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# Students' Value Orientations, Intuitive Decision Making, and Motivational Interference, and Their Relations to Regret

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# MOTIVATION AND SOCIAL PROCESSES

# Students' Value Orientations, Intuitive Decision Making, and Motivational Interference, and Their Relations to Regret

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Students' learning activities frequently compete with their leisure options, leading to regret after decisions to study. Using a sample of 233 German and 194 Australian undergraduate students, the authors explored possible determinants of the personality construct *regret*. They investigated whether the level to which students rely on intuition in decision making is negatively connected to the tendency to regret a decision and whether the degree to which during studying students are distracted by leisure incentives (motivational interference) is positively related to regret. Students' achievement and wellbeing value orientations are expected to be linked to intuition and interference. In both samples, interference was positively related to regret whereas intuition was negatively related to regret only in the German sample. The authors did not find the expected link between intuition and interference. In both samples, value orientations were related, as expected, to intuition and interference. Regret could possibly be reduced if motivational interference is avoided.

Keywords intuition, motivational interference, regret, value orientations

IMAGINE A COLLEGE STUDENT, Pierre—sitting at his desk at home in the early evening—has just decided to start working on an essay for his major subject. He has had a difficult time considering pros and cons in coming to this decision because his friends have asked him to join them for a barbecue. While working on a boring text, his thoughts wander. Later, Pierre starts

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to rethink his decision: "Has it been right to use the time to prepare the essay? Should I have instead spent the time with my friends?" Would Pierre tend to regret his decision less if he had not invested so much thought in weighing the options and if he could better concentrate on the learning task? Would he consider alternatives less thoroughly if he could enjoy life instead of giving so much weight to studying? The present article addresses intuitive decision making and motivational interference as possible determinants of regret after having decided for studying instead of for a leisure option.

Because there is reason to believe that regret has adverse consequences for students' study motivation and life satisfaction, it seems important to identify factors related to the emergence of regret. Little is known about regret in study situations (see Kuhnle, Hofer, & Kilian, 2011; Kuhnle & Sinclair, 2011). To fill this gap, we aimed to investigate the tendency to experience regret and how it is related to value orientations, intuition, and motivational interference during studying.

#### Regret

Many of us are probably familiar with the unpleasant emotional experience of regret after a decision. It stems from comparing an obtained decision outcome to outcomes that might have been had one chosen differently (Van Dijk & Zeelenberg, 2005). Regret as a state arises if a person realizes that an alternative considered, but not chosen, would have been a better choice. Regret is described as a cognitively laden emotion (Gilovich & Medvec, 1995). It emerges because making a decision consists of not only choosing one alternative but also rejecting other options. Dissatisfaction with the chosen option can lead to regret, which is determined by the positive attributes of the rejected alternative and their value to the person (Sagi & Friedland, 2007). Even if the opportunity of choice can have positive consequences on intrinsic motivation (Deci & Ryan, 1985), with greater choice there is a higher probability that one of the rejected alternatives could have yielded a better result than the chosen one; hence, the opportunity to experience regret increases (Sagi & Friedland, 2007).

People differ in their sensitivity to potential regret (B. Schwartz et al., 2002). Regret proneness as a trait can be defined as the tendency to experience regret when an individual realizes that he or she should have decided differently. It seems that the tendency to experience regret is becoming more and more significant—especially in Western societies—because students are confronted with a multitude of leisure activities that can indirectly or directly interfere with learning activities (Boekaerts, 2003; Iyengar & Lepper, 2000; Lens, Lacante, Vansteenkiste, & Herrera, 2005). Alternative activities or temptations can be conceptualized as opportunity costs. Within an expectancy-value framework, Wigfield and Eccles (2000) defined these costs as "how the decision to engage in one activity (e.g., doing schoolwork) limits access to other activities (e.g., calling friends)" (p. 72). For students, costs refer to which alternatives they have to give up when deciding on a learning task, as well as the effort they will need to invest in the completion of the task. In a learning environment, these alternatives are usually leisure activities, such as going out with friends. Under these conditions, regret may be a common phenomenon in students.

