Examining the Motivational Impact of Intrinsic Versus Extrinsic Goal Framing and Autonomy-Supportive Versus Internally Controlling Communication Style on Early Adolescents' Academic Achievement

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The present experimental research examined whether framing early adolescents' (11- to 12-year-olds) learning activity in terms of the attainment of an extrinsic (i.e., physical attractiveness) versus intrinsic (i.e., health) goal and communicating these different goal contents in an internally controlling versus autonomy-supportive way affect performance. Both conceptual and rote learning were assessed. Three experimental field studies, 2 among obese and 1 among nonobese participants, confirmed the hypothesis that extrinsic goal framing and internal control undermine conceptual (but not rote) learning, even in comparison with a control group. Study 3 indicated that the positive effect of intrinsic goal framing on conceptual learning was mediated by task involvement, whereas the positive effect of autonomy-supportive communication style on conceptual learning was mediated by relative autonomous motivation.

Various studies indicate that children's natural interest and engagement in learning declines over the elementary school years (Anderman & Maehr, 1994; Lepper & Hodell, 1989), which most likely negatively affects their achievement as well. Several researchers have claimed that this trend is, at least in part, due to the way teachers and the school approach the learning process (Maehr & Midgley, 1996; Simmons & Blyth, 1987). One theory that helps clarify how school environments affect children's and early adolescents' motivation and grades is self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000b). SDT posits that the content of goals (i.e., intrinsic vs. extrinsic) supported by teachers and the school as well as the way these goal contents are communicated (i.e., autonomy-supportive vs. controlling) explain variance in children's motivation and school performance. The present research examined these claims in a series of three experimental field studies.

Intrinsic Versus Extrinsic Goals and Autonomous Versus Controlled Motivation

The type of goals on which people focus can vary. One way to describe these differences is to state that these goals are either intrinsic or extrinsic (Deci & Ryan, 2000; Kasser, 2002; Kasser & Ryan, 1996). Within SDT, intrinsic goals, such as community contribution, affiliation, health, and self-development are said to reflect people's natural growth tendencies. In contrast, extrinsic goals, such as physical attractiveness, financial success, power, and image, are assumed to create on average an "outward orientation" (Williams, Cox, Hedberg, & Deci, 2000). They tend to orient people toward engaging in interpersonal comparisons (Sirgy, 1998), obtaining contingent approval and acquiring external signs of self-worth and success (Kasser, Ryan, Couchman, & Sheldon, 2004). Previous correlational studies (Kasser & Ryan, 1993, 1996; McHoskey, 1999; Sheldon & McGregor, 2000; Vansteenkiste, Duriez, Simons, & Soenens, in press) have demonstrated that an excessive focus on extrinsic relative to intrinsic life goals is associated with lower well-being, increased ill-being, and less socially adaptive functioning.

It is important to note that the concept of intrinsic versus extrinsic goal pursuits is conceptually different from the classical motivational constructs of intrinsic and extrinsic motivation (Ryan & Deci, 2000a). Whereas the former reflects the differential content or types of goals that people can pursue in their daily behavior (the "what" of goal pursuits), the latter pertains to people's motives or reasons for pursuing particular goals (the "why" of goal pursuits; see Deci & Ryan, 2000). Within SDT, people's motives for engaging in an activity are situated along a continuum

that varies in its relative degree of self-determination. Intrinsic motivation, which is defined as engaging in an activity for its own sake, is fully self-determined or autonomous. In contrast, extrinsically motivated behavior is guided by the pursuit of an outcome that is separable from the activity itself but can nevertheless vary in its relative degree of autonomy (Ryan & Connell, 1989). In this respect, SDT distinguishes three types of extrinsically motivated behavior. When people engage in an activity to comply with an externally pressuring demand (i.e., external regulation) or to meet internally pressuring feelings of guilt, shame, and self-aggrandization (i.e., introjected regulation), their actions are said to be relatively controlled; hence, these two types of extrinsic motivation are often combined to form a controlled motivation composite (e.g., Vansteenkiste, Lens, Dewitte, De Witte, & Deci, 2004). In contrast, when people identify with the personal importance of the activity (i.e., identified regulation), they are more likely to engage in the activity with a sense of volition and willingness. For this reason, identified regulation and intrinsic motivation are often combined to form an autonomous motivation composite (e.g., Vallerand, Fortier, & Guay, 1997).

Previous studies have documented the advantages of autonomous relative to controlled motivation, including deeper information processing, higher performance, maintained persistence, and higher well-being (e.g., Black & Deci, 2000; Vallerand et al., 1997; Vansteenkiste & Deci, 2003; Williams, McGregor, Zeldman, Freedman, & Deci, 2004). Furthermore, SDT researchers have maintained and empirically demonstrated that both people's goal contents (intrinsic vs. extrinsic) and their motives (autonomous vs. controlled) have independent effects on well-being and adjustment (Sheldon & Kasser, 1995; Sheldon, Ryan, Deci, & Kasser, 2004).

Intrinsic Versus Extrinsic Goal Framing

Previous SDT studies have primarily studied the effect of different goal contents from an individual difference perspective, namely, as the degree to which people focus on the attainment of intrinsic rather than extrinsic goals. However, not only individuals but also social environments can be described in terms of the types of goals they promote or emphasize (Holland, 1985; Kasser & Ahuvia, 2002; Sagiv & Schwartz, 2000). Although some social contexts encourage and reinforce the pursuit of intrinsic goals, others focus on the pursuit of extrinsic goals (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). According to SDT, environments that emphasize intrinsic versus extrinsic

goal contents should have the same functional effects on learning and achievement as individuals' pursuit of intrinsic versus extrinsic goals.

Vansteenkiste, Simons, Lens, Sheldon, et al. (2004) examined this issue in a recent set of experimental field studies by framing a particular learning activity in terms of the attainment of either an intrinsic goal (e.g., self-development) or an extrinsic goal (e.g., financial success). They found that presenting the learning material as serving the attainment of an extrinsic goal undermined deep processing of the learning material, academic achievement, and persistence compared with intrinsic goal framing (see also Vansteenkiste, Simons, Soenens, & Lens, 2004).

Two different but related explanations were provided to account for the debilitating effect of extrinsic goal framing (Vansteenkiste, Simons, Lens, Soenens, et al., 2004). First, extrinsic goals impede a deep absorption in the learning task because they tend to shift people's focus away from the learning task to external indicators of success and self-worth (attentional shift). Second, extrinsic goal framing is nevertheless likely to prompt some type of behavioral engagement in the learning, but the learning is likely to be more rigid, narrow focused, and superficial because extrinsic goals are said to induce a more strategic approach to the learning activity (strategic approach). These two processes are likely to interfere with a full organization, elaboration, and understanding of the reading material and, hence, forestall a task-oriented approach of the learning material (Nicholls, 1989; Nicholls, Cobb, Wood, Yackel, & Patashnick, 1990). In line with these claims, Vansteenkiste, Simons, Lens, Soenens, et al. (2004) found that extrinsic relative to intrinsic goal framing led college students to become less task oriented, which in turn decreased their performance.

