. High time management skills also contributed to higher test score and systematicity performance and a low performance approach orientation contributed to higher systematicity performance. We concluded that self-regulatory skills should be trained in order to have intrinsically motivated students perform well on novel tasks in the classroom.

Keywords: Self-regulation theory; Achievement goal theory; Self-determination theory; Intrinsic motivation.

Différents points de vue théoriques sur la motivation rendent plus difficile la décision de quel modèle a le meilleur potentiel pour offrir des prédictions valides sur la performance dans la classe. Le but de cette étude était d'explorer les construits de la motivation dérivés de différentes perspectives de motivation qui prédisent le mieux la performance à une tâche nouvelle. Les construits de motivation de la théorie de l'auto-détermination, de

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la théorie de l'auto-régulation, de la théorie des buts d'accomplissement ont été examinés en tandem. La performance a été mesurée à l'aide de la systématicité (i.e. comment des étudiants systématiques ont travaillé sur une tâche de résolution de problème) et du score au test (i.e. score au test à choix multiples). Des analyses de régression hiérarchiques sur des données de 259 étudiants de l'école secondaire ont montré une relation quadratique entre une orientation d'évitement de la performance et les deux résultats de la performance, indiquant qu'un évitement de la performance extrêmement élevé ou faible a eu pour résultat la performance la plus faible. De plus, deux effets d'interaction à trois dimensions ont été observés. La motivation intrinsèque a semblé jouer un rôle-clé dans le score au test et dans la systématicité de la performance, pourvu que la régulation de l'effort et les habiletés méta-cognitives étaient toutes les deux élevées. Les résultats indiquent que la motivation intrinsèque en soi n'est pas assez pour atteindre une bonne performance. Au lieu de cela, un score modéré sur l'évitement de la performance, accompagné de l'habileté de rester motivé et de régulariser effectivement et contrôler le comportement pendant la tâche, est nécessaire pour atteindre une bonne performance. Des habiletés de gestion du temps élevées ont aussi contribué à un score au test plus élevé et à la systématicité de la performance. Une faible orientation de l'approche performance a contribué à une plus forte systématicité de la performance. Nous avons conclu que les habiletés auto-régulatoires doivent être entraînées afin que les étudiants intrinsèquement motivés puissent bien performer aux tâches nouvelles en classe.

La existencia de diferentes puntos de vista teóricos sobre la motivación hace difícil la decisión de cuál modelo tiene el mejor potencial de generar predicciones válidas sobre el desempeño en una aula de clase. Este estudio fue diseñado para explorar los constructos de motivación derivados de las diferentes perspectivas motivacionales que predicen el desempeño ante una tarea nueva. Los constructos de la motivación como la teoría de autodeterminación, la teoría de autoregulación y la teoría general del logro fueron investigadas en pares. El desempeño fue medido a través de puntajes sistemáticos (p.e. como trabajan los estudiantes de manera sistemática en una tarea de resolución de problemas) y puntaje de pruebas (p.e. el puntaje en una prueba de selección múltiple). Los análisis de regresión múltiple de los datos de 259 estudiantes de la escuela secundaria mostraron una relación cuadrática entre la orientación hacia la evitación de la tarea y ambos resultados de la tarea, indicando que una evitación extremadamente alta o extremadamente reducida de la tarea estaban asociadas con un desempeño más pobre. Además se observó el efecto de dos interacciones de tres caminos. La motivación intrínseca juega aparentemente un rol importante tanto en el resultado de las pruebas como en el desempeño sistemático, observándose elevados niveles de regulación del esfuerzo así como de las habilidades metacognitivas. Los resultados indican por otro lado que sólo la motivación intrínseca no es suficiente para el mantenimiento de un buen desempeño. Más bien son necesarios un porcentaje moderado de evitación del desempeño junto con la habilidad de mantenerse motivado y efectivamente regulado, así como el control sobre las conductas requeridas para la tarea. Adecuados recursos de organización del tiempo contribuyen también con altos puntajes en las pruebas, mientras que el desempeño sistemático y una reducida orientación hacía el desempeño contribuyen a un desempeño sistemático más elevado. Nosotros concluimos que los recursos de autoregulación deberían ser entrenados con el objetivo de tener estudiantes intrínsicamente motivados que presenten en la clase un buen desempeño respecto de tareas nuevas.

