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The self-regulation of motivation

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Chapter 5

The self-regulation of motivation: Motivational strategies as mediators between motivational beliefs and engagement for learning

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Abstract

In this research we studied students´ motivational self-regulation as mediator between motivational beliefs and motivational outcomes. Dutch students in pre-vocational secondary education (N=3602, mean age 14) completed a questionnaire on five motivational strategies (Environmental Control, Interest Enhancement, Self Consequating, Performance Self-talk, Mastery Self-talk); motivational beliefs (value attached to schoolwork, competence); and motivational engagement (pleasure, effort, persistence, achievement). A validation of the self-report questionnaire on the five motivational strategies showed a good fit. Structural equation modelling indicated that strategy-use partly mediates the relation between value, and effort and pleasure. Competence showed a weak direct relation with effort an pleasure. No relations were found for achievement. Further implications of these findings for practical use and further research are discussed.

Keywords: validation, motivational strategies, motivational beliefs, structural equation modelling

5.1 Introduction

The aim of this research was to study students' use of motivational strategies in relation to their motivational engagement, that is, effort and persistence, pleasure and interest in learning, and achievements. Being motivated is not self-evident. In the Netherlands, motivation is especially poor in pre-vocational secondary education. This is apparent from high absenteeism and drop-out rates (Central Bureau of Statistics, 2015). Motivation decreases during secondary education (Opdenakker, Maulana, & Den Brok, 2012; Van der Veen & Peetsma, 2009), and, even if students are motivated, they can be distracted from learning (Boekaerts & Niemivirta, 2000; Fries, Schmid, Dietz, & Hofer, 2005; Lemos & Gonçalves, 2004). Researchers, therefore, have been interested in motivational strategies. These strategies help students to get started on schoolwork, to persist in the presence of motivational threats (Boekaerts & Corno, 2005; Kuhl, 1984; Wolters, 1998, 1999, 2003; Wolters & Rosenthal, 2000), or to shift their focus from non-learning to learning goals (Boekaerts & Niemivirta, 2000). Previous studies have shown that the use of these strategies can lead to more effort, and persistence (Bembenutty & Zimmerman, 2003; Boekaerts & Corno, 2005; Dignath & Buttner, 2008; Donker, De Boer, Kostons, Dignath, Van der Werff, 2014; Vermeer, Boekaerts & Seegers, 2001; Wolters, 2003). Results on relations between the use of strategies and achievement are less conclusive, but some studies suggest that the relation is mediated by effort (Schwinger, Steinmayr, & Spinath, 2009; Schwinger & Stiensmeier-Pelster,2012).

Furthermore, it is theorized that strategies are not used as a matter of fact: students need motivation to get to work. Motivational beliefs are strong determinants in students' choice to engage in learning (Ajzen, 1991; Bandura, 1991; De Brabander & Martens, 2014; Eccles & Wigfield, 2002; Gollwitzer, 2012; Pintrich 1999; Wolters & Benzon, 2013; Zimmerman & Schunk, 2008). This includes the use of learning strategies and motivational

strategies (Pintrich & DeGroot, 1990; Wolters & Pintrich 1998). If so, this is important information for the design of intervention studies on the use of strategies; students' beliefs should be taken into account. In this study we focus on the beliefs students have about the value of the task, and their competence (Eccles & Wigfield, 2002). The assumption is that students will be more inclined to use motivational strategies to protect their learning intentions against distractions and competing goals when they belief schoolwork is valuable and they can perform schoolwork successfully.

The aim of this research was to study students' use of motivational strategies as a function of their motivational beliefs, in order to increase their motivational engagement and achievement. First, we tested the validity and usability of Wolters's questionnaire on motivational strategies for this population.

5.1.1 Motivational strategies

Students are considered to be agents in their own learning process, able to use self-regulatory strategies purposefully in order to reach their learning goals (Pintrich & De Groot, 1990; Zimmerman, 2000, 2002; Zimmerman & Schunk, 2008). To assess students' motivational self-regulation, Wolters (1998) designed a questionnaire on the basis of an inventory of motivational strategies that college students used. In a follow-up study with ninth- and tenth-grade students, an exploratory factor analysis resulted in five theoretically meaningful strategies (Wolters, 1999). First, Interest Enhancement (IE), also described in by Sansone, Weir, Harpster, and Morgan (1992), concerns making a task more interesting and enjoyable by turning it into a game, or by relating schoolwork to one's daily life. Second, Environmental Control (EC) is defined as 'students' efforts to arrange or control their surroundings or themselves, to make completing a task easier, or more likely to occur without interruption.' (Wolters, 1999, p. 283). Examples include keeping a tidy desk, and working at

a productive time of the day (Zimmerman & Martinez-Pons, 1990). Third, Self Consequating (SC), also studied by Zimmerman and Martinez-Pons (1986), concerns linking consequences to the effort that is put into learning. Examples of SC are promising oneself something good to eat, or denying oneself the pleasure to hang out with friends. The fourth and fifth strategy concern Self-Talk, defined as ´verbalizations that are addressed to oneself, which can serve both instructional and motivational functions' (Hardy, Hall, & Hardy, 2005; p. 905). Performance Self-Talk (PST) comprises telling oneself to start working and persist in order to get good grades, or to outperform others. Mastery Self-Talk (MST), finally, concerns telling oneself to start working in order to get a grasp on the learning material.

Based on the self-determination continuum as described by e.g. Deci and Ryan (2000), Wolters distinguishes between extrinsic and intrinsic regulation of motivation (Wolters, 1998). Or, as Reeve (2012) states: " Students use autonomous guides to action while others rely on controlling and environmental guides." (pg. 153). This distinction is important as the autonomous forms of regulation are more beneficial for the motivation for learning than the controlling forms of regulation (Deci & Ryan,1985, 2000; Reeve, 2012; Ryan & Deci, 2000). Controlling forms of motivation regulation steer students' behaviour in the prospect of results that are separate from schoolwork itself: avoiding punishment, getting rewards, pleasing parents or teachers, outperforming others, or boosting self-esteem. Autonomous forms steer students' behaviour in the prospect of results that are related to schoolwork itself: understanding the subject matter, recognizing the value of schoolwork, working towards one´s own goals and values. Following Wolters (1998), we consider PST and SC, to be typical controlling forms of motivation regulation, whereas MST and IE can be grouped under autonomous regulation of motivation. Although EC is not related to schoolwork itself, it does not exert any pressure as opposed to SC and PST. Therefore we did not classify EC as a controlling or autonomous regulation of motivation.