Although the results of these studies on intrinsic versus extrinsic goal framing reveal a coherent picture, they are limited by the sampling of college students and adults. Hence, an important goal of the present research was to explore whether extrinsic relative to intrinsic goal framing also undermines early adolescents' (11- to 12-year-olds) learning and achievement. A recent study by Kasser (2003) provides some preliminary evidence for this claim. Specifically, Kasser showed that materialistically or extrinsically oriented early adolescents (average age = 12.5 years) displayed elevated levels of anxiety, decreased levels of happiness and self-esteem, and a lower engagement in proenvironmental behaviors compared with nonmaterialistically oriented early adolescents (see also Flouri, in press). Thus, at the individual level, it seems that early adolescents

who endorse materialistic standards equally suffer from doing so as older participants. Such a claim is also shared by researchers in consumer psychology (e.g., Levin & Linn, 2004). These results provide preliminary evidence for our hypothesis that framing a learning activity in terms of intrinsic versus extrinsic goals might affect early adolescents' conceptual integration of learning information in ways similar to that experienced by middle adolescents.

In contrast to previous studies on intrinsic versus extrinsic goal framing, we assessed two different aspects of performance: conceptual and rote learning. Conceptual learning requires deep and thoughtful processing of information and requires a more creative and integrative solution. In contrast, rote learning requires only a superficial engagement in the learning and has a more straightforward or rote path to the solution; literal memorization of factual information is sufficient (Entwistle & Entwistle, 1991; Grolnick & Ryan, 1987). We expected that the debilitating effect of extrinsic goal framing would occur for conceptual learning because extrinsic goal framing interferes with a thoughtful elaboration of the reading material. In contrast, because intrinsic goals are more closely linked with people's inner-growth tendencies, learning in the service of such goal is more likely to prompt a deep and task-oriented commitment toward learning. Hence, we explored whether the effect of intrinsic versus extrinsic goal framing on conceptual learning would be mediated by task involvement.

Such differences were not predicted for rote learning because extrinsic goals can be highly motivating and, hence, might prompt some degree of engagement in the learning activity. However, because extrinsic goals are less consistent with individuals' inner-growth tendencies, learning in the service of such goals is likely to be associated with a more superficial and less integrated processing. Under extrinsic goal circumstances, the learning tends to be more strategic in nature because it is used to attain the extrinsic goal. Consistent with this hypothesis, Vansteenkiste, Simons, Lens, Sheldon, et al. (2004) reported that extrinsic relative to intrinsic goal framing resulted in more superficial processing, but this outcome was assessed through self-reports rather than behaviorally, as was the case in the present study.

A final issue concerns the long-term effects of intrinsic versus extrinsic goal framing on achievement, an issue that has not received any empirical attention. We predicted that intrinsic goal framing would result in a better retention of conceptual learning material, even after controlling for initial scores in conceptual learning. This hypothesis is based on the assumption that intrinsic goal framing is more likely to induce a deep commitment toward learning and to promote a cognitive style that is conducive to the active processing and organization of material needed for conceptual integration.

Autonomy-Supportive Versus Internally Controlling Communication Style

Social contexts not only differ in the type of goal contents they promote but also in the way these goal contents are introduced and communicated. For instance, people can be pressured to pursue an intrinsic or extrinsic goal, but they can also decide for themselves whether it is worthwhile to pursue such a goal. Within SDT (Ryan & Deci, 2000b), these contexts are described as being controlling versus autonomy-supportive. Studies among children have indicated that pressuring communication styles undermine persistence (Deci, Driver, Hotchkiss, Robbins, & Wilson, 1993) and forestall the conceptual (but not rote) learning process (Grolnick & Ryan, 1987). Such controlling environments produce an external locus of causality (deCharms, 1968), thereby frustrating people's basic need for self-determination or autonomy, that is, their tendency to engage in a willing and volitional manner in an activity.

We aimed to extend this research by examining the impact of a different type of controlling communication style. Rather than inducing only an externally controlling regulation by using explicitly and overtly controlling language such as "you should" or "you have to," we aimed to trigger an internally controlling regulation by using a more subtle and covert type of control. As mentioned earlier, SDT holds that individuals can also place themselves under pressure to engage in an activity by buttressing their task engagement with feelings of shame, guilt, and anxiety, or with self-esteem contingencies, so that they regulate their behavior on the basis of introjected (i.e., partially internalized) motives (Deci & Ryan, 2000).

Furthermore, social environments can elicit the introjected regulations or internally pressuring forces that are available within individuals and, hence, have the potential to regulate people's behavior. Such internally pressuring regulations can be triggered by indicating that the outcome of the activity has implications for one's self-esteem (Ryan, 1982); by threatening people with love withdrawal (Assor, Roth, & Deci, 2004); by inducing feelings of guilt, shame, and anxiety for not performing the requested behavior (Barber, 1996); or by using other psychologically controlling tactics (Barber, 1996; Soenens,

Vansteenkiste, Duriez, Luyten, & Goossens, 2005). Past SDT studies (Koestner, Zuckerman, & Koestner, 1987; Plant & Ryan, 1985; Ryan, 1982) have shown that such internally controlling environments fail to promote a continued engagement and interest in the activity, presumably because they induce an external perceived locus of causality (deCharms, 1968). However, to our knowledge, no SDT study has examined the impact of such internally controlling social contexts on task involvement and conceptual and rote learning.

In the present study, the internally controlling context was created by inducing feelings of guilt and shame for not engaging in the activity and by using instructions in which participants' self-worth was placed at stake. On the basis of SDT, we expected that an internally controlling versus autonomy-supportive context would have a debilitating impact on conceptual learning among early adolescents because it produces an external perceived locus of causality (deCharms, 1968). We did not anticipate such differences for rote learning. Internally controlling environments, just as extrinsic goal contexts, can have a motivational effect so that people might display some behavioral engagement in the learning. However, the learning behavior is likely to be less committed and more superficial because it is primarily undertaken to overcome or suppress the internally pressuring forces that prompted the learning. Consistent with such reasoning, Assor et al. (2004) showed that conditional regard, as a facet of internal control, induced some degree of behavioral enactment, but the behavior was associated with more negative feelings because of the introjected forces that had induced it.

Present Research

The goal of the present three field studies was to examine whether framing a learning activity in terms of intrinsic versus extrinsic goal attainment as well as communicating these different goal contents in an autonomy-supportive versus internally controlling way affect early adolescents' conceptual and rote learning. In all three studies, participants read a text about the four-leaf clover, which is a simplified version of the food pyramid (http://www.nutrition.gov). Participants were told that learning to follow the guidelines of the four-leaf clover would either be helpful to attain the intrinsic goal of health and physical fitness or the extrinsic goal of physical attractiveness and beauty (Kasser & Ryan, 1996). These two goals, which were provided in either an autonomy-supportive or internally controlling fashion,

had been manipulated in a previous study by Vansteenkiste, Simons, Soenens, et al. (2004), but the target activity in that study was exercising rather than reading a text, and the participants were middle rather than early adolescents.

The reading material in the present research contained health-related information. The study of motivational factors, such as goal content and communication style, that may affect the learning of health-related information is an important topic because various studies have reported a steady increase in overweight and obesity among early adolescents over the past decade (e.g., Cole & Roede, 1999; Flegal & Troiano, 2000). Although the provision of health-related information might by itself constitute one important tool to adopt a healthier lifestyle, we suggest that the interpersonal style of presenting this information yields important implications for the learning and retention of it (Williams, Cox, Kouides, & Deci, 1999). Because the provision of such health-related information is even more relevant for obese compared with nonobese children, such children participated in Studies 1 and 2.