Researchers and practitioners signal motivation problems in education. Legault, Green-Demers, and Pelletier (2006), for instance, state: "Of the most prominent academic problems plaguing today's teenage youth is a lack of motivation toward academic activities" (p. 567). As practice reveals, teachers and educators find it difficult to explore the motivation jungle on their own and to choose effective strategies to enhance students' motivation. Furthermore, a body of research stresses the positive influence of motivation on performance (e.g., Pintrich & Schrauben, 1992; Ryan & Deci, 2000), but we still do not have a complete understanding of motivational aspects that enhance classroom performance in real-life settings (Boekaerts & Martens, 2006). This might be due to the proliferation of terms in the numerous motivation theories that have been developed since 1900 (Boekaerts, Van Nuland, & Martens, in press).

DEVELOPMENT OF PERSPECTIVES IN MOTIVATION PSYCHOLOGY

Early theories of motivation used two main types of explanation for motivation. Theorists focusing on arousal, will, and instincts (e.g., James) described motivation as an internal force that *pushes* people to act in a certain way. Theorists adopting a conditioning perspective (e.g., Thorndike), considered motivation to be initiated by environmental stimuli *pulling* people towards enticing objects, people, or events. Later theorists have built on existing theories or developed new views on motivation (e.g., achievement motivation; self-determination theory; achievement goal theory;

self-regulation theory). For educational practitioners, these different theoretical viewpoints make it hard to select the perspective with the best potential to guide classroom interventions. Usually research is set up from one theoretical perspective. Comparisons of the predictive power of constructs from multiple conceptual frameworks are missing. As such, there are many unanswered questions such as: Is "more" motivation always better? Are we looking for a certain optimum? The aim of the present study was to investigate motivation constructs that stem from different theoretical perspectives in tandem, to provide insight into the effectiveness of motivation-enhancing strategies in the classroom. We do not claim to be exhaustive in integrating all motivation theories, but three contemporary motivation theories that have led to numerous publications were examined in tandem, namely self-determination theory (SDT, Deci & Ryan, 1985), self-regulation theory (Boekaerts, 2006), and achievement goal theory (Nicholls, 1984).

SELF-DETERMINATION THEORY PERSPECTIVE

SDT stresses the concept of intrinsic motivation, which refers to the motivation to engage in activities for the inherent joy that such an activity gives, as distinguished from extrinsic motivation, which relies on external rewards (Deci & Ryan, 1985). Research emphasized the importance of creating a favorable learning environment in order to elicit intrinsic motivation because this results in favorable behavior such as persistence, preference for understanding, and curiosity, which in turn result in better performance (see Ryan & Deci, 2000). However, the exact mechanism that leads from intrinsic motivation to performance is not clear. Ryan and Deci postulated that intrinsically motivated students are actively engaged in interesting tasks that promote personal growth. Such tasks often have an aspect of novelty, but SDT does not clearly describe how students deal with novelty. We theorized that intrinsically motivated students may perform better during novel, challenging tasks provided they have access to self-regulatory skills.

SELF-REGULATION THEORY PERSPECTIVE

Self-regulation theory distinguishes metacognitive, motivational, and behavioral aspects of learning (Boekaerts, 2006). Those aspects are labeled metacognitive skills (i.e., the ability to use effective learning strategies), effort regulation (i.e., the ability to remain motivated), and time management (i.e., the ability to plan and monitor learning) (Zimmerman, 2001). These skills determine how students regulate their learning in order to attain their goals. Research shows that students with higher self-regulatory skills perform better (Boekaerts & Corno, 2005).