5.1.2 Motivational beliefs and the relation with strategies and motivational outcome measures

Motivational strategies are not applied as a matter of course; motivational beliefs partly determine whether students will engage in learning. Before acting, students weigh up and consider whether they believe themselves sufficiently competent (self-efficacious) and whether the task is sufficiently valuable (Eccles & Wigfield, 2002; Gollwitzer, 2012; Heckhausen & Gollwitzer,1987; Pintrich & De Groot, 1990; Zimmerman & Schunk, 2008). Kuhl refers to this as choice motivation (Kuhl, 1984). This partly determines whether students will protect working at the task against competing goals and distractions. In other words, they will be more inclined to use motivational strategies. The assumption is that the relation between motivational beliefs and motivational outcomes is mediated by the use of strategies.

Some empirical studies have been carried out on the mediation as a whole. Pintrich and DeGroot (1990) showed that strategy-use mediated the relation between both motivational beliefs and performance. In a study by Wolters and Pintrich (1998), the relation between value and performance was fully mediated, whereas the relation between and competence performance was partly mediated by strategy-use. For more findings, we turn to the individual paths of the mediation. Concerning the path between beliefs and strategies, studies by Bong (1999), Boekaerts (2002), Pintrich (1999) and Van der Veen and Peetsma (2009) show a positive relation between the value students ascribe to schoolwork and their intentions to act and self-regulate. More specifically, Wolters and Rosenthal (2000) found positive relations between value and the use of strategies, except for PST; eighth graders who perceived more value in schoolwork were more inclined to use strategies, except for the strategy of urging themselves to get higher grades or to outperform others. In a study with undergraduates by Sansone, Wiebe, and Morgan (1999), value was positively related to IE;

the information that the otherwise boring task was important to the researchers made students invent games in order to persist and get the work done. Pintrich (1999) reported that stronger feelings of competence went hand in hand with more use of motivational strategies. These findings were corroborated by Zimmerman & Martinez-Pons (1990) for fifth-grade, ninth-grade and eleventh-grade students for, among others, EC and SC; by Wolters and Benzon (2013) for college students for all strategies except IE; and by Wolters and Rosenthal (2000), for eight-grade students for all strategies except SC.

A second body of research concerns the path between strategies and motivational outcomes. Sansone, et al. (1992) found a positive relation between IE and effort. According to Wolters (1999), students who made more use of the five strategies reported more effort than students who made less use of strategies, with the strongest relation for MST. These findings are supported by Schwinger, Steinmayr, and Spinath (2009), and Schwinger and Stiensmeier-Pelster (2012), except for the relation between IE and effort, which was weak or non-significant in their studies. However, students' use of IE was related to their interest in schoolwork (Hulleman & Harackiewicz, 2009). Results on the relation between strategies and achievement were inconsistent. Wolters found no relation between strategies and grades in his study in 1998. However, in his study in 1999 the use of PST was positively related to grades. In studies by Hulleman and Harackiewicz (2009), the use of IE was positively related to students' performance; and Nota, Soresi, and Zimmerman (2004) found an effect for SC and grades. According to Schwinger and Steinsmeier-Pelster (2012), and Schwinger, et al. (2009), the use of strategies is related to achievement, but via effort.

5.1.3 Research questions and hypotheses

We aim to answer the following research questions: 'Are the motivational strategies that Wolters describes part of the reality of students in pre-vocational secondary education?' and

‘Do motivational strategies mediate the relation between motivational beliefs – i.e., competence and perceived value – and motivational outcomes – i.e., effort, pleasure, persistence, and achievement?’. The findings described above were consistent for the mediational function of MST and EC between motivational beliefs and effort, and inconsistent for PST, IE and SC. We therefore hypothesize that strategy-use positively mediates the relation between both beliefs, and effort, possibly with the exception of PST, IE and SC (H1). Interestingly, although perceived pleasure and interest in schoolwork is seen as an important part of students´ motivation, only one study was found that related the use of motivational regulation strategies to interest and none of the studies addressed the relation between strategy use and pleasure. Therefore, our hypotheses are based on the theoretical distinction between controlling forms of motivation regulation and more autonomous forms of motivation regulation: We expected MST and IE to have stronger relations with effort, persistence and pleasure, than PST and SC (H2). Results for the use of motivational regulation strategies and performance are inconsistent. Therefore, no hypotheses were formulated for achievement

5.2 Method

Participants

Respondents (N=3602, 11 to 21 years of age, M=14.04, S.D. = 1.27) from 49 schools for pre-vocational secondary education, mainly from the urban region in the west of the Netherlands (62%) filled in the questionnaire. The remaining 38% came from urban and rural areas all over the country.

Instruments

We used Wolters' questionnaire on strategies to measure strategy-use. First, the items were translated from English (see Table 2) to Dutch by the researcher. Final agreement on the translation was settled through discussion between the researcher and a near-native English speaker from the Netherlands. To increase comprehensibility, we added some examples to the items. Retranslation to English resulted in items with comparable meaning.

Scales for competence, value, pleasure/interest, and effort, were derived from the Intrinsic Motivation Inventory, validated by McAuley, Duncan, and Tammen. (1989), and Tsigilis and Theodosiou (2003). Competence assesses students' beliefs about their current ability to perform schoolwork (5 items, e.g. 'I am good at doing schoolwork'). Value measures to what degree students perceive schoolwork as useful, for now or in the future (5 items, e.g. 'I think schoolwork is relevant for my future'). Pleasure/interest, effort and persistence are expressions of motivational engagement (Reeve, 2012) (5 items, e.g. 'I like doing schoolwork'; 5 items, e.g. 'I put much energy into schoolwork'). The pleasure/interest scale was validated for students in pre-vocational secondary education by Van Nuland, Dusseldorp, Martens, and Boekaerts (2010). The motivational outcome persistence from the MSLQ (Pintrich, Smith, Garcia, & McKeachie, 1991) measures students' endurance, even when faced with boring or difficult tasks (5 items, e.g. 'I try to finish schoolwork, even when it is boring'). All scales were measured on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5); all questions referred to schoolwork in general. Achievement was measured for the subjects Dutch and Mathematics, with a self-report question ('Is your grade at the moment a pass or a fail?').