In all three field experiments, we examined the effect of intrinsic versus extrinsic goal framing and autonomy-supportive versus internally controlling communication style on conceptual and rote learning. In addition to short-term assessments of both aspects of learning, Studies 1 and 2 also contained long-term assessments. Furthermore, Study 1 contained an externally controlling condition in addition to an internally controlling condition. Study 2 included a control group, whereas Study 3 examined the mediating mechanisms that might explain the predicted effect on conceptual learning.

Study 1

A sample of obese early adolescents read a text about the four-leaf clover (an older version of the food pyramid). Participants were told that learning more about these issues either serves the attainment of the intrinsic goal of health and physical fitness or the extrinsic goal of physical appearance and being attractive to others. Because previous research (e.g., Probst et al., 1995) showed that being thin represents an important goal for obese early adolescents, it is of interest to explore whether framing a learning activity in terms of a highly valued extrinsic goal would motivate them to process the reading material better and to obtain higher grades. However, and perhaps in contrast to intuition, on the basis of previous research and SDT, we expected extrinsic relative to intrinsic goal framing to undermine conceptual

learning, even if the former goal is valued by these early adolescents. This hypothesis is based on the assumption that extrinsic goal framing causes an attentional shift away from the learning task. However, because extrinsic goals, due to their strategic connotation, are likely to prompt some superficial engagement in the learning activity, such differences were not expected for rote learning.

In addition to varying the goal content, the intrinsic versus extrinsic goal contents were communicated in an autonomy-supportive, internally controlling, or externally controlling fashion. The inclusion of an externally controlling condition was deemed important to understand and compare the effect of an internally controlling context because the latter context has not been operationalized in previous research. We expected that both types of controlling contexts would reduce conceptual learning on both the short term and long term, and that both would result in poorer retention of conceptual learning material over time compared with autonomy support because they both induce an external perceived locus of causality. Such differences were not predicted for rote learning because controlling contexts are likely to induce some behavioral engagement but of a less committed sort. No significant differences in achievement were expected between both controlling conditions

Finally, we investigated whether an interaction effect between goal content and social context would emerge so that early adolescents being told that their task engagement serves the attainment of an intrinsic goal and this goal being provided in an autonomy-supportive way would result in an even higher level of performance. Such a synergistic interaction effect was obtained by Vansteenkiste, Simons, Lens, Sheldon, et al. (2004) among late adolescents. In that study, it was argued that the positive effect of intrinsic goals is more likely to become salient when the goals are provided in an autonomy-supportive (rather than a controlling) way.

Method

Participants and Procedure

Sixty-six female and 64 male fifth- and sixth-grade (11 to 12 years old) obese Belgian early adolescents participated in the study ($N = 130$). Participants were Caucasian children from a middle-class background. Both the participants' parents and the directory of the schools where the study took place had filled out consent forms to allow children's participation in the study. In total, one school and 29 classes participated.

The study took place in a school where a schoolwide initiative on adopting healthy eating and drinking behaviors was organized at the time the study was conducted because the school directory had found that many of the children had serious weight problems. The present study fit within that initiative, which increases its ecological validity. The experiment took place during participants' regular classes, in which they were asked to read during 15 min a nutritional text, that is, a text about the guidelines that are offered by the four-leaf clover, an older version of the food pyramid. The text was an integral element of the curriculum and reached the level of complexity that can be expected from this age group. The text was two pages. Participants knew they would have to read the text outside the context of the present experiment, and the teachers had been involved in the selection of the reading material.

Each class group consisted of 20 to 25 pupils, with some of them obese and others not. All children in each class group were provided with a set of written instructions (about 10 lines). A research assistant who was unfamiliar with the theoretical purpose of the study randomly assigned the obese children to one of the six experimental conditions (cell sizes vary between 21 and 23) by giving them a particular set of instructions. Nonobese children received a different set of instructions (and the results of these manipulations are not reported herein). The research assistant was able to determine whether participants were obese or nonobese (and thus assign the appropriate instruction set) because all participants of each class had written down their estimated length and weight on a sheet of paper. Subsequently, they were asked to calculate their Body Mass Index (BMI) scores. Then, they wrote down these scores on a sheet of paper, which they put in front of them on their desks. If their estimated BMI scores were above 25, the research assistant gave them one of the six instruction sets that were part of the present study. If their estimated BMI score was under 25, they were assigned a different instruction set, and these early adolescents were not part of the present study. The instruction sets were of the same length so that anyone looking at them casually would not suspect there were differences among them.

Early adolescents who were selected for participation in the present study on the basis of their self-reported BMI scores also appeared to be obese according to formal criteria for obesity (Troiano & Flegal, 1998). Participants' effective degree of obesity could be calculated because a dietician assessed weight and length 1 to 7 days after participation in the experiment in the context of the school-based

initiative on health. Official weight parameters, that is, percentage overweight, were calculated for each participant by using the following formula: [BMI score/Average BMI adjusted for gender and age] × 100 (Dietz, 1998; Poskitt & European Childhood Obesity Study Group, 1995). The average BMI scores adjusted for age and sex are based on the normative data of the National Health and Nutrition Examination Survey (NHANES, 2004). A weight between 90% and 120% of the normal weight for one's length, gender, and age is considered normal; between 120% and 140% indicates overweight; between 140% and 160% indicates moderate obesity; and more than 160% indicates severe obesity (Troiano & Flegal, 1998). Participants' weight varied between 182% and 332% of normal weight with an average weight of 240% (SD = 24.70), suggesting that participants had on average 140% overweight and, hence, all met the criterion for severe obesity.

The participants read their assigned set of instructions before reading the text. Both goal content and communication style were manipulated in the instructions. Half the participants were told that following the nutritional guidelines outlined in the text was important to attain the intrinsic goal of physical health (i.e., "Doing your best to follow the guidelines of the four-leafed clover that are described in the text might help you to stay more healthy and might prevent you from becoming ill" and "Children who eat a piece of fruit each day are much more likely to remain physically fit than early adolescents who eat candy"). The other half were told that it would help them attain the extrinsic goal of appearing physically attractive to others (i.e., "Doing your best to follow the guidelines of the four-leafed clover might help you to become physically appealing to others" and "Children who eat a piece of fruit each day are much more likely to remain good-looking and attractive to others than early adolescents who eat candy").

The externally controlling context was operationalized by using explicitly controlling language such as, "you should follow the guidelines of the four-leafed clover," "you have to," and "you are expected to." The internally controlling context was operationalized by stating that "a lot of kids follow the guidelines of the four-leafed clover to feel good about themselves and to avoid feeling guilty for not doing so" and they were told that "it is important for your own good to read this text carefully." These instructions were intended to enhance the internal pressure to read the text carefully and to follow the guidelines of the four-leaf clover. In the autonomy support condition, wording such as "we invite you to," "you can decide for yourself to follow

the guidelines of the four-leafed clover," and "you might want to do your best to read this text carefully" were used instead. Participants were tested on their knowledge (both conceptual and rote learning) concerning the text immediately following the reading of the text material and again 4 weeks later. In addition to gathering performance outcomes, we also collected a broad variety of persistence measures (e.g., exercise attendance, diet attendance, and weight loss). These results are reported elsewhere (Simons, Vansteenkiste, Braet, & Deci, 2004).