ACHIEVEMENT GOAL THEORY PERSPECTIVE

Achievement goal theory originated in attempts to integrate mastery goals (valuing intrinsic aspects of learning) with performance goals (valuing the outcome of learning) (Nicholls, 1984). Combining these goals with an approach–avoidance dimension resulted in four different goal orientations (Harackiewicz, Barron, Pintrich, Elliot, & Trash, 2002). Students with a mastery approach orientation are concerned with acquiring new information and have confidence in their ability to do so. Students with a performance approach orientation are concerned with obtaining high performance. Students with a performance avoidance orientation are motivated to avoid low performance. Students with a mastery avoidance orientation try to master new information but worry about their skills to do so. Many studies demonstrated that the different goals affect performance differentially (e.g., Covington, 2000). However, controversy in results exists. There are studies that report weak or inconsistent relations between achievement goals and performance (for a review see Kaplan & Maehr, 2007).

INTEGRATING THE MOTIVATION PERSPECTIVES

The three motivation theories have seldom been tested jointly, and it is still unclear how the various variables interact in the classroom. It is interesting to explore how intrinsic motivation interacts with self-regulatory skills and to investigate the added value of the four goal orientations. We theorized that intrinsically motivated students may perform better than students with low intrinsic motivation only if at least one (two-way interaction) or two (three-way interaction) of their self-regulatory skills are high. This theorizing led us to explore the interaction effects between intrinsic motivation and self-regulatory skills. Secondly, we wanted to study the added value of constructs from achievement goal theory. This has led to the second research question: Which goal orientation construct is needed to predict classroom performance?

METHOD

Participants and procedure

Participants were 259 Dutch secondary school students attending 9th or 10th grade of prevocational or senior general secondary education (127 boys and 132 girls, $M_{\text{age}} = 12.52$; $SD = .85$). The data were collected in the classroom with a novel, online, individual problem solving task and digitalized questionnaires, during one lesson period (45 min). Observations showed that missing data (14%) were due to technical problems caused by random computer failure and not to individual differences of the excluded students. Missing values were imputed using an expectation maximization approach implemented in EQS, version 6.1 (Bentler & Wu, 1995).

Materials

Music assignment

To measure problem solving performance we developed an online problem-solving task based on the *aquarium task* developed by Vollmeyer, Burns, and Holyoak (1996). We presented participants with a music store (see Figure 1), where three input variables—number of people, volume of music, and amount of light in the store—could influence CD sales for four music types (R&B, hip-hop, techno, and rock). Students had 10 trials to figure out the causal linear relations between input variables and CD sales (i.e., it was emphasized that input variables did not interact). Students could set each input variable to "more," "equal," or "less," in order to explore the influence on four different types of CD sales. At the beginning of each trial, all CDs were set to the initial selling values (30 for each music type).

Performance: Test score and systematicity

Performance on the assignment was first measured with nine multiple choice questions. These questions tested the understanding of the causal effects of the input variables on CD sales (e.g., "If the number of people in the store decreases and the other circumstances stay the same, the sales of rock CDs will be: (a) 5, (b) 30, or (c) 55"). The score on this measure was calculated by adding all correct scores (Cronbach's $\alpha = .65$, no violations of normality assumption). Cronbach's α was slightly below the Cronbach and Shavelson (2004) standard of acceptable reliability ($\geq .70$), but since our study is exploratory we included this variable in our analysis. Categorical principal component analysis showed acceptable support for a one-component structure of this measure. Component loadings ranged from .37 to .63 and the proportion of variance explained by the first component was 26.6%.