Before testing the mediation, we performed structure equation modelling on motivational beliefs and motivational outcomes. We removed five items on competence and effort, with loadings < .40. These items were formulated with a negation. Obviously, students

did not respond to these items similarly to affirmatively formulated items. Furthermore, due to a strong correlation, we merged effort and persistence, from this point referred to as effort. Cronbach's alphas were satisfactory (.76 to .83). Environmental Control (.62) and competence (.60) showed a weak reliability, but we have to take into account that competence consisted of two items only. For descriptive statistics, see Table 3.

Procedure

Instructed assistant researchers introduced the questionnaire in the classroom. The paper and pencil self-report questionnaire was filled in by the students in approximately 25 minutes, in the presence of the assistant researcher and a teacher.

Analyses

We first examined whether Wolters' questionnaire on motivational strategies was applicable to Dutch students in pre-vocational secondary education. The sample was divided into two random sets: the validation set (N = 1751), and the analysis set (N = 1829). The validation set was further divided into two random sets for cross validation: the training set (N = 908, 47% boys), and the test set (N = 843, 48 % boys). The analysis set was used to test the hypotheses about the mediational function of motivational strategies. We validated the questionnaire with structural equation modelling in EQS 6.2 (Bentler, 2005; Byrne, 2006). Maximum likelihood estimation was used to estimate the parameters. We tested the factor structure of the hypothesized models on the training set. The fit of the model is determined by the strength of the model, but is also influenced by weak items, items with a negation and items that have a high covariance, due to similarities other than the characteristics of the scale they belong to. Therefore, based on the observed model, post-hoc modifications were performed in order to improve the hypothesized model, provided the modifications were theoretically sound. To

rule out overfitting and changes made purely based on chance, the best fitting model cross validated on the test set. Increasing levels of equality constraints were applied to assess the invariance of the questionnaires (Byrne, 2006). A critical value of -0.01 ΔCFI was used to judge invariance (Cheung & Rensvold, 2002). Subsequently, the analysis set (N = 1829) was used to test the mediation model with structural equation modelling in EQS 6.2.

Fit indices

The fit indices for both validation and mediation are derived from Byrne (2006). A non-significant chi square indicates a good fit. However, as chi square is sensitive to sample size, it is divided by the degrees of freedom; a value < 3, preferably < 2, indicates a good fit. Furthermore, a Comparative Fit Index (CFI) with values between .90 and .95, preferably > .95, and the Root Mean Square Error of Approximation (RMSEA), with a value < .08, preferably <.05, within a small confidence interval (CI) and interval values close to 0, are also indicators of a good fit. A chi square test is used to judge differences between the hypothesized structure and the modified models.

5.3 Results

5.3.1 Data inspection

Missing values, less than 2% for all scales, were missing completely at random. Respondents with mainly missing values (N = 22) were removed. In the analyses, we used maximum likelihood estimation for the missing values. Inspection showed sixteen respondents as outliers, but no reason was found to remove these respondents. The data is partly skewed; therefore we will turn to the robust fit measures.

5.3.2 Results validation

The 5-factor model with all factors correlated (A1) showed a good fit. One item on Interest Enhancement with a factor loading <.40 was removed from the model. Apparently, 'making a game out of schoolwork' did not fit with the other items. Indeed, inspection of the remaining items showed a focus on 'looking for the value in schoolwork'. Furthermore, high standardized residuals revealed a shared denominator for two items on Self Consequating; in contrast to the other items in the same scale these items both mentioned 'homework', and therefore had somewhat more in common with each other than with the rest of the items. This prompted us to correlate the two error terms, and the fit improved significantly (A2). High correlations between the strategies, especially between the two strategies using Self-Talk, urged us to test Self-Talk as one factor (A3), Self-Talk as a second order factor (A4), and all strategies as one (A5). The fit of the three alternative models was less satisfactory. In conclusion, although strategies are related, students distinguished between the five motivational strategies, with high loadings for individual items. To test the stability of the preferred model (A2) and to rule out capitalization of chance due to overfitting, the model was cross validated on the test set (A6, A7, A8, A9). It showed an even better fit, indicating that the model is good, but not completely invariant across samples (see table 1 and table 2). The five-factor model was then used for further analyses.

Table 1:
Goodness-of-fit indices for motivational strategies

Model	Data set	N	AIC	χ2	df	χ2/df	CFI	RMSEA	90% CI	Δ
A1 5 factors, all correlated	training	908	237.147	635.147	199	3.19	0.946	0.049	0.045, 0.053	
A2 Minus item IH 2, 2 error terms correlated	training	908	100.521	456.521	178	2.56	0.965	0.042	0.037, 0.046	A1 vs A2 p < .0001
A3 Self Talk as one factor	training	908	105.259	469.295	182	2.58	0.964	0.042	0.037, 0.046	A2 vs A3 p < .05
A4 Self Talk as second order factor	training	908	734.258	1100.258	183	6.01	0.885	0.074	0.070, 0.079	A4 vs A2 p < .0001
A5 All strategies as one factor	training	908	559.565	935.565	188	4.98	0.906	0.066	0.062, 0.070	A5 vs A2 p < 0001
A6 Cross validation (like A2)	test	834	122.849	478.849	178	2.69	0.957	0.045	0.040, 0.050	Δ CFI A6 vs A2 < .01
A7 Configural invariance	training/test	908/834	481.670	1197.670	358	3.35	0.944	0.052	0.049, 0.055	
A8 Measurement invariance	training/test	908/834	481.067	1229.067	374	3.29	0.943	0.051	0.048, 0.054	Δ CFI A8 vs A7 < .01
A9 Factorial invariance	training/test	908/834	469.807	1237.807	384	3.22	0.943	0.051	0.047, 0.054	Δ CFI A9 vs A7 < .01