Measures

Perceived autonomy. Participants rated on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*very much*) the degree to which they experienced their reading of the nutritional text as their personal choice (e.g., "I felt like it was my own choice to read the text"; 4 items, α = .80). This measure was used as a manipulation check.

Performance. Participants took a first test (20 questions) directly following the reading of the text material and filled out a second but different test (10 questions) 4 weeks after the experiment. The test questions had been constructed by the teachers and had been used on previous occasions outside this experiment. The children would have had to respond to the questions even if they had not been involved in the study. Half the questions of each test assessed rote learning, and the other half assessed conceptual learning; these different types of questions were presented in random order. As for the rote learning, participants were asked to insert a single word that was missing from a sentence that was literally taken from the reading material (e.g., "How many portions of fruit do you need to eat each day?" or "Which disease does Céline suffer from?"). Two independent and trained raters, blind to the nature of the study, determined whether the single word that needed to be inserted in each of the sentences was correct (1) or incorrect (0). There was perfect agreement between the two raters scoring each question, as indexed by a perfect Pearson correlation between both sets of rating scores. As for the conceptual learning, participants were given a set of questions that addressed the core ideas that were discussed in the text (e.g., "Explain what hypertension means" or "Explain why obesity yields various health problems"). The correct answers could not be literally found in the reading material; instead, the participants needed to have processed the reading material more deeply and thoughtfully to provide a meaningful and correct answer to these questions.

Two independent and trained raters who were blind to the nature of the study evaluated the answers by indicating whether the answer was correct (1) or incorrect (0). Interrater reliability as assessed by Pearson correlation was .92.

Results and Discussion

Preliminary Analyses

The correlations between the outcome variables are in the bottom half of Table 1. Perceived autonomy was positively correlated with both assessments of conceptual learning but was unrelated to both measures of rote learning. Conceptual learning at Time 1 was not correlated with rote learning at Time 1, but conceptual learning at Time 2 was strongly and negatively correlated with rote learning at Time 2. Both measures of conceptual learning and both measures of rote learning were positively intercorrelated.

To examine whether the autonomy support versus internal control and external control manipulations produced the intended effect, we used a one-way analysis of variance (ANOVA). The overall F value was significant, $F(2, 127) = 116.5$, $p < .001$. Follow-up contrast analyses indicated that participants in the autonomy support condition ($M = 3.08$, $SD = .28$) experienced their task participation as more autonomous compared with participants in either the internal control condition ($M = 2.10$, $SD = .30$), $t(127) = 15.01$, $p < .001$, or the external control condition ($M = 2.44$, $SD = .33$), $t(127) = 9.06$, $p < .001$. Participants in the internal control condition also experienced their task engagement as less autonomous compared with participants in the external control condition, $t(127) = 5.31$, $p < .001$.

Finally, a one-way ANOVA indicated that participants' degree of obesity significantly differed across conditions, $F(5, 129) = 8.39$, $p < .001$. Because participants who are more overweight might put more effort in reading the text, we controlled for degree of obesity in predicting achievement outcomes.

Primary Analyses

ANOVA. Table 2 presents the means and standard deviations of the six cells for the outcome variables. First, we performed a three-way multivariate analysis of covariance (MANCOVA) using gender, goal content (intrinsic, extrinsic), and communication style (autonomy support, internal control, external control) as predictors for the four dependent variables (conceptual and rote learning at Time 1 and Time 2). Results showed main effects for goal content, $F(4, 114) = 4.38$, $p < .01$, $\eta^2 = .13$, and communication style, $F(8, 230) = 12.13$, $p < .001$, $\eta^2 = .30$, but not for the covariate degree of obesity or for gender. The interaction between goal content and communication style did not reach significance, $F(8, 230) = .89$, *ns*, and none of the interactions between gender and any manipulated variable was significant. Because gender did not have any effect, we did not control for gender in further analyses.

We then performed four univariate ANCOVAs. After controlling for degree of obesity, goal content significantly affected conceptual learning for both the short-term assessment, $F(1, 123) = 7.89$, $p < .01$, $\eta^2 = .06$, and the long-term assessment, $F(1, 123) = 4.11$, $p < .05$, $\eta^2 = .03$, but it did not predict rote learning at the short term, $F(1, 123) = 3.62$, *ns*, or at the long term, $F(1, 123) = 1.92$, *ns*. As can be seen in Table 2, intrinsic goal framing enhanced conceptual learning compared with extrinsic goal framing. As for communication style, a main effect was found on all four achievement outcomes: short-term conceptual learning, $F(2, 123) = 43.09$, $p < .001$, $\eta^2 = .41$; long-term conceptual learning, $F(2, 123) = 25.99$,

Table 1

Means and Intercorrelations Between Outcome Variables for Study 1 (Below Diagonal) and for Study 2 (Above Diagonal)

	M						
	Study 1	Study 2	1	2	3	4	5
1. Perceived autonomy	2.29	3.14	—	.23*	.01	.24*	.06
2. Conceptual learning T1	6.10	6.66	.51**	—	− .42**	.51**	− .33**
3. Rote learning T1	7.66	7.40	− .04	− .07	—	− .11	.38**
4. Conceptual learning T2	2.62	2.91	.45**	.40**	.11	—	− .63**
5. Rote learning T2	3.62	3.48	− .14	.04	.29**	− .57**	—

Note. T1 = Time 1; T2 = Time 2.
*$p < .05$. **$p < .01$.

Table 2

Cell Means and Standard Deviations for the Six Experimental Conditions: Study 1 (N = 130)

	Intrinsic goal		Extrinsic goal	
	M	SD	M	SD
Autonomy support				
Short-term achievement				
Conceptual	7.77	1.19	6.91	1.04
Rote	7.59	1.18	7.35	1.23
Long-term achievement				
Conceptual	3.64	1.00	3.30	0.82
Rote	3.50	0.91	3.30	0.76
Internal control				
Short-term schievement				
Conceptual	5.57	1.21	5.10	1.04
Rote	8.33	0.97	7.81	1.12
Long-term achievement				
Conceptual	2.29	1.06	1.67	1.11
Rote	4.10	9.70	3.76	1.00
External control				
Short-term achievement				
Conceptual	5.68	1.09	5.43	0.93
Rote	7.68	1.32	7.24	1.14
Long-term achievement				
Conceptual	2.45	0.96	2.29	1.10
Rote	3.52	0.96	3.59	0.68

$p < .001$, $\eta^2 = .30$; short-term rote learning, $F(2, 123) = 4.23$, $p < .05$, $\eta^2 = .07$; and long-term rote learning, $F(1, 123) = 4.30$, $p < .05$, $\eta^2 = .07$. Goal content and communication style explained between 9% and 45% of the variance in the achievement outcomes (all $ps < .001$).

Finally, we performed follow-up contrast analyses to explore which communication styles differed from each other. Three contrasts were tested. Autonomy support was compared with both controlling contexts, and the two controlling contexts were compared with each other. Autonomy support positively predicted conceptual learning at the short term, $t(127) = 7.47$, $p < .001$, and long-term, $t(124) = 5.03$, $p < .001$, compared with external control, but no differences were found for rote learning at the short term, $t(127) = .01$, *ns*, and long term, $t(127) = .89$, *ns*. Autonomy support also resulted in better conceptual learning at both the short term, $t(127) = 8.35$, $p < .001$, and long term, $t(127) = 6.81$, $p < .001$, compared with internal control. However, internal control produced higher rote learning at both the short term, $t(127) = -2.41$, $p < .05$, and long term, $t(127) = -2.92$, $p < .05$, compared with autonomy support. Finally, no differences were found between internal control and external control for conceptual learning

at the short term, $t(127) = .93$, *ns*, and long term, $t(127) = 1.79$, *ns*, but internal control resulted in more rote learning at both the short term, $t(127) = -2.38$, $p < .05$, and long term, $t(127) = -2.02$, $p < .05$.