To our knowledge, it is unfortunate that there are no studies that have examined the effects of regret proneness on students. Regret may have detrimental effects on students' academic behavior and motivation. First, negative emotions such as regret are likely to reduce cognitive resources that are needed for the accomplishment of the task in question (Pekrun, Goetz, Titz, & Perry, 2002). Second, regret may affect students' future decision making (e.g., Tsiros & Mittal, 2000;

Zeelenberg & Pieters, 2007). If choice overload is high, it can reduce the subsequent motivation to commit to the choice (Iyengar, Huberman, & Jiang, 2004). Students might avoid studying to escape these emotions. Given that regret may have detrimental effects, it seems natural to investigate the potential determinants of regret. We are only aware of two studies so far that have suggested that the constructs *intuitive decision making* (Kuhnle & Sinclair, 2011) and *experience of motivational interference* during studying (Kuhnle et al., 2011; Kuhnle & Sinclair, 2011) affect the tendency to experience regret. In the present study, we aimed to replicate these findings with two samples from Germany and Australia. We aimed also to examine the effect of well-being and achievement value orientations on intuition and motivational interference.

#### Intuition and Regret

We suspect that the way in which students usually come to their decisions influences the degree of postdecisional regret. Two thinking styles can be distinguished. Cognitive decision making is defined as conscious, analytic, and relatively affect free (Epstein, Pacini, Denes-Raj, & Heier, 1996). Individuals who use the cognitive system try to weigh all relevant aspects of the options thus also analyze the pros of the options not chosen. If students closely consider the alternatives available before they come to a decision, the alternatives remain salient and can contribute to a higher level of regret (Carmon, Wertenbroch, & Zeelenberg, 2003). In contrast, intuition is understood as an experience of direct knowing without the use of conscious reasoning (Sinclair, Ashkanasy, Chattopadhyay, & Boyle, 2002). Dane and Pratt (2007) defined it as "affectively charged judgments that arise through rapid, non-conscious and holistic association" (p. 40). The benefit of intuition in decision making has been discussed particularly in situations of high complexity and with multiple alternatives. Besides preventing the salience of alternatives, intuitive decision making may contribute to low regret when one considers the confirmatory feeling that tends to accompany the emergence of intuitive knowing (Sinclair & Ashkanasy, 2005). Students in an intuitive decision mode may have a feeling of knowing with certitude, which reduces doubts about the achieved decision. Intuition has been widely studied in the area of management entrepreneurship (see Sadler-Smith, Hodgkinson, & Sinclair, 2008), but there is little research dedicated to its role in the learning environment. In an online study with university students, a negative correlation between intuition and regret occurred after having accomplished a real task (Kuhnle & Sinclair, 2011). Therefore, we expected that students who are high in intuitive decision making have a lower level of regret.

#### Motivational Interference During Studying and Regret

When a student faces several alternatives but is able to select only one of them, a conflict is created which leads to the experience of motivational interference while performing the chosen action. This term denotes the (negative) influence of attractive alternatives on the ease of self-regulation of the current task, dependent on the incentives of the chosen and nonchosen alternatives. The more attractive an alternative action appears, the higher the level of motivational interference (Fries, Dietz, & Schmid, 2008). The tendency to experience motivational interference during learning displays itself in the form of bad mood, distractibility, low depth of processing, low persistence, and shifts from one action to another. The mere knowledge of an alternative action,

such as watching music video clips, has been shown to interfere with the activity that is actually being performed (e.g., learning texts about medical topics; Fries & Dietz, 2007).

Regret refers to situations that arise after a chosen action is executed. The experience of motivational interference occurs during the performance of the chosen action. Regret and motivational interference result from the presence of positive incentives attached to the options not chosen. Given the similarities of the two constructs, it is no surprise that motivational interference in a complex task and state regret displayed a close correlation in the online study with college students (Kuhnle & Sinclair, 2011), and that motivational interference during the activity chosen after an action conflict and trait regret were rather loosely but significantly correlated in a study with high school students (Kuhnle et al., 2011). We propose that the tendency to experience motivational interference is positively related to the disposition to experience regret.

#### Value Orientations, Intuition, and Motivational Interference

We expect that students' value orientations determine their tendency to make intuitive decisions and their experience of motivational interference in school–leisure conflicts. Value orientations are seen as guiding principles in the life of a person (S. H. Schwartz et al., 2001) and are especially relevant in situations with conflicting alternatives, which are more likely when given a choice of highly valued options (Verplanken & Holland, 2002). In this study, we distinguish between achievement and well-being value orientations, which are stimulated by the distinction between modern and postmodern values proposed by Inglehart (1997). They relate to school and leisure—two main areas of high school and university students' lives (Lens et al., 2005; Ratelle, Vallerand, Senécal, & Provencher, 2005; Senécal, Julien, & Guay, 2003) that are particularly relevant for motivational action conflicts (Fries, Schmid, Dietz, & Hofer, 2005).