Table 2
Strategies, items, standardized solution, error, and R Squared, N=834

	EC	SC	IE	PST	MST	E	R2
Environmental Control (EC)							
I try to get rid of any distractions around me.	.629					.777	.396
I change my surroundings so that it is easy to concentrate on schoolwork.	.567					.824	.321
I choose a place where I like to work.	.548					.837	.300
I try to study at a time when I can be more focused.	.466					.885	.217
Self Consequating (SC)							
I promise myself I can do something I want later if I finish the assigned work now.		.789				.614	.623
I tell myself I can do something I like later if right now I do the work I have to get done.		.744				.668	.554
I make a deal with myself that if I get a certain amount of the work done, I can do something fun afterwards.		.695				.719	.483
I promise myself some kind of reward if I get the assignment done.		.579				.815	.336
I reward myself each time I get part of the work done until I´m finished.		.477				.879	.227
Interest Enhancement (IE)							
I think of a way to make the work seem interesting.			.710			.704	.504
I try to find ways that relate the material to my life			.535			.845	.286
I try to make schoolwork more enjoyable by turning it into a game.			.516			.856	.267
Performance Self Talk							
I remind myself how important it is to do well on tests and assignments.				.759		.652	.575
I try to make myself work harder by thinking about getting good grades.				.740		.672	.548
I think about how my grade will be affected if I don´t do my schoolwork.				.676		.737	.457
I remind myself about how important it is to get good grades.				.464		.886	.215
Mastery Self Talk							
I tell myself that I should keep working just to learn as much as I can.					.787	.617	.620
I challenge myself to complete the work and learn as much as possible.					.763	.647	.581
I persuade myself to keep at it just to see how much I can learn.					.761	.649	.578
I think about trying to become good at what we are learning or doing.					.733	.680	.537
I persuade myself to work hard just for the sake of learning.					.719	.695	.517

5.3.3 Results mediation

Inspecting the mean scores of strategy use, we conclude that strategies are not used extensively. Mastery Self-talk, Performance Self-talk, Environmental Control and Self Consequating show an average or just above average use, while Interest Enhancement is hardly used at all. To test the hypotheses on the mediational function of motivational strategies between motivational beliefs and motivational outcomes, we performed structural equation modelling, including beliefs, the five strategies and pleasure and effort as outcome measures. However, the results showed that the regression coefficients were different from the strength and the sign of the correlations, with some coefficients being stronger, and some coefficients being weaker or even negative. These results, together with strong correlations between the scales on motivational strategies, point in the direction of multi-collinearity; there is not sufficient unique variance to predict pleasure and effort for each strategy individually. So although the results of the validation of the questionnaire allowed us to treat the strategies separately, we were forced to analyse strategy use as a unidimensional construct. In line with Schwinger and Steinsmeier-Pelster (2012), who ran into the same statistical problems, we performed structural equation modelling on the overall motivational regulation, and inspected each strategy separately to detect unique patterns. We are aware of the fact that we cannot comment on the significance of the separate strategies. The overall model showed a fairly adequate fit (χ=3130.674, df=729, p<.0001, χ/df =4.29, CFI=.917, RMSEA=.042, CI= .041,.044). To test the significance of indirect effects we used the test of joint significance, a straightforward procedure, that, tested in a simulation study by Leth-Steensen & Gallitto (2016), proved to be a good alternative for bootstrapping with regard to power and Type I errors. If the individual paths that together form the mediation are all significant, than the indirect effect can be regarded as significant. The coefficients for the individual paths are all significant, therefore both direct and indirect effects are significant

(Leth-Steensen & Gallitto, 2016). The coefficients show that the direct effects are stronger that the indirect effects.

First, we examined the mediation as a whole. Consistent with our hypothesis (H1), strategy-use partly mediated the relation between value, and effort and pleasure. This means that students who perceived schoolwork as more valuable reported more use of motivational strategies, resulting in more pleasure and effort in schoolwork than students who attached less value to schoolwork (Figure 2). The indirect and direct effect were more or less equally strong. Contrary to our hypothesis (H1), strategy-use did not mediate between competence, and effort and pleasure, except for a weak mediation by IE for pleasure. This means that students who feel competent also reported more pleasure, but not via the use of strategies, except by trying to establish the value of schoolwork.

Table 3:
Descriptive statistics: mean, sd, standardized skewness, Cronbach's alpha, number of items, and correlations. N = 1829. EC=Environmental Control, SC=Self Consequating, IE=Interest Enhancement, PST=Performance Self-Talk, MST=Mastery Self-Talk, VL=Value, CP= Competence, PL=Pleasure, EF=Effort, GD=Grade Dutch, GM=Grade Math

	M	**sd**	**Stand. skew**	**alpha**	**N-items**	**EC**	**SC**	**IE**	**PST**	**MST**	**VL**	**CP**	**PL**	**EF**
EC	2.68	.87	3.10	.62	4	-								
SC	2.52	1.02	5.25	.82	5	.77**	-							
IE	1.95	.82	15.12	.67	3	.75**	.78**	-						
PST	2.83	.96	1.72	.73	4	.77**	.79**	.75**	-					
MST	3.02	1.04	.32	.87	5	.79**	.77**	.76**	.91**	-				
VL	3.88	.81	-11.11	.76	4	.49**	.47**	.47**	.63**	.68**	-			
CP	3.42	.88	-7.02	.60	2	.34**	.28**	.34**	.39**	.43**	.52**	-		
PL	2.72	.86	1.18	.80	5	.50**	.45**	.50**	.52**	.61**	.67**	.49**	-	
EF	3.63	.79	-7.92	.83	7	.54**	.59**	.41**	.57**	.63**	.66**	.46**	.62**	-
GD						.04	.03	.02	.00	.03	.03	.09	.03	.10
GM						.04	.03	.03	.03	.04	.03	.21**	.07	.11