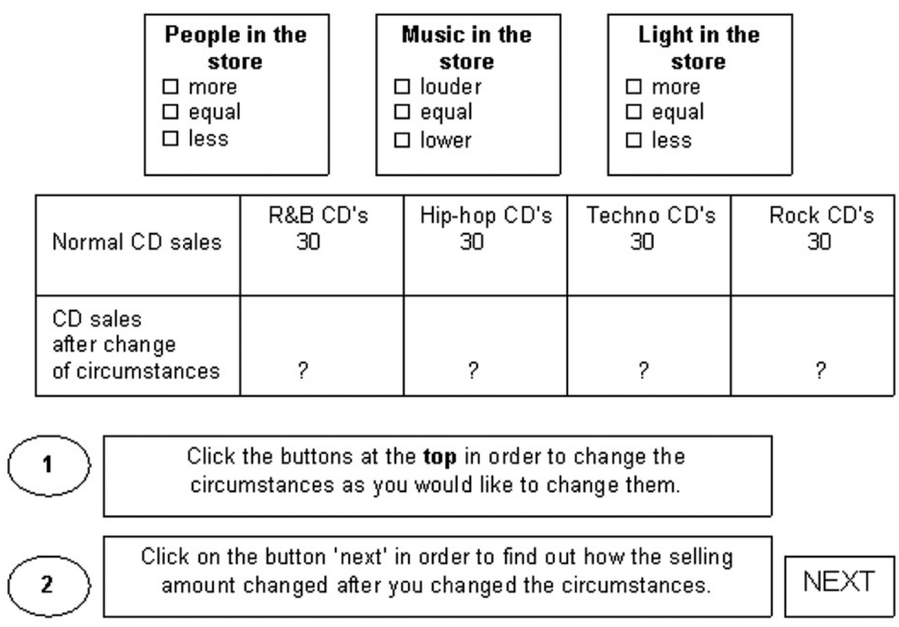

Figure 1. Representation of the music assignment.

Second, performance was assessed in terms of the quality of strategy use, the so-called systematicity (Vollmeyer & Rheinberg, 2006). As outlined above, students could change three input variables in each of 10 trials. The highest systematicity level was defined as: varying only one variable at each trial, keeping the two other variables to equal (Tschirgi, 1980). This strategy is most effective (rewarded with 2 points) because the effect of varying the value of one variable can then be separated from the rest. Varying the same variable in the same way at the next trial was rewarded with 1 point. Varying more than one variable at one trial was not rewarded. There are two options of varying one variable, that is, a change to "more" or to "less." Students using a systematic strategy consistently at each trial score 12 points after 6 trials (2 points $\times$ 3 variables $\times$ 2 options). At the remaining 4 trials, these students can only repeat a strategy. Hence, students could score a maximum of 16 points. As systematicity scores consist of counts and no interpretation of scoring criteria is needed, interrater reliability is not reported. Assumption of normality was satisfied.

Predictors of performance

After reading the instruction for the music assignment, information on the predictors of performance was collected with items answered on a 7-point Likert scale (1 = very unlike me, 4 = little bit like me, 7 = very like me). The motivation scales were constructed as the mean score on the corresponding items. First of all, intrinsic motivation was measured with seven situation specific items from a Dutch translation of Ryan and Deci's Intrinsic Motivation Inventory (e.g., "I believe I will enjoy this music assignment," Cronbach's $\alpha = .83$). At the same time, information on goal orientation was collected with a situation-specific adaptation of the Dutch Questionnaire for Goal Orientation, which is a translation of Elliot and McGregor's (2001) Achievement Goal Questionnaire. Four subscales with three items each (mastery approach: e.g., "I want to learn as much as possible from this music assignment," $\alpha = .84$; performance approach: e.g., "To me it is important that I outperform other students in this music assignment," $\alpha = .84$; performance avoidance: e.g., "My goal for this music assignment is to prevent me failing it," $\alpha = .67$; mastery avoidance: e.g., "I expect that I will not understand this music assignment as well as I would like," $\alpha = .25$), measured goal orientation. Because of the low internal consistency of the mastery avoidance subscale, this dimension was excluded from further analysis. Assumptions of normality were satisfied.