Researchers have already established that some values directly relate to intuition. Dane and Pratt (2007), for example, suggested relevance of uncertainty avoidance and the femininity pole as two of these values. Activities associated with the values of well-being are usually performed for their immediate, positive appeal, triggering a more spontaneous and affectively charged behavior. In contrast, achievement values seem to be connected with deliberative thinking in planning and organizing activities, in order to reach long-term goals (Dietz, Hofer, & Fries, 2007). Therefore, well-being value orientations should be positively, and achievement value orientations negatively related to intuition.

In line with previous research, achievement values should be negatively, and well-being value orientations positively related to motivational interference during studying (Hofer, Schmid, Fries, Kilian, & Kuhnle, 2010; Hofer et al., 2007). Students with high achievement values are better able to concentrate after having chosen a study or work activity over a leisure alternative, and thus experience a lower level of motivational interference. In contrast, students with high well-being values are less successful in shielding themselves from competing leisure activities. Although both values can coexist, a negative connection between them has been found in former studies (Hofer et al., 2007).

A Model of Value Orientations, Motivational Interference, Intuition, and Regret

On the basis of the thoughts outlined so far, we tested the following hypotheses:



FIGURE 1 The expected model.

- 1. Students with high well-being value orientations, and those with low achievement value orientations, are expected to rely more on intuition because they value emotion-driven actions.
- Students with high well-being and low achievement value orientation experience more motivational interference during studying because they have difficulties focusing on the learning task.
- Students who tend to experience motivational interference during studying have higher regret proneness because the incentives of the nonchosen option have been present continuously.
- 4. Students high in intuitive decision making are less prone to regret because they are less likely to retain in their minds the incentives of the nonchosen option. (The relation between intuition and regret is expected to be bidirectional.)
- 5. Students high in intuition experience less motivational interference during studying because they can focus better on the task at hand.

We combined the central assumptions in a structural equation model (see Figure 1). To look at the generalizability of the model, we tested it on two samples from different countries; Germany and Australia. We did not aim for a cultural comparison, but examined whether the model holds in samples that are moderately different in culture while highly distant geographically. Germany and Australia are regarded as Western countries. They have high incomes and are postindustrialized countries where self-expression is highly valued (Inglehart & Welzel, 2005). Students in both countries appear to possess a high amount of action alternatives, making them prone to school–leisure conflicts, motivational interference during studying, and the experience of regret.

#### METHOD

#### Participants

The sample consisted of 233 German undergraduate students (69.5% female) with a mean age of 21.8 years (SD = 2.90), and 194 Australian undergraduate students (54.6% female) with a mean

age of 21.9 years (SD = 3.78) from a large university in each country. Students in the Australian sample completed the questionnaire directly following a lecture, while the German students had the opportunity to complete the questionnaire during their lunch break. Students participated voluntarily, and anonymity of all data was ensured.

#### Measures

#### Regret

In the Australian sample, regret proneness was measured with the five items of the original regret scale (B. Schwartz et al., 2002), and with the validated translated version of this questionnaire in the German sample (Greifeneder & Betsch, 2006; e.g., "Whenever I make a choice, I'm curious about what would have happened if I had chosen differently"; see the Appendix). Students responded on a 7-point scale ranging from 7 (*completely agree*) to 1 (*completely disagree*). This measure had a Cronbach's alpha of .67 in the original study of B. Schwartz and colleagues (2002), .77 in the study of Greifeneder and Betsch (2006), and .74 in the study of Kuhnle and colleagues (2011).

#### Intuition

We measured intuition with six items contrasting two questions (e.g., "Do you often rely on your gut feeling when you make a decision, or do you do this rarely or never?"). The questionnaire included aspects such as (a) spontaneous or nonconscious decisions determined on the basis of former experiences and (b) reliance on affective perceptions (see the Appendix). Because this instrument was never used in English, the original German version was reverse-translated in order to check the adequacy of the translated version. High values indicated a high preference for intuitive decisions.