Long-Term Impact on Achievement. Finally, to determine whether both manipulations would predict retention of learned information over time, we performed an additional set of ANCOVAs using goal content and communication style as the independent variables in the prediction of long-term achievement after controlling for short-term achievement (i.e., the covariate). As for communication style, we examined only the effect of autonomy support versus internal control in this analysis because this constitutes the crucial type of controlling communication style in the present research. Two ANCOVAs were performed: one including conceptual learning as the dependent variable and the other including rote learning as the dependent variable. First, both intrinsic versus extrinsic goal framing, $F(1, 82) = 4.10$, $p < .05$, $\eta^2 = .05$, and autonomy support versus internal control, $F(1, 82) = 24.12$, $p < .001$, $\eta^2 = .23$, significantly predicted conceptual learning at the long term after controlling for conceptual learning at the short term. The interaction did not reach significance, $F(1, 82) = .47$, *ns*. Goal content and communication style explained an additional 19% ($p < .001$) of the variance in conceptual learning at the long term after controlling for short-term conceptual learning. A second ANCOVA indicated that internal control significantly predicted rote learning at the long term, $F(1, 82) = 5.53$, $p < .05$, $\eta^2 = .06$, compared with autonomy support, after controlling for short-term rote learning. Neither goal content, $F(1, 82) = 1.31$, *ns*, nor the interaction effect, $F(1, 82) = .07$, *ns*, reached significance. Communication style predicted an additional 7% ($p < .05$) of the variance in long-term rote learning after controlling for short-term rote learning.

These results provide initial evidence for the hypothesis that emphasizing the utility of a learning activity to attain an extrinsic rather than an intrinsic goal decreases early adolescents' conceptual learning at both the short term and long term and results in poorer retention of conceptual learning material. Presumably, extrinsic goal framing tends to shift early adolescents' attention away from the learning activity and to the external signs of self-worth and success, thereby impeding a conceptual integration of the learning material. It is notable that extrinsic goal framing contexts elicited some processing of

information, probably because of the strategic approach that characterize these goal contents: Participants in the extrinsic goal condition scored equally high on rote learning as participants in the intrinsic goal condition.

Although an internally controlling context may intuitively seem to be less harmful for children's performance compared with externally controlling contexts, we found that both types of control exercise an equally debilitating effect on conceptual learning. Both types of controlling environments led early adolescents to integrate and conceptualize the learning information less thoughtfully and to retain less conceptual learning information over a longer period than when their feelings of autonomy and self-initiative were supported. From an SDT perspective, these results should come as no surprise because internally controlling communication styles can be assumed to elicit an introjected regulation for performing an activity in addition to an external regulation, resulting in outcomes that are at least as negative as externally controlling communication styles. However, internal control produced some learning, or at least processing of information, because participants in the internal control condition obtained higher rote learning scores at both the short term and long term compared with participants involved in the autonomy support and external control conditions. Also, they obtained higher scores for rote learning over time.

Finally, in contrast to previous studies (Vansteenkiste, Simons, Lens, Sheldon, et al., 2004), no interaction effect emerged between both factors; two main effects were found, but both factors did not work in a synergistic way to create an additional positive effect on performance.

Study 2

The goal of Study 2 was to replicate and extend the findings of Study 1. We expected intrinsic goal framing and autonomy support to enhance children's conceptual, but not rote, learning, as was found in Study 1. Study 2 also explored the more precise effects of goal content and communication style by including a control group. Participants in the control group did not read any instructions before their text reading, but they directly read the text material. Hence, all four experimental groups differed from the control group with respect to both experimental manipulations.

Four a priori predictions were tested with contrast analyses. We expected that participants involved in an experimental condition containing both facilitating factors (autonomy support and intrinsic goals) would obtain higher scores for conceptual learning than would participants in the control group. The conceptual learning in the experimental condition containing both debilitating factors (internal control and extrinsic goal) would be undermined compared with the control group.

The differences between the control group and a condition in which one facilitating and one debilitating factor were present (the autonomy-support/extrinsic goal condition and the internal control/intrinsic goal condition) were examined in an exploratory fashion because there is no clear theoretical basis within SDT to predict the direction of these effects. If the negative effects associated with the debilitating factors counterbalance the expected positive effects of the facilitating factors, no differences with the control group would be expected for conceptual learning. If, however, the effect of the facilitating factor is stronger than the effect of the debilitating factor, higher conceptual learning would be expected in the experimental conditions compared with the control condition. If the opposite is true, participants in the control condition would obtain higher conceptual learning scores than would participants in the two experimental conditions in which only one facilitating factor was present.

Method

Participants and Procedure

Fifty-nine female and 54 male 11- to 12-year-old obese Belgian early adolescents ($N = 113$) participated in the study. Participants were Caucasian children from a middle-class background. As in Study 1, participants read a text about the four-leaf clover. In contrast to Study 1, participants did not read the text in small groups during their regular classes but instead read the text individually during their annual visit at a medical center. Participants' parents, the directory of the schools participants came from, and the directory of the medical center provided written consent forms for children's participation in the study. The participants all lived in the same region; they were going to different schools but all visited the same medical center. Participants came from 40 schools and 90 classes. During their visit at the medical center, all participants had their weight and length assessed, allowing the nurses at the medical center to determine children's degree of obesity (i.e., percentage overweight) in the same way as had been done in Study 1. If children appeared to have a weight that was above 140% of normal weight for

their length, they were set apart in a room to read a text about the four-leaf clover on their own. In other words, if children did not meet the criterion of inclusion for overweight (Van Wynckel & van Mil, 2001), they did not read the text. Participants' weight varied between 141% and 178% of normal weight, with an average weight of 152% (SD = 7.02). Although this sample was less overweight than that in Study 1, participants nevertheless were on average 52% overweight and all met the criterion for moderate obesity.

The same instructions as in Study 1 (except for external control, which was not manipulated in Study 2) were randomly distributed among early adolescents in the experimental conditions (ns = 21–23). Participants in the control group (n = 26) were not administered any set of instructions but were casually invited to read a text about the four-leaf clover. Participants all read the text during 15 min and then filled out a questionnaire assessing their perceived autonomy while reading. Subsequently, all participants took a test that asked 20 questions concerning their understanding of the reading material. Four weeks later, all children who participated in the study were invited for a follow-up visit at the medical center. In this second visit, participants of the present study took a second test that contained 10 questions.

Measures

Perceived autonomy was assessed in the same way as in Study 1 ($\alpha = .77$). The same written tests were administered to the participants as in Study 1, and a research assistant in the medical center, who was blind to the children's condition assignment and was unfamiliar with the theoretical purpose of the study, graded the tests.