Participants' perceptions of their self-regulatory skills were retrospectively measured by a Dutch validated version (Blom, Severiens, Broekkamp, & Hoek, 2004) of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1991). We used three subscales: time management (7 items; e.g., "I made good use of my study time for this music assignment," $\alpha = .80$), effort regulation (5 items; e.g., "Even when I was bored, I tried to focus my attention on the music assignment," $\alpha = .66$), and metacognitive skills (7 items; e.g., "When working on this music assignment, I made up questions to help my understanding of the material," $\alpha = .84$). Assumption of normality was satisfied.

Statistical analysis

The first stage of data analysis involved testing assumptions about linear effects of the predictors on performance. We inspected the scatterplots by investigating both linear and quadratic relations between each pair of predictor and outcome variables. The second stage consisted of two hierarchical regression analyses to investigate the multivariate relations of the predictors with each performance measure. All predictors were standardized a priori. For those predictors showing a quadratic relation, quadratic terms were calculated as cross-products of the variable with itself. Two- and three-way interaction effects were calculated as cross-products between two or three predictors respectively.

At Step 1 of the regression analyses all seven predictors were entered; at Step 2 all relevant quadratic terms were entered. At Steps 3 and 4 the two- and three-way interaction variables were entered. In these latter steps, the forward selection method was used, which allowed us to detect the strongest interaction effects. Finally, to maintain the hierarchy and to assess the effects correctly for those three-way interaction effects that were selected in Step 4, the corresponding two-way interaction terms were entered in Step 3.

RESULTS

Correlations

Correlations of the study variables are presented in Table 1. The correlation between the two outcome variables was moderately high (.47), indicating

TABLE 1
Correlations of the study variables ($N = 259$)

	1a	*1b*	*2a*	*2b*	*2c*	*2d*	*3a*	*3b*	*3c*
1a Test score	–	.47**	.07	.01	−.15*	.10	.10	.27**	.27**
1b Systematicity		–	.03	−.07	−.18**	.08	.03	.16*	.22**
2a Intrinsic motivation			–	.49*	−.29**	.60**	.41**	.28**	.35**
2b Performance approach				–	−.19*	.64**	.40**	.20**	.36**
2c Performance avoidance (squared term)					–	−.27**	−.06	−.10	−.10
2d Mastery approach						–	.40**	.30**	.46**
3a Metacognitive skills							–	.41**	.68**
3b Effort regulation								–	.59**
3c Time management									–

*$p < .05$; **$p < .01$ (both two-tailed).

that both have unique variance. The strength of the relations with the predictor variables was about the same for test score and systematicity. Significant positive relations were found between test score (or systematicity) and effort regulation, and between test score (or systematicity) and time management. A significant negative relation was found between test score (or systematicity) and performance avoidance orientation. Remarkably high correlations were found between intrinsic motivation and the achievement goals performance approach (.49) and mastery approach (.60). Furthermore, significant positive relations were found between intrinsic motivation and each of the three self-regulatory skills. The intercorrelations of the self-regulatory scales were high, in particular between metacognitive skills and time management ($r = .68$).

Predicting performance

Inspection of scatterplots indicated a quadratic relation between performance avoidance and both outcome measures. This quadratic relation implied that there was a range from score 2 to 5, with 4 as the most optimal score on performance avoidance, which results in the highest predicted test score and systematicity. An extreme score (1–2 or 6–7) resulted in a decline on both outcome measures.

Test score

The results of the regression analysis showed that in total, 16% of the variance of test score could be explained (Table 2). In Step 4, the three-way interaction effect of intrinsic motivation with metacognitive skills and with effort regulation resulted in a 2% significant increase in explained variance of test score ($\Delta R^2 = .02$, $p < .05$). The main effect of time management and the quadratic effect of performance avoidance imply a significant positive relation between time management and test score, and indicate that there is an optimal performance avoidance score. Inspection of the residuals showed satisfaction of the normality assumption.