** Correlation is significant at the 0.01 level (2-tailed).

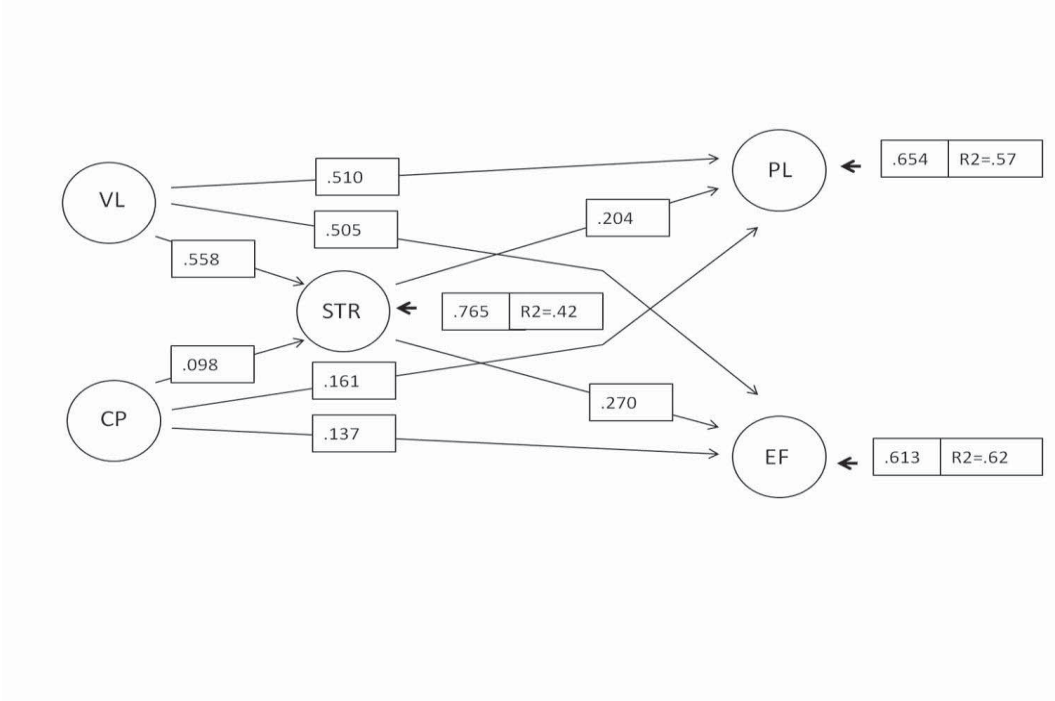

Figure 1: *Strategy use (STR) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Standardized values, errors and r-squared. All paths significant at p < .05 level.*

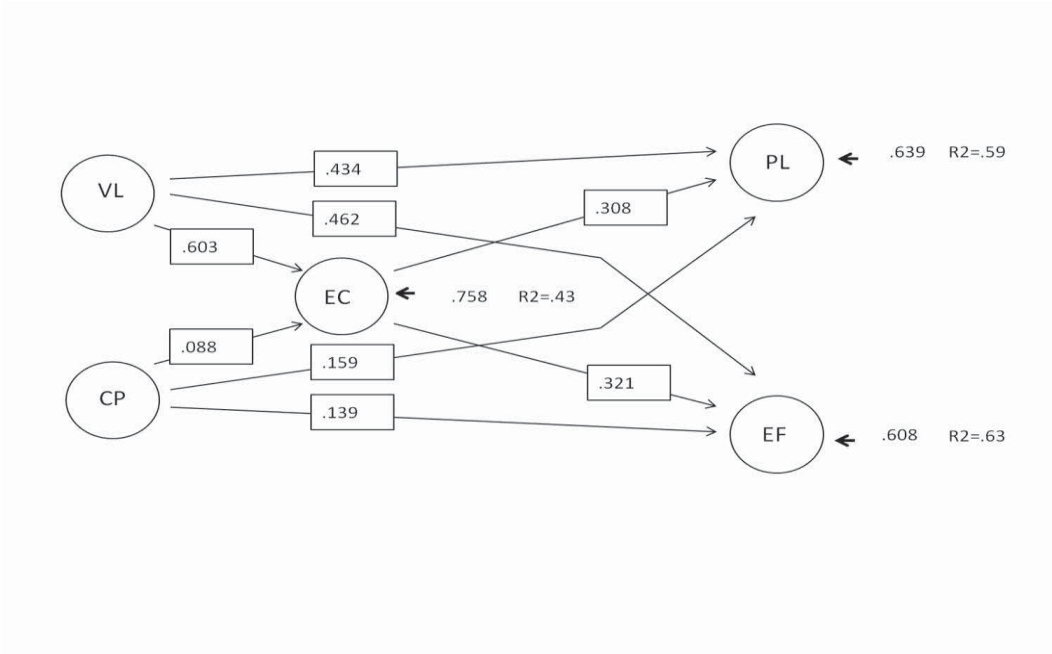

Figure 2: Environmental Control (EC) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at p < .05 level.

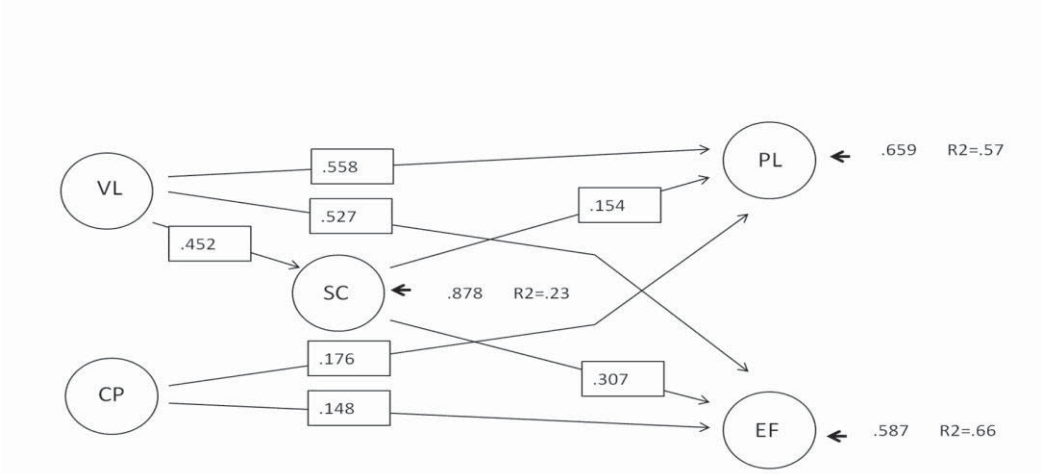

Figure 3: Self Consequating (SC) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level