#### Motivational Interference Studying

The action alternatives *studying for an exam* and *meeting friends* are contrasted in a conflict vignette used in former studies (e.g., Hofer et al., 2007):

Imagine the following situation: It is an afternoon during the week or a weekend day. You are sitting at your desk and you are just about to start studying for an exam when the phone rings. Your friends call to ask if you want to join them. They want to pick you up in a minute.

After reading this vignette, students imagined that they had decided for the university-related activity. Then, they answered 15 items related to affective, cognitive, and behavioral destabilization of their study performance. This item pool measures aspects of bad mood (e.g., "I'll get into a bad mood easily because I sit at the desk while the others have fun"), distractibility (e.g., "While studying, I'll be easily distracted"), switching (e.g., "I'll start to study, but then switch to another activity quickly"), missing persistence (e.g., "It'll be very hard for me to keep on studying until the end"), and low depth of processing (e.g., "I'll soon be completely absorbed in studying so that I won't think about anything else"). The answers were rated on 4-point scales ranging from 0 (*not true at all*) and 3 (*totally true*). This scale was constructed on the basis of adolescent

students' statements in a preceding interview study (Schmid, Hofer, Dietz, Reinders, & Fries, 2005). Students were asked to think about a situation in which they were trying to do some work for school, while, for example, their friends met to play football. They described in detail how they would deal with these conflict situations. As this prototypical learning situation happens quite often, we regarded this measure as a general reaction of students in academic settings. The items for the various aspects were highly correlated and we focused the analyses on a mean score. In a sample of sixth- and eighth-grade students, Cronbach's alpha was 0.93 (Hofer et al., 2007).

#### Value Orientations

Achievement and well-being value orientations were assessed according to two value prototypes used in former research (e.g., Hofer et al., 2007). One prototype described a student who values achieving something in life, working toward clear goals (e.g., good job), and wants to persevere even through uncomfortable tasks. The other prototype was a student who values leisure activities, loves spontaneous action, and for whom friends are of central importance (see Fries et al., 2005). On two items, the students judged their similarity ("How similar are you to Simon?") to each prototype on a 6-point scale ranging from 0 (*very dissimilar*) and 5 (*very similar*), and their empathy ("How much would you like somebody like Simon?") on a 6-point scale ranging from 0 (*not at all*) to 5 (*very much*). The prototypes were originally derived from the interview study mentioned earlier (Schmid et al., 2005). The students were asked about their meaning of achievement and well-being. In a sample of adolescents, the retest reliabilities of these measures with a 2-week interval in between turned out to be  $r_{tt} = 0.58$  for the achievement value orientation and  $r_{tt} = 0.71$  for the well-being value orientation (Hofer et al., 2007).

#### Data Analysis

For testing the hypothesized structural equation model, we used the maximum likelihood parameter estimates method of Mplus (Muthén & Muthén 2007). The model was evaluated with multiple fit indexes:  $\chi^2$ ,  $\chi^2/df$ , the CFI, RMSEA, and SRMR. Missing values were handled using full information maximum likelihood implemented in Mplus. The proportion of missing values for the items included in the analysis was low, ranging from 0.0 to 0.9%.

We conducted multiple-group analyses to determine the consistency of the model across the two countries. Three models were computed. First, we calculated a baseline model where the parameters were estimated separately within each group (unconstrained model [1]:  $\chi^2(118) = 241.29$ , p < .001). In the second model, we constrained measurement weights (factor loadings) to be identical for Germany and Australia: constrained model (2):  $\chi^2(126) = 250.08$ , p < .001. Results of a chi-square difference test indicated that the difference between the unconstrained and constrained model is not significant,  $\Delta \chi^2(8) = 8.79$ , *ns*. This supports the measurement invariance across groups. In the third model, we set structural weights to be equal as well: constrained model (3):  $\chi^2(134) = 270.53$ , p < .001. Comparing this model with the unconstrained model, the chi-square difference test demonstrated that the difference is significant,  $\Delta \chi^2(16) = 29.24$ , p < .05. Because the analyses supported measurement invariance—but not structural invariance—across the two countries, we calculated separate models for each country.

The value orientations were specified as correlated manifest exogenous variables, while the other variables were specified as endogenous latent variables. We randomly aggregated the items

of the intuition and regret scales to item parcels that served as indicators for the latent variables because there are no subscales in these questionnaires. The parcels consisted of two or three items. According to the internal consistency approach (Kishton & Widaman, 1994), the parcels for motivational interference reflect the five aspects of the scale. We scaled latent variables by fixing one of their loadings to one.