To interpret this interaction effect, we visualized the effect for every level of effort regulation, adjusted for the linear effects of mastery approach, time management, performance approach, and quadratic performance avoidance (i.e., low or -1 *SD*, mean or 0 *SD*, and high or $+1$ *SD*) (see upper panels of Figure 2). The combination of high effort regulation and high metacognitive skills seems crucial for intrinsically motivated students to do well on test score (see slopes at the left upper plot in Figure 2). For this particular group, the adjusted correlation between intrinsic motivation and test score was .38, indicating that a higher intrinsic motivation was positively related to a higher test score. For the other groups intrinsic motivation was negatively related to test score or did not matter. Note that the combination of high effort regulation with low metacognitive skills and vice versa did not occur in our sample.

Systematicity

A total of 15% of the variance of systematicity could be explained. Results pointed to a significant three-way interaction effect between intrinsic motivation, metacognitive skills and effort regulation (see Table 2). This effect resulted in a 2% significant increase in explained variance of systematicity ($\Delta R^2 = .02$, $p < .05$). The main effects of performance approach, time management, and the quadratic effect of performance avoidance imply a significant negative relation between a performance approach orientation and systematicity, a positive relation between time management and systematicity, and again indicate

TABLE 2
Results of hierarchical regression analyses for test score and systematicity ($N = 259$)

	Test score			*Systematicity*		
	β	R^2	ΔR^2	β	R^2	ΔR^2
Step 1		.12			.10	
Performance approach	−.06			**−.18***		
Performance avoidance	−.09			−.05		
Mastery approach	.03			.08		
Intrinsic motivation	−.06			−.06		
Metacognitive skills	−.14			−.21		
Effort regulation	.16			−.04		
Time management	**.27****			**.41*****		
Step 2		.13	.02*		.13	.03**
Performance avoidance (squared term)	**−.13***			**−.17****		
Step 3		.14	.01		.13	.00
Intrinsic motivation × Metacognitive skills	.12			.02		
Intrinsic motivation × Effort regulation	.08			−.04		
Intrinsic motivation × Time management	−.10			.08		
Step 4 (forward)		.16	.02*		.15	.02*
Intrinsic motivation × Metacognitive skills × Effort regulation	**.16***			**.15***		

Note. Standardized regression coefficients (β) of the final model after the fourth step are displayed, together with the squared multiple correlation coefficient after each step (R). Significances of main effects and first order interactions of predictors included in the second order interactions are not shown. The remaining significant main and interaction effects in the final regression equations are shown in bold. *$p < .05$; **$p < .01$; ***$p < .001$.

that there is a range of optimal performance avoidance scores. The main effect of metacognitive skills cannot be interpreted by itself due to the interaction effect. Inspection of the residuals showed satisfaction of the normality assumption.

To interpret this interaction effect, we visualized the effect for every level of effort regulation adjusted for the linear effects of mastery approach, time management, performance approach, and quadratic performance avoidance (i.e., low or −1 SD, mean or 0 SD, and high or +1 SD) (see lower part of Figure 2). The plots show that despite the low univariate relation between systematicity and intrinsic motivation ($r = .03$), a negative relation emerged between intrinsic motivation and systematicity. One group did not display this negative pattern. Inspection of the slopes of the left lower plot in Figure 2 reveals that considering scores on systematicity, students with high effort regulation benefit from high intrinsic motivation, provided that their metacognitive skills are also high ($r = .10$) compared to students with moderate metacognitive skills. Note again that the combination of high effort regulation with low metacognitive skills and vice versa did not occur in our sample.