Results and Discussion

Preliminary Analyses

The correlations among the outcome variables are in the top half of Table 1. As in Study 1, perceived autonomy was positively correlated with both assessments of conceptual learning, whereas it was unrelated to rote learning. Conceptual and rote learning at Time 1 were negatively correlated, and both aspects of learning at Time 2 were also negatively correlated. Conceptual learning at Time 1 was positively correlated with conceptual learning at Time 2, and rote learning at Time 1 was also positively correlated with rote learning at Time 2.

Next, we performed an independent sample t test to examine whether the autonomy-supportive versus internally controlling instruction was experienced in the intended way. As in Study 1, participants in the autonomy-supportive condition ($M = 3.63$, $SD = .31$) engaged in a more autonomous and willing manner in the activity than did those in the internally controlling condition ($M = 2.65$, $SD = .36$), $t(85) = 13.69$, $p < .001$. Furthermore, contrast analyses indicated that participants in the control group had lower perceived autonomy scores than did participants in either the autonomy-support/intrinsic goal condition, $t(108) = -5.28$, $p < .001$, or the autonomy-support/extrinsic goal condition, $t(108) = -3.27$, $p < .001$, whereas they scored higher on perceived autonomy compared with either the internal control/intrinsic goal condition, $t(108) = 4.61$, $p < .001$, or the internal control/extrinsic goal condition, $t(108) = 4.21$, $p < .001$.

Finally, as for participants' degree of obesity (i.e., percentage overweight), a one-way ANOVA indicated that degree of obesity significantly differed across the five conditions, $F(4, 112) = 9.01$, $p < .001$. Hence, we introduced participants' degree of obesity as a covariate in the prediction of achievement.

Primary Analyses

ANOVA. The means and standard deviations of the four achievement assessments for the four experimental groups and the control group are in Table 3. First, we conducted a three-way MANCOVA on the four performance outcomes. After controlling for degree of obesity, $F(4, 79) = .64$, *ns*, and gender, $F(4, 79) = .64$, *ns*, results showed main effects for goal content, $F(4, 79) = 6.45$, $p < .001$, $\eta^2 = .25$, and communication style, $F(4, 79) = 21.00$, $p < .001$, $\eta^2 = .52$, but no interaction effect was found, $F(4, 79) = .67$, *ns*. Also, none of the interactions between gender and any of the independent variables reached significance. Hence, we did not control for gender in subsequent analyses.

We then performed four univariate ANCOVAs. We found that intrinsic goal framing enhanced conceptual learning at the short term, $F(1, 82) = 35.64$, $p < .001$, $\eta^2 = .30$, and at the long term, $F(1, 82) = 62.38$, $p < .001$, $\eta^2 = .43$, compared with extrinsic goal framing. In contrast, extrinsic goal framing promoted rote learning at the short term, $F(1, 82) = 9.09$, $p < .01$, $\eta^2 = .10$, and long term, $F(1, 82) = 28.99$, $p < .001$, $\eta^2 = .26$, compared with intrinsic goal framing. Furthermore, autonomy support enhanced conceptual learning at both the short term, $F(1, 82) = 15.74$, $p < .001$, $\eta^2 = .16$, and long term,

Table 3
Cell Means and Standard Deviations for the Four Experimental Conditions and the Control Group: Study 2 (N = 113)

	Autonomy support intrinsic goal (n = 22)		Autonomy support extrinsic goal (n = 21)		Internal control intrinsic goal (n = 22)		Internal control extrinsic goal (n = 22)		Control group (n = 26)	
	M	SD	M	SD	M	SD	M	SD	M	SD
Short-term achievement										
Conceptual	8.00	1.20	6.55	1.41	7.10	1.00	5.09	1.57	6.62	1.10
Rote	7.18	1.14	7.59	1.40	6.86	1.01	7.91	1.31	7.42	1.17
Long-term achievement										
Conceptual	4.05	0.84	2.45	0.91	3.29	0.72	1.77	0.97	3.00	0.85
Rote	3.00	1.02	3.95	0.72	2.90	0.83	3.86	0.77	3.62	0.90

$F(1, 82) = 11.83$, $p < .001$, $\eta^2 = .13$, compared with internal control. Finally, none of the interactions between goal content and communication style was significant: short-term conceptual learning, $F(1, 82) = 1.04$, *ns*; long-term conceptual learning, $F(1, 82) = .06$, *ns*; short-term rote learning, $F(1, 82) = 2.00$, *ns*; long-term rote learning, $F(1, 82) = .04$, *ns*. Goal framing and communication style explained between 11% and 51% of the variance in the achievement outcomes (all $ps < .001$).

Contrast analyses. The other goal of Study 2 consisted of examining whether the experimental conditions differed from the control group. Contrast analyses were used to test the four a priori formulated contrasts. Participants in the autonomy-support/intrinsic goal condition obtained higher performance scores on short-term conceptual learning, $t(108) = 3.77$, $p < .001$, and long-term conceptual learning, $t(108) = 4.18$, $p < .001$, compared with participants in the control group. Both conditions did not differ with respect to short-term rote learning, and participants in the control group obtained higher scores for long-term rote learning, $t(108) = -2.47$, $p < .001$, compared with participants in the autonomy-support/intrinsic goal condition. Participants involved in the extrinsic goal/internal control condition had lower scores for conceptual learning at both the short term, $t(108) = -4.15$, $p < .001$, and the long term, $t(108) = -4.91$, $p < .001$, compared with control group participants. Both groups did not differ for both assessments of rote learning. Next, none of the achievement scores of participants involved in the autonomy-support/extrinsic goal condition differed from the control group participants except for long-term conceptual learning, $t(108) = 2.18$, $p < .05$: Participants in the autonomy-support/extrinsic goal condition obtained lower conceptual learning scores compared with those in

the control group. Finally, the participants in the intrinsic goal/internal control condition did not differ from the control group on any achievement outcome except for long-term rote learning, $t(108) = -2.82$, $p < .01$: Participants in the control group obtained higher rote learning scores compared with those in the intrinsic goal/internal control condition.

Long-Term Impact on Achievement. As in Study 1, two ANCOVAs were conducted to determine whether goal content and communication style would predict both long-term conceptual and rote learning after controlling for the initial conceptual and rote learning scores. The first ANCOVA indicated that intrinsic versus extrinsic goal framing, $F(1, 82) = 34.53$, $p < .001$, $\eta^2 = .30$, and autonomy support versus internal control, $F(1, 82) = 7.34$, $p < .01$, $\eta^2 = .08$, positively predicted long-term conceptual learning after controlling for short-term conceptual learning. The interaction between goal content and communication style was not significant, $F(1, 82) = .19$, *ns*. Goal content and communication style explained an additional 21% of the variance ($p < .001$) in long-term conceptual learning. The second ANCOVA indicated that intrinsic versus extrinsic goal framing negatively predicted long-term rote learning, $F(1, 82) = 20.16$, $p < .001$, $\eta^2 = .20$, whereas communication style, $F(1, 82) = .28$, *ns*, and the interaction term, $F(1, 82) = .09$, *ns*, did not reach significance after controlling for initial rote learning scores.