#### RESULTS

#### **Descriptive Analyses**

The descriptive statistics for the combined sample and the two subsamples are shown in Table 1. In the subsamples, a few internal consistencies were less than ideal. Despite this, we decided to proceed with the analysis given that the internal consistencies of the variables in the combined sample range from moderate ( $\alpha = 0.67$ ) to satisfactory ( $\alpha = 0.87$ ).

Nearly all postulated relations were statistically significant and in the expected direction, except for the relation between intuition and motivational interference (see Table 2).

#### Structural Equation Model

Figures 2 and 3 display the models with standardized path coefficients. They show an acceptable fit (e.g., Browne & Cudeck, 1993; Hu & Bentler, 1995) for the German sample,  $\chi^2(59) = 120.76$ ,  $\chi^2/df = 2.05$ , CFI = 0.932, RMSEA = 0.067, SRMR = 0.053; and for the Australian sample,  $\chi^2(59) = 120.53$ ,  $\chi^2/df = 2.04$ , CFI = 0.892, RMSEA = 0.073, SRMR = 0.054). The paths connecting the constructs were established following the proposed theoretical relations. Factor loadings were all statistically significant.

In both samples, we found the expected negative relation of achievement value with motivational interference (Germany: -.17, p < .05; Australia: -.18, p < .05) and intuition (Germany: -.22, p < .01; Australia: -.18, p < .05). We also identified the anticipated positive relation of

	Combined sample			German sample			Australian sample		
	Mean	SD	α	Mean	SD	α	Mean	SD	α
1. Well-being value orientation	3.01	1.01	.67	3.33	0.86	.59	2.62	1.05	.67
2. Achievement value orientation	3.15	.93	.68	2.90	0.87	.64	3.45	0.91	.65
3. Motivational interference studying	1.49	.52	.87	1.56	0.52	.88	1.40	0.51	.88
4. Intuition	.48	.30	.70	0.46	0.32	.74	0.50	0.28	.66
5. Regret	4.24	1.22	.76	4.01	1.36	.83	4.51	0.95	.60
6. Age	21.88	3.33	—	21.84	2.90	—	21.93	3.78	—

TABLE 1 Means, Standard Deviations, and Internal Consistencies ( $\alpha$ ) in the Combined Sample (N = 427), the German Sample (N = 233), and the Australian Sample (N = 194)



*Fit indices*:  $\chi^2(59)=120.76$ ,  $\chi^2/df=2.05$ ; CF1=0.932; RMSEA=0.067; SRMR=0.053

*Note.* For clarity reasons, the factor loadings of the latent variables are omitted from the figure, but all of them are highly significant. Parameter estimates are standardized. Solid path coefficients are statistically significant p < .05. Dotted path coefficients are not statistically significant (N =233).

FIGURE 2 The structural equation model for the German sample.



*Fit indices:*  $\chi^2(59)=120.53$ ,  $\chi^2/df=2.04$ ; CF1=0.892; RMSEA=0.073; SRMR=0.054

*Note.* For clarity reasons, the factor loadings of the latent variables are omitted from the figure, but all of them are highly significant. Parameter estimates are standardized. Solid path coefficients are statistically significant, p < .05. Dotted path coefficients are not statistically significant (N = 194).

FIGURE 3 The structural equation model for the Australian sample.

Contentions in the Combined Sample $(N = 427)$									
	1	2	3	4	5				
1. Well-being value orientation	_								
2. Achievement value orientation	34**	—							
3. Motivational interference studying	.31**	26**	_						
4. Intuition	.28**	23**	.09	_					
5. Regret	.02	.05	.23**	15**					
6. Age	07	12*	18**	.01	14**				

TABLE 2 Correlations in the Combined Sample (N = 427)

*Note.* p < 0.05; p < 0.01.

well-being value with motivational interference (Germany: .30, p < .001; Australia .23, p < .01) and intuition (Germany: .36, p < .001; Australia: .26, p < .01). The proposed association of motivational interference and regret was identified (both countries: .33, p < .05). Furthermore, in the German sample, there was a highly significant relation between intuition and regret (Germany: -.29, p < .001), which was not observable in the Australian sample. In both samples, the postulated negative relation between intuition and interference is missing.