DISCUSSION

We explored the main and interaction effects of motivation constructs derived from different motivation theories on performance on a novel task in a classroom context. One quadratic relationship and two three-way interaction effects reached significance for both performance outcomes. We revealed that the influence of intrinsic motivation on test score and systematicity is moderated by metacognitive skills and effort regulation. Students highly able to remain motivated during the learning task benefit from their intrinsic motivation, considering their high test score and systematicity performance, *if* they are able to use effective learning strategies. Based on SDT, we expected that intrinsic motivation would lead to better performance and would be contingent on the use of self-regulatory skills. The finding that intrinsic motivation is only important when scores on both effort regulation and metacognitive skills are high confirms this expectation. Therefore, intrinsic motivation in itself is not enough; students also need to be able to effectively regulate and control task behavior.

Regarding the goal orientation constructs included in our study, performance approach (aiming at a quick performance result) appeared to result in lower systematicity scores. This seems plausible because performing well on the music assignment with regard to systematicity implies that only one variable be varied at a time, which enhances understanding of the system but reduces speed. Furthermore, performance avoidance appeared to be implicated in the prediction of

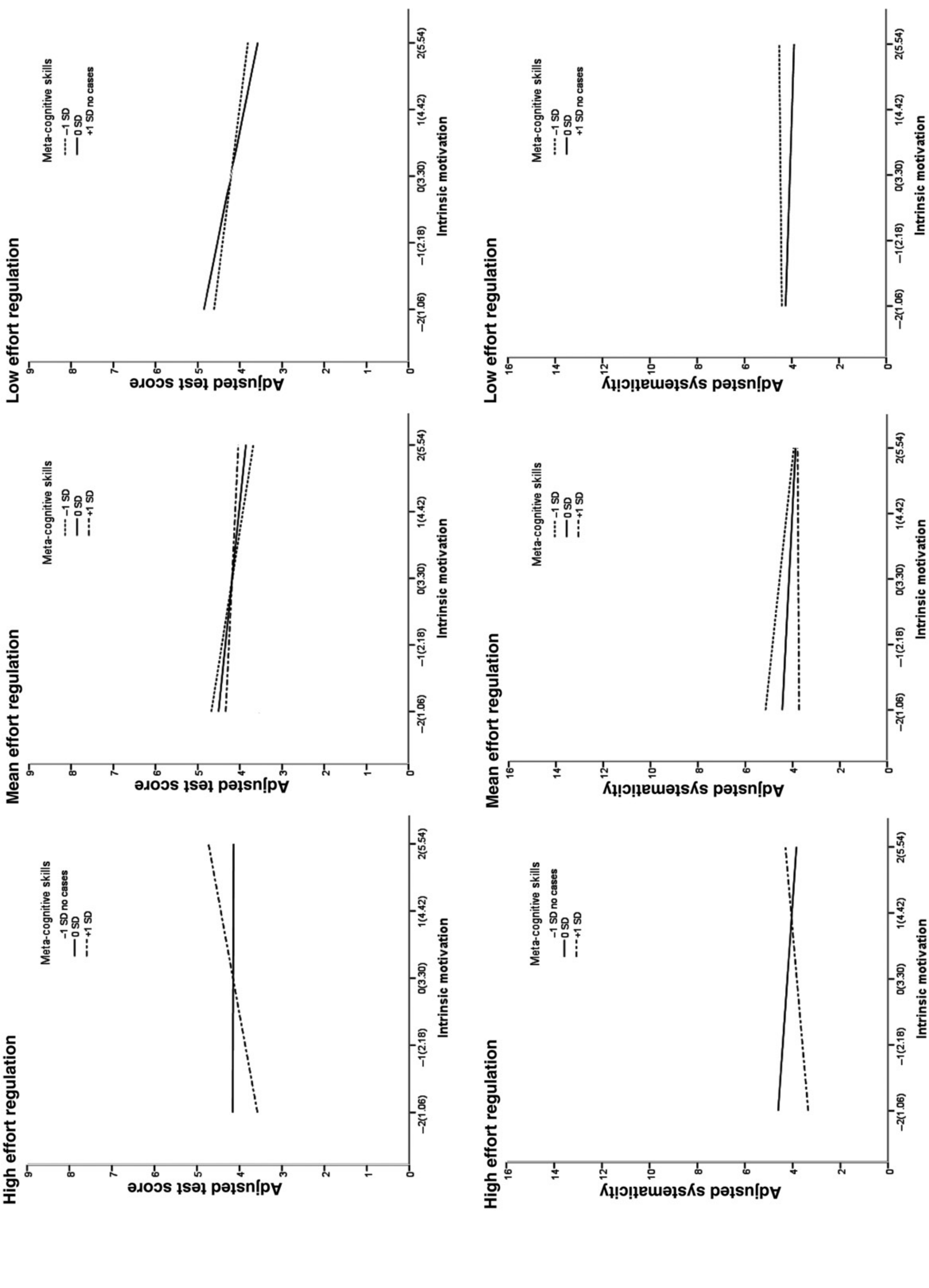

Figure 2. Interaction plots for every level of effort regulation with test score (upper panels) and with systematicity (lower panels).

students' performance. When students are moderately motivated to avoid a low performance, performance is affected positively. Nevertheless, the question of how to establish this in the classroom remains.

Although the motivational constructs only moderately predicted classroom performance ($R^2 = 16\%/15\%$), we believe that the explained variances are substantial. If motivation constructs can predict performance on a novel task at 16% and 15%, we are of the opinion that teachers should try to increase their students' performance by helping them to develop strategies to enhance their motivation. Influencing motivation is feasible, especially if we compare it to intelligence and social economic status, two variables that affect performance but are not under the teacher's control.

Limitations of this study