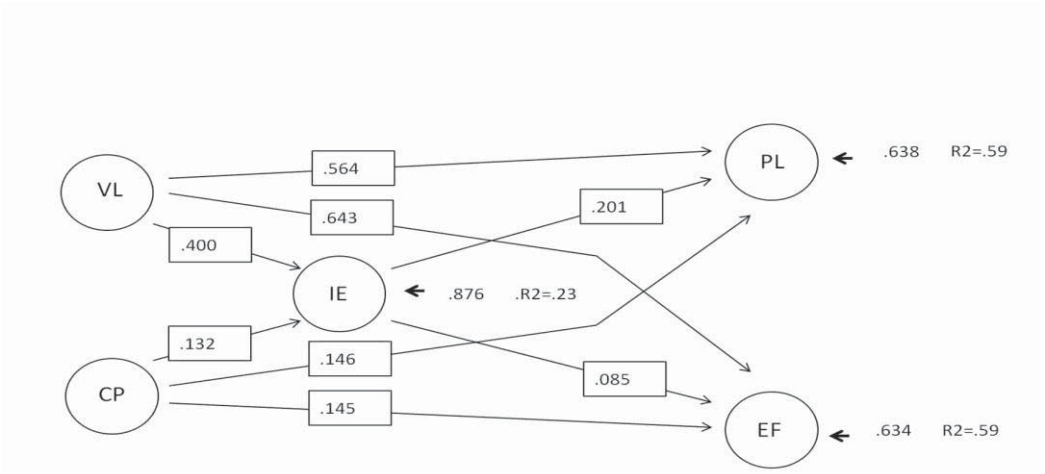

Figure 4: Interest Enhancement (IE) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level.

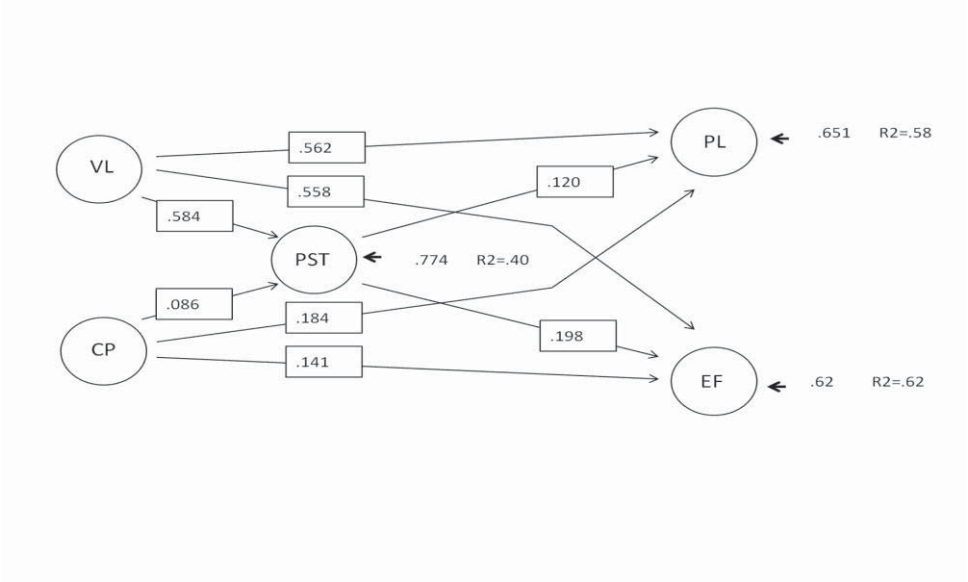

Figure 5: Performance Self talk (PST) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level.

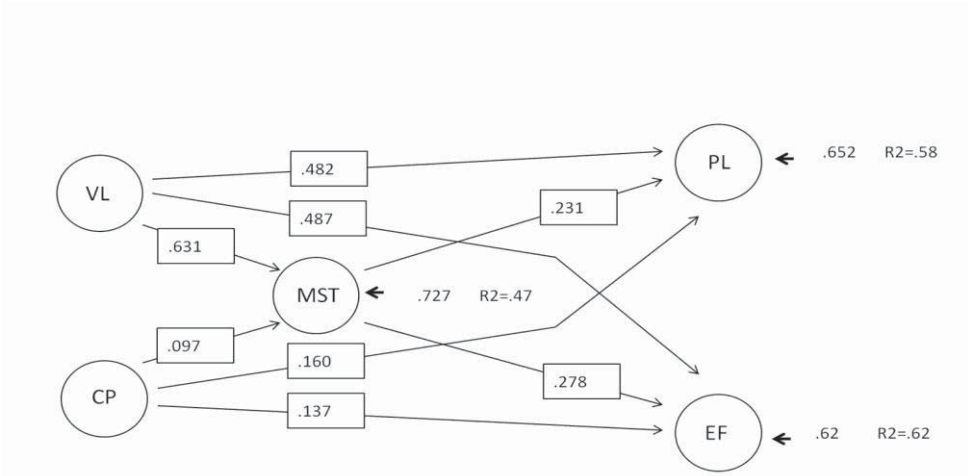

Figure 6: Mastery Self Talk (**M**ST) as mediator between Value (VL) and Competence (CP), and Pleasure (PL) and Effort (EF). Loadings, error and r-squared. All paths significant at $p < .05$ level.