In summary, nearly all expected relations showed up in both samples, even if some of their means differed significantly (see Table 1). Students in the Australian sample indicated a significantly lower well-being value, t(423) = 7.60, p < .001, d = .74; and a lower experience of motivational interference, t(424) = 3.20, p < .001, d = .31; compared with the German sample. In contrast, the Australian sample showed a higher achievement value, t(423) = -6.37, p < .001, d = .62); and a higher level of regret, t(421) = -4.29, p < .001, d = .42.

#### DISCUSSION

In this study, possible determinants of the personality construct regret are explored. Regret is relevant to learning because students often are faced with motivational conflicts between study and leisure options. We looked at possible determinants and explored the relations between intuition, motivational interference during studying, individual value orientations, and regret. Although not all postulated relations were supported, the descriptive findings and the structural equation models identified factors that may affect the occurrence of regret.

Consistent with findings from value research (Inglehart & Baker, 2000), students in both samples reported fairly high achievement and well-being values orientations, suggesting they hold a plurality of values. Our data also show that students from both countries are familiar with regret and that they seem to experience motivational interference to a fair extent during studying when a temptation is present. This can indicate that many students have free choice from a broad spectrum of options for how to spend their time after school.

In line with our first two expectations, the findings show that well-being and achievement values are differentially related to intuition and motivational interference. The tendency to decide

intuitively and the experience of performance impairment caused by a nonchosen alternative are systematically related to the value priorities of students. In the case of motivational interference, this reinforces results from previous studies (see Hofer et al., 2010). For intuition, it adds to the knowledge that students with high well-being values tend to decide intuitively while students with high achievement values seem to decide more rationally. Thinking mode obviously is part of the whole person and embedded in the broader system of individual functioning.

Concerning Hypotheses 3 and 4 about the determinants of regret, the data suggest that motivational interference during studying may promote the tendency to experience regret, thus confirming previous results (Kuhnle et al., 2011; Kuhnle & Sinclair, 2011). This strengthens the idea that both motivational interference and regret depend on the incentives of the nonchosen option. The beneficial effect of intuition on regret that also has been shown previously (Kuhnle & Sinclair, 2011), however, appeared only in the German sample. It is possible that Australian students tended to justify intuitive decisions rationally afterwards, which could eliminate the buffering effect on regret. This notion is supported by higher achievement values in the Australian sample, which could point to a higher preference for rational justifications.

As a further point, contradictory to our Hypothesis 5, the shielding function of intuition from disturbing thoughts or negative mood due to the missed alternative seems not to be relevant to the experience of motivational interference. We even found a positive correlation between intuition and motivational interference in the German sample. This result was unexpected because we postulated that during study activities that are intuitively chosen, the attractive leisure option should be less cognitively available. Students who tend to decide intuitively rather than deliberately have been shown to accomplish the chosen task with higher concentration (Kuhnle & Sinclair, 2011). As of now, we have to leave this question unresolved.

The structural equation models are not identical, but similar in essence, pointing to the generalizability of the main results. Despite significant differences between the two samples in the mean of some variables, all paths, with the exception of the path from intuition to regret, can be found in both samples. Both samples were convenience samples, and they seemed to be different enough for the aim of investigating generalizability. There was no attempt to parallelize them; thus, we excluded a cross-cultural comparison. In future studies, however, it might be interesting to compare students from countries with markedly different values and action opportunities.

With regard to limitations of this study, the quality of the scales has to be taken into critical examination. The Regret scale uses items that are formulated as statements. In general, questions are regarded as easier to process mentally. It also entails a reverse-scored item. Negatively worded items are regarded as challenging to comprehend. Furthermore, one item is double-barrelled in that it contains more than one condition (see Artino, Gehlbach, & Durning, 2011). Last, the internal consistency of this scale in the Australian sample is low. The Intuition Decision mode scale is set up so that one can either be intuitive or a planner, implying that intuitive and cognitive decision modes are opposite ends of the same continuum. However, this turns out to not be the case. Intuitive and cognitive decision modes are often found to be orthogonal (Betsch, 2004). Because this study includes only the intuitive decision mode, the question of whether the cognitive decision mode is opposite or orthogonal to it remains open.