We hope we have demonstrated the importance of integrating constructs from different motivational perspectives to further our understanding of motivation in the classroom; however, this study is not without limitations. It was exploratory and involved performance on a novel task. Although we used validated scales to measure the motivation constructs, there are psychometric limitations. First, the high intercorrelations among the self-regulatory skills might suggest a one-factor structure for the MSLQ instead of a three-factor structure as proposed by Pintrich et al. (1991). Results of additional confirmatory factor analyses showed that a correlated three-factor structure did not fit our data well. However, neither did a one-factor structure. In particular, the high correlation between metacognitive skills and time management (.68) might have caused a multicollinearity problem in the tested regression models. We repeated the regression analyses without entering time management. The coefficients of metacognitive skills remained negative. This result indicated that multicollinearity was not a problem.

Second, although reliability coefficients of our key constructs were mainly above the cutoff point (.70), conclusions on performance avoidance (.67), effort regulation (.66), and test score (.65) need to be drawn with caution. Research should confirm whether the findings hold in situations involving curricular tasks, and future intervention research could test our key findings in the actual classroom. Another limitation of the present study is the focus on the short-term effect of motivation. The effect of motivation might be a long-term effect. In addition, long-term effects also need to be investigated.

Theoretical implications

The present results show that performance approach, performance avoidance, intrinsic motivation, and self-regulatory skills are important predictors of performance. Further research should investigate whether the quadratic effect of performance avoidance can be retrieved in other situations with other tasks. With this research, we hope to have demonstrated that theorists working within different perspectives should exchange ideas to build comprehensive theories that are useful for explaining and enhancing actual classroom motivation and performance.

Practical implications

With the present study we wanted to provide ingredients for useful guidelines for educators and teachers wishing to enhance motivation in their classrooms. Interventions designed to improve students' self-regulatory skills and school achievement have already been proven effective (Schunk & Ertmer, 2000). Those interventions should be continued, since the present study showed that intrinsic motivation leads to a better performance only if effort regulation and metacognitive skills are both high. Engaging in a task for the inherent joy it provides is clearly not enough to enhance performance on a novel task. It is found that teachers could help improve their students' performance by providing training in metacognitive, effort regulation, and time management skills in order to have intrinsically motivated students perform well. Hence, individual interventions can be designed if teachers detect which self-regulatory skill is inadequate to attain higher classroom performance for every student.

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