To summarize, the results of Study 2 replicate the findings of Study 1 while extending them. As in Study 1, both intrinsic goal framing and autonomy support promoted conceptual learning at both times and resulted in better retention of conceptual learning material over time, but no interaction between

intrinsic goals and autonomy support was found. Such main effects were not found for rote learning. In contrast, extrinsic goal framing (but not internal control) promoted rote learning at both times and even resulted in a better retention of such factual information over time compared with intrinsic goal framing. In addition, the combined presence of autonomy support and intrinsic goal content resulted in a better conceptual integration of the learning information but undermined rote learning at the long term (but not the short term) compared with a control group. In contrast, the combination of internal control and extrinsic goal rationale undermined conceptual but not rote learning compared with the control group. Finally, when one facilitating and one debilitating factor were provided, early adolescents' conceptual and rote learning at both moments generally neither increased nor decreased compared with the control group, presumably because the negative performance effects associated with a debilitating factor (i.e., internal control or extrinsic goal framing) were neutralized by the positive effects associated with the facilitating factor (i.e., intrinsic goal framing or autonomy support), resulting in a null effect. Having shown the negative performance effects caused by internal control and extrinsic goal framing, the next step was to gain insight into the mechanisms that might explain these effects. This was the primary goal of Study 3.

Study 3

In addition to again examining the effects of intrinsic goal framing and autonomy-supportive communication style on conceptual and rote learning, the following mediational hypotheses were formulated. As for goal content, we reasoned, in line with Williams et al. (2000) and Vansteenkiste, Simons, Lens, Soenens, et al. (2004), that linking task engagement with an extrinsic goal is likely to orient people's attention to external criteria or signs of self-worth. Such an outward orientation distracts learners from the learning task and impedes a full absorption of the reading material. This reduction in task involvement, in turn, was expected to account for the negative impact on conceptual learning.

As for communication styles, we hypothesized that the effect of autonomy support versus internal control on conceptual learning would be mediated by children's level of willing and uncoerced engagement in the learning task. Various studies among older age groups demonstrated the mediating role of perceptions of autonomy in the effect of autonomy-supportive versus externally controlling contexts on

achievement (e.g., Vansteenkiste, Simons, Lens, Sheldon, et al., 2004; Williams et al., 2004). In a similar vein, we investigated whether the effect of internal control versus autonomy support on achievement would be mediated by an increased controlled regulation (i.e., external and internal regulation), a reduced autonomous regulation (i.e., intrinsic and identified regulation), or both types of regulation.

We also expected internally controlling environments to hamper a committed task engagement because a task-involved absorption in the reading material is promoted most when people's autonomous motivation to engage in the activity is supported (Deci & Ryan, 2000; Grolnick & Ryan, 1987). In contrast to Studies 1 and 2, participants in Study 3 were nonobese. We deemed it important to examine our hypotheses in a nonobese sample, both because we wanted to assess the generality of the effects and because the learning of health-related information is also important for these children.

Method

Participants and Procedure

Forty-two female and 38 male 11- to 12-year-old Belgian early adolescents ($N = 80$) participated in the study. As in Studies 1 and 2, participants were Caucasian children from a middle-class background. In contrast to Studies 1 and 2, participants' percentage of overweight was not assessed. Hence, it can be expected that participants' weight scores in the present sample represent the normal weight range for their age group. Both the parents of the children and the directory of the schools that participated in the study provided a written consent form. As in Study 1, a schoolwide initiative on adopting more healthy eating habits took place at the time the study was conducted. The present study fit within that larger project, increasing its ecological validity. Participants read the same nutritional text (i.e., a text about the guidelines that are offered by the four-leaf clover) during their regular classes as did the participants involved in Studies 1 and 2. The nutritional text was part of their regular curriculum. Children participated in the experiment in small groups of 20 to 30 pupils. The same four instructions as in Study 2 were randomly distributed among participants ($n = 20$ in each condition). Following the reading of the learning material (15 min), children filled out a set of questionnaires assessing their perceived autonomy during their task engagement; their external, introjected, identified, and intrinsic reasons for reading the text; and their task involvement. Then,

participants took a test that asked 20 questions concerning their understanding of the reading material.

Measures

Perceived autonomy. The same scale was used as in Studies 1 and 2. Because two items considerably reduced the internal consistency of the four-item scale, they were omitted. The intercorrelation between both remaining items was .89 ($p < .001$).

Relative autonomy. Participants indicated on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*very much*) to what extent they had engaged in the reading activity for external reasons (caused by external forces or pressures; six items, e.g., "I read the text because others told me I should read it"; $\alpha = .90$), for introjected reasons (derived from internal pressures such as guilt or the intention to preserve one's self-esteem; six items, e.g., "I read the text because I would feel bad about myself if I did not read it"; $\alpha = .95$), for identified reasons (reflecting the person's self-endorsed values; five items, e.g., "I read the text because its content is personally meaningful to me"; $\alpha = 92$), and for intrinsic reasons (motivated by intrinsic task enjoyment; four items, e.g., "I read the text because I found it very interesting"; $\alpha = .87$). The items were taken from the Self-Regulation Questionnaire (SRQ) – Academic, developed by Ryan and Connell (1989), and were adapted to the current situation. The subscales can be combined into a relative autonomy index by weighting each style in accord with its place on the relative autonomy continuum (Ryan & Connell, 1989), but a relative autonomy score can also be constructed by subtracting the controlled motivation composite (introjection+external regulation) from the autonomous motivation composite (intrinsic motivation+identified regulation), as was done by Sheldon et al. (2004). The first approach is legitimate when the four subscales form a reasonable simplex pattern (Guttman, 1958), with each subscale correlating more positively (or less negatively) with subscales closer to it and less positively (or more negatively) with subscales farther from it. Because such a simplex pattern was not obtained in the present study, this relative autonomy score could not be created. In contrast, because the autonomous ($\alpha = .95$) and controlled motivation ($\alpha = .96$) composite scores were strongly negatively correlated, $r(80) = -.82$, $p < .001$, we created a relative autonomy score by subtracting controlled motivation from autonomous motivation and used this indicator of relative autonomy in all analyses.

Task involvement. Before filling out a set of items that assess task involvement, early adolescents were asked to think about the type of goals they had in mind when reading the text. Task involvement, which reflects the degree to which early adolescents are fully absorbed in the reading task, was assessed with five items (e.g., "My primary goal is to fully understand the content of this text"). Items were taken from previously validated questionnaires (Midgley et al., 1997; Pintrich, Smith, Garcia, & McKeachie, 1991), but they were adapted to the present situation by changing the stem from "studying this course" to "reading this text" (see also Simons, Dewitte, & Lens, 2000). Participants recorded their agreement with each item by circling a number between 1 (*completely disagree*) and 4 (*completely agree*). Internal consistency was .85.

Test performance. The same test was given to the participants as the test used at Time 1 in Studies 1 and 2.

Results and Discussion

Preliminary Analyses

The correlations between each pair of outcome variables are presented in Table 4. Perceived autonomy was positively related to task involvement, relative autonomy, and conceptual learning, but it was unrelated to rote learning. Both task involvement and relative autonomy were positively intercorrelated—both positively predicted conceptual learning—but they were unrelated to rote learning. Conceptual and rote learning were negatively correlated.

An independent t test indicated that participants in the autonomy support condition ($M = 3.11$, $SD = .43$) engaged in a more willing manner in the reading activity compared with those in the internal control condition ($M = 1.40$, $SD = .31$), $t(78) = 20.54$, $p < .001$.