In general, subsequent studies on multiple goals and resulting incentives from nonchosen options in cases of goal conflict—which form the central theme of this article—are expected to be promising. They seem to be relevant issues for school and college students, but research in this area is only in its early stages. In particular, inquiring after the effects of regret on students

merits deeper investigations. Regret is mostly regarded as aversive, but it also may have positive effects. In contrast with other negative emotions, regret can help people to make sense of past experiences, to facilitate avoidance behaviors, and to gain insights into the self (see Saffrey, Roese, & Summerville, 2008). An interesting research field could be the domain-specificity of regret. Other emotions, such as enjoyment or anger, have shown relatively weak between-domains relations of different school subjects (Goetz, Frenzel, Pekrun, Hall, & Lüdtke, 2007). Because regret is mostly caused by the positive aspects of the rejected alternatives and their importance for the individual, regret about missed learning opportunities in a subject regarded as important by the student should be stronger than regret about a less appreciated subject.

Although the relations shown in this study are modest, and causal inferences are dubious, some tentative reflections about practical implications seem appropriate. Returning to our student Pierre, if he tends to experience regret, he can perceive studying situations as unsatisfying and draw the conclusion that the next time he should go out with friends instead of studying. This can result in a change of learning or working behavior, with serious effects on achievement at school due to reduced, or procrastinated, study behavior (see Kuhnle et al., 2011). Under the premise that regret should be avoided, and considering that regret results from positive aspects of nonchosen options, the educational rationale should be to prevent such options. Evidence has shown that students who do their homework at fixed times experienced less motivational interference during studying, displayed less academic procrastination, and had better grades (Hofer, Kuhnle, Kilian, & Fries, 2012). One interpretation of the result is that these students delegate the control of action to the situation: When they do not consider alternatives, they conserve motivational and cognitive resources (Wood, Quinn, & Kashy, 2002). Promoting intuitive over rational thinking might be another means. Pathways along this line of thought however are not unproblematic. Suppose that Pierre decides more intuitively: A danger may arise because he could possibly decide more often to go out with friends rather than to study. In this case, he would feel regret, but for the opposite reason. Moreover, intuitive thinking is probably not the best way to come to decisions in each situation. Last, the implications of the results on value orientations are equivocal. On the one hand, students with high well-being values should have better chances of avoiding regret because they tend to decide intuitively. On the other hand, they tend to experience high motivational interference during studying. The reverse holds true with the other value dimension. Students with high achievement values tend to decide rationally, but experience less motivational interference during studying. If both values are high, school-leisure conflicts may happen more often, while low values are detrimental because values are a source of motivated behavior. Baumeister and Vohs (2002) argued that a decision congruent with actual value orientations is expected to minimize regret. As a result, the inclusion of value orientation in a specific learning situation seems to be promising because, in a situation with a certain decision, a direct relation between value orientations and regret is conceivable. As values are hard to change by educational means, other ways to minimize the effect of positive incentives of the nonchosen option have to be looked at. A good candidate is self-control strength, which is the ability to pursue important, long-term goals when attractive, short-term goals are present (Baumeister & Heatherton, 1996). Students high in self-control turned out to have low regret and motivational interference, procrastinated less, and had better school grades (Hofer et al., 2012; Kuhnle et al., 2011). Strengthening students' capacity to exert self-control over their feelings, thoughts, and actions by repeated practice could be followed by improvements in shielding against temptations before, during, and after studying.

#### AUTHOR NOTES

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#### APPENDIX

#### Items of the Regret Scale

Whenever I make a choice, I'm curious about what would have happened if I had chosen differently.

Whenever I make a choice, I try to get information about how the other alternatives turned out. If I make a choice and it turns out well, I still feel like somewhat of a failure if I find out that another choice would have turned out better.

When I think about how I'm doing in life, I often assess opportunities I have passed up. Once I make a decision, I don't look back. (R)

Items of the "Intuitive decision mode" scale

- a) Do you prefer to improvise?
- or

or

or

or

- b) Do you plan everything ahead of time?
- a) Do you solve problems spontaneously?
- b) Do your decisions take a longer time?
- a) Would you describe yourself as a spontaneous person?
- b) Do you think over things first?
- a) Do you follow norms?
- b) Do you rely on your own feelings?
- a) Do you often rely on your gut feeling when you make a decision?
- 01
- b) Do you do this rarely or never?
- a) Do you plan far in advance?
- b) Do you decide quickly and spontaneously?