To detect unique contributions, we analysed each strategy separately (Figure 3-7). The paths that are shown are all significant at $p < .05$ level. Consistent with our hypothesis, all strategies were positively related to effort, except for IE that showed a negligible relation.

EC showed the strongest relation with both effort and pleasure. This means that students who reported to manage their surroundings more frequently in order to start working and persist, also reported putting more effort into schoolwork, and perceive more pleasure. Consistent with our hypothesis, the more autonomous forms of regulation MST and IE showed stronger relations with pleasure than and SC and PST, the more controlling forms of motivational regulation. Contrary to our hypothesis, SC showed stronger relations with effort than MST and IE. Finally, no relations were found between the use of motivational strategies and achievement (see figure 1-6)

5.4 Conclusions and discussion

Motivational strategies can help students to get started with schoolwork, to persist in the presence of motivational threats, or to shift their focus from non-learning to learning goals. Previous studies show that the use of these strategies can lead to more effort, persistence and better achievement. It is assumed that students will use strategies more frequently when the task is sufficiently valuable to them, and when they deem themselves sufficiently competent to perform the task successfully. In this research, we studied motivational strategies as mediators between motivational beliefs and motivational outcomes for students in pre-vocational education.

We first validated the questionnaire on motivational strategies. In line with Wolters' (1999) results, the questionnaire proved valid for Dutch students in pre-vocational secondary education; the model with five separate strategies showed the best fit. Concerning the research question on the mediational role of strategies, our results clearly indicate that (a) students in pre-vocational education know and use motivational strategies, albeit not extensively; (b) competence showed only a direct, weak relation with effort and pleasure in doing schoolwork, and a weak relation with only one strategy, i.e. IE; (c) strategy-use partly

mediated the relation between perceived value on the one hand, and effort and pleasure on the other, with moderate direct and indirect relations; (d) individual strategies showed slightly different patterns; and (e) no relations were found for achievement. We will further elaborate on these findings.

In line with our expectations, we found a mediational role of strategy-use between the value students attach to schoolwork and the effort they report (H1). This is in line with the findings by Bong (1999), Wolters and Rosenthal (2000), Sansone, et al. (1999) and Donker et al. (2014). Contrary to our expectations, the mediational role of strategy-use for students who felt competent at schoolwork was negligible (H1), except for IE: There was a weak relation between competence and IE, which in turn was related to pleasure, but not to effort. Apparently, feeling competent only prompt students to engage in finding the value of schoolwork and none of the other motivational regulation strategies. This finding is in line with the findings reported by Wolters (2003): feeling competent only showed a direct relation with motivational outcomes and not with the use of the motivational regulation strategies. However, we should bear in mind that competence scale consisted of two items only. This may have affected the results. Wolters (2003) and colleagues (Wolters & Benzon, 2013; Hulleman & Harackiewizc, 2009) suggest that the relation between a feeling of competence and the use of motivational regulation strategies might be curvilinear. This makes sense: when one feels confident that one can fulfil a task successfully, why use strategies? And, vice versa, when one feels incompetent for schoolwork, this probably will include feelings of incompetence for the use of motivational regulation strategies. However, our data were not curvilinear. Recall that we used self-effiacy in relation to schoolwork, which does not automatically mean students feel competent to use motivational regulation strategies. Bong (1999), Zimmerman, Bandura, and Martinez-Pons (1992), and Zimmerman (2000) differentiate between the competence belief that one can fulfil schoolwork successfully and

self-regulatory efficacy, which is the belief that one is able to self-regulate, that is, 'to plan and manage specific areas of functioning' (Zimmerman, 2000, p. 18).

In our study, we did not find any relations with achievement, except for a weak direct relation between competence and the achievement for math. Schwinger et al. (2009) argued that motivational strategies aim to increase students' motivation and are not directly focused on improvement of students' grades. In their study the effect of motivational strategies on grades was mediated through the effort student put into schoolwork. We did not find such a mediation.

Next, we turn to the distinction between more autonomous and more controlling motivational regulation strategies. As predicted, MST and IE indeed showed a stronger relation with pleasure/interest, confirming the results of Deci and Ryan (2000, 1985), Ryan and Deci (2000), Wolters (2003) and Reeve (2012); strategies that are connected to the task itself and include more internal, autonomous regulation, are more beneficial for perceiving pleasure in schoolwork than more externally regulating, controlling strategies, such as PST and SC. However, the more controlling strategy SC has a stronger relation with effort than MST, and PST, and EC has the strongest relation both with effort and pleasure/interest. Surprisingly, IE was not related to effort at all. This raises questions for future intervention research. PST is comparable with performance-approach goal orientation, a goal orientation that focuses on getting good grades and outperforming others. It is positively related to persistence, affect, and performance (Harackiewicz et al., 2002a; Harackiewicz et al., 2002b; Linnenbrink, 2005), but it can also cause, for instance, fear of failure and stress (Midgley, Kaplan, & Middleton, 2001). Thus, should we encourage students to use those strategies that prove to have a positive relation with motivational outcomes, irrespective of their controlling or autonomous nature; or should we train students to use strategies that are, according to SDT, more autonomously regulating, and therefore more beneficial? Future studies on

motivational strategies should take into account different outcome measures, such as fear of failure and negative emotions to obtain a broader view of the effect of motivational strategies. Although the findings of this study are promising, some limitations need to be taken into account. First, we chose to use Wolters's questionnaire because it has been validated and is formulated in clear language, suitable for the intended population. However, although the validation shows that students distinguish between the five strategies, high correlations prevented us from testing the mediational effect of each strategy within one analysis. Therefore we miss the unique contribution of each strategy to motivational outcomes, which may be important information for intervention studies. Furthermore, although we concluded that strategy use mediated the relation between beliefs and motivational outcomes significantly, bootstrapping techniques can provide us with interval estimates of the indirect effects, which gives an idea of the strength of the effect. Secondly, using Wolters' questionnaire also meant we ignored strategies that might also be relevant and effective, for instance, 'help-seeking' (Karabenick, 2004; Pintrich, 2000). Furthermore, Schwinger et al. (2007) divided IE into two scales, distinguishing between situational interest, which focuses on making the task more fun, and personal significance, which focuses on personal value and relevance. They also added the setting of proximal goals as a motivational strategy (Schwinger et al., 2009). Future studies can reveal a wider range of motivational strategies that students use and could be beneficial for their motivation for learning. Thirdly, although studies with once-off questionnaires give useful information, on-line measures of self-regulation are necessary. The effect of beliefs and strategies on motivational outcomes, are, as Bandura (1991, p. 269) formulated, 'products of reciprocal causation'. Increased pleasure and effort can, in turn, lead to a higher valuation of schoolwork and better achievements can lead to a stronger sense of competence (Boekaerts & Cascallar, 2006; Zimmerman, 2000; Zimmerman & Schunk, 2008). It should be noted that the conclusions in this study are based

on correlational results, therefore we cannot draw any conclusions about causality. The fourth limitation in this study is that we asked students to report on schoolwork in general. Wolters and Pintrich (1998) showed that the use of regulatory strategies does not differ across domains, but Bong reported that scores on competence are moderately correlated, and scores on value are weakly correlated across domains (Bong, 1999, 2001, 2004). The more generally formulated items in this study could therefore have tempererd the results. Furthermore, we used a self-report method to measure achievement. Self-reported grades are less reliable when reported by students from lower educational levels and for students with lower results (Kuncel, Credé, & Thomas, 2005). This study dealt with students from lower educational levels. Also, we measured performance as a dichotomous variable. This could explain the lack of results for achievement in relation to motivational regulation strategies. Finally, we removed some items that were formulated with a negation, because they did not fit in the scales. The aim of these items is to check whether respondents have read the items carefully and answered them according to the instruction. In our opinion, the fact that analyses show that students differentiated between the various scales proves that students filled in the questionnaire conscientiously, and not 'on automatic pilot'. Nevertheless, in future studies we will look more carefully into the differences between positively and negatively formulated items.

Implications for future research

This study shows that students in pre-vocational education know and use motivational strategies. Yet, the mean scores of the strategies in this study show that there is enough room for improvement. Intervention studies are necessary to establish whether creating more awareness of motivational strategies and training students in motivational strategies increases their use of such strategies and subsequently has more impact on their motivational outcomes

(Bembenutty & Zimmerman, 2003; Boekaerts & Corno, 2005; Dignath & Buttner, 2008; Gollwitzer & Sheeran, 2006; Kramarski & Mizrachi, 2006; Kuhl, 2000).

In addition, this study shows that the use of motivational strategies is related to the value students attach to schoolwork. When training these strategies, it might therefore prove beneficial to include the value belief in the training; the more value students attach to schoolwork, the more they use motivational strategies. Therefore, special attention should be paid to the strategy IE that comprises looking for the value of a task in order to start working and keep working at schoolwork. So, IE could be considered as a reminder for those students who already value schoolwork. However, the strategy would be even more beneficial for students who do *not* find schoolwork worthwhile in the phase before the decision to act has been made. In the ideal situation we would like to see a high, but negative correlation: the less value is attached to schoolwork, the higher the use of IE. This would increase the value belief, and, according to our results, the more students value schoolwork, the more they use the motivational strategies. We see here the distinction made between motivational strategies and volitional strategies (Boekaerts & Corno, 2005; Wolters, 2003) Motivational strategies help students in the pre-decisional phase with the choice to actually get started, i.e. IE. Volitional strategies help students in the post-decisional phase, after the choice to get to work is made, to continue working at schoolwork (e.g. Gollwitzer, Heckhausen, & Ratajczak,1990). The implication is that we should promote using different strategies at different stages in the working process in order to make an intervention on strategy use more effective.

Third, we want to focus on effort. More use of motivational strategies leads to more effort, but not to better achievements. The assumption that if we put effort into our work we will achieve better results is almost hardwired into the way we think about learning. However, our measurement of effort relates to the *amount* of effort exerted, not the *quality* of

that effort; it is not self-evident, after all, that more of the same effort will be effective. Indeed, the effort exerted might not be effective at all; we can imagine students forcing themselves to stay put at their desk, chewing their pen, really making an effort to work, but not actually learning. We could overcome this problem by first training students to use cognitive and meta-cognitive strategies, focusing on how to approach and handle the cognitive side of learning. The extra effort that is triggered by the use of motivational strategies can subsequently be used effectively, namely by applying cognitive and meta-cognitive strategies. However, effort has more drawbacks. Students did not distinguish between effort and persistence. Effort can be seen as the regular energy one puts into schoolwork, whereas persistence includes perseverance in case of distractions and setbacks, which is typically the effect one expects from using strategies. Also, both schoolwork and the use of strategies require effort, but we did not distinguish between the two. This could have contaminated the results of this study. Following Boekaerts (2006) we recommend a more detailed study of the quality of effort students claim to put into schoolwork.

Furthermore, achievement appears to be a difficult outcome measure in relation to motivation (Gagne & St Pere, 2002), irrespective of whether the grade is self-reported or derived from the school administration. However, many studies use achievement as an outcome measure. A clear description of the mechanism that is apparently assumed to be present in the link between motivational beliefs, motivational strategies, motivational outcomes, and achievement could shed some light on the inconclusive findings for achievement.

Finally, competence was not related to the use of motivational strategies. Future studies should take different mind-sets into account (Dweck, 2006). According to Dweck, students with a fixed mind-set have the idea that their (in)competence is innate and unchangeable. In that case, the use of strategies will not seem helpful to them. Students with

a growth mind-set perceive their competence as malleable, which implies that the use of strategies will be seen as helpful, as a means to grow.

In conclusion, this study shows that students use motivational strategies, which leads to more effort put into schoolwork and to more pleasure whilst doing schoolwork. The more value students attach to schoolwork, the more they use motivational strategies. Intervention studies are needed to establish causal relations and to find out whether the training of strategies will strengthen these effects. According to this study, the training of strategies will be more effective if it is accompanied by paying attention to the beliefs about the value that students attach to schoolwork. A training like this could help students to motivate themselves, especially in situations that are not inherently motivating.