Primary Analyses

ANOVA. First, we performed a three-way MANOVA using the independent variables of goal

Table 4

Means and Intercorrelations Between Mediating and Dependent Variables: Study 3

	M	1	2	3	4
1. Perceived autonomy	2.26				
2. Task-involvement	2.54	.73**			
3. Relative autonomy	0.55	.89**	.86**		
4. Conceptual learning	7.25	.41**	.27*	.42**	
5. Rote learning	7.79	.04	.09	.02	−.54**

*$p < .05$. **$p < .01$.

Table 5

Cell Means and Standard Deviations for the Four Experimental Conditions: Study 3 (N = 80)

	Intrinsic goal		Extrinsic goal	
	M	SD	M	SD
Autonomy support				
Task-involvement	3.02	0.48	2.79	0.34
Relative autonomy	1.06	0.49	0.72	0.47
Conceptual learning	7.25	1.21	6.30	0.86
Rote learning	7.95	1.47	7.65	1.18
Internal control				
Task involvement	2.37	0.28	2.00	0.33
Relative autonomy	− 0.61	0.29	− 1.17	0.26
Conceptual learning	7.85	1.18	7.60	1.27
Rote learning	7.50	1.19	8.05	1.05

content, communication style, and gender on the variables measuring task involvement, relative autonomy, and both learning outcomes. Results showed main effects for goal content, $F(4, 69) = 7.62$, $p < .001$, $\eta^2 = .31$, and communication style, $F(4, 69) = 113.61$, $p < .001$, $\eta^2 = .87$, but no interaction effect was found, $F(4, 69) = 1.02$, *ns*. Gender did not have any effect, and none of the interactions between gender and the manipulated variables reached significance. Hence, we did not control for gender in any subsequent analyses.

We then performed four univariate ANOVAs. Table 5 presents the means and standard deviations of the mediating and outcome variables in the four conditions. As predicted, we found that intrinsic goal framing resulted in a higher task involvement, $F(1, 76) = 13.50$, $p < .001$, $\eta^2 = .15$; higher relative autonomy, $F(1, 76) = 26.93$, $p < .001$, $\eta^2 = .26$; and more conceptual learning, $F(1, 76) = 5.50$, $p < .05$, $\eta^2 = .07$, compared with extrinsic goal framing. No differences were found for rote learning, $F(1, 76) = .21$, *ns*. As for communication style, autonomy support resulted in increased task involvement, $F(1, 76) = 77.77$, $p < .001$, $\eta^2 = .51$; higher relative autonomy, $F(1, 76) = 414.33$, $p < .001$, $\eta^2 = .85$; and higher conceptual learning, $F(1, 76) = 13.82$, $p < .001$, $\eta^2 = .15$. No differences were found for rote learning, $F(1, 76) = .01$, *ns*. None of the interactions between goal content and communication style reached significance. The amount of variance explained in the outcomes varied between 22% and 86% (all ps < .001).

Mediational analyses. A second goal of Study 3 was to examine whether the impact of goal content on performance was mediated by task involvement and whether the effect of type of communication style was mediated by relative autonomy. Two sets of

mediational analyses were performed. Each test consisted of checking for the following four necessary conditions for strict mediation (Kenny, Kashy, & Bolger, 1998): (a) the independent variable affects the dependent variable; (b) the independent variable affects the mediator variable; (c) the mediator affects the dependent variable, even after controlling for the independent variable; and (d) the effect of the independent on the dependent variable disappears after statistical controlling for the mediator. Before examining mediation through linear regression analyses, the goal content and communication style dimensions were dummy coded by assigning a value of 1 to extrinsic goal framing and internal control and a value of 2 to intrinsic goal framing content and autonomy support.

First, linear regression analyses showed that both intrinsic versus extrinsic goal framing and autonomy support versus internal control goal framing positively predicted conceptual learning (βs = .24 and .38, $p < .05$ and $p < .01$, respectively), suggesting that the first requirement for mediation was fulfilled. Both manipulations were unrelated to rote learning; hence, the mediational analyses for rote learning could not be continued. Second, intrinsic versus extrinsic goal framing significantly affected task involvement ($\beta = .28$, $p < .05$), whereas autonomy support versus internal control significantly predicted relative autonomy ($\beta = .89$, $p < .01$), indicating that the second condition for mediation was fulfilled. Third and fourth, the mediator task involvement significantly affected conceptual learning after entering the independent variable goal content in the first step ($\beta = .23$, $p < .01$), whereas the significant main effect of goal content on performance became nonsignificant (drop in β from .24 to .17, *ns*), indicating that task involvement mediates the effect of goal content on conceptual learning. This pattern of mediational findings is displayed in Figure 1. As for communication style, the mediating variable relative autonomy significantly predicted conceptual
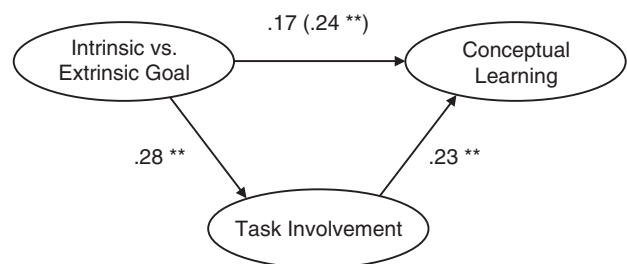

Figure 1. Task involvement as a mediator in the direct effect of intrinsic versus extrinsic goal framing on conceptual learning. **$p < .01$.
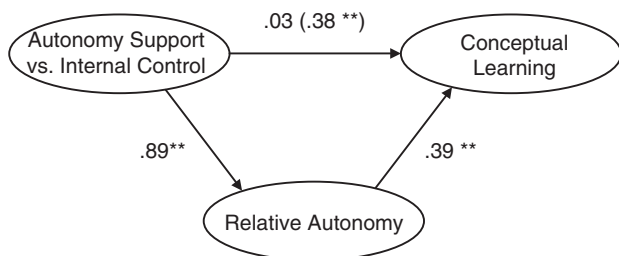
Figure 2. Relative autonomy as a mediator in the direct effect of autonomy support versus internal control on conceptual learning. **p < .01.

learning ($\beta = .39$, $p < .01$) after entering the independent variable communication style in the first step, whereas the significant effect of communication style disappeared (drop in β from .38 to .03, *ns*). Figure 2 shows this pattern of mediational findings.

The results of Study 3 indicate that both intrinsic goal framing and autonomy support promote task involvement and result in a more autonomous regulation of learning compared with extrinsic goal framing and internal control. As found in Studies 1 and 2, both intrinsic goal and autonomy support enhanced conceptual learning, but such effects were not found for rote learning. Finally, the positive effect of intrinsic versus extrinsic goal framing was mediated by task involvement, whereas the effect of autonomy support versus internal control was explained by participants' relative autonomy for studying.

General Discussion

The goal of the present research was to investigate the effect of intrinsic versus extrinsic goal framing and autonomy-supportive versus internally controlling communication style on early adolescents' conceptual and rote learning. Several interesting findings emerged.

Intrinsic Versus Extrinsic Goal Framing

Previous studies (e.g., Vansteenkiste, Simons, Lens, Sheldon, et al., 2004; Vansteenkiste, Simons, Soenens, et al., 2004) have investigated the impact of different types of situationally induced goal contents (intrinsic vs. extrinsic) on performance among middle and late adolescents. However, these issues have not been examined among early adolescents, and no distinction has been made in these studies between different aspects of learning, that is, conceptual versus rote learning.

In line with this earlier work, the present experimental studies demonstrated that intrinsic goal fram-

ing consistently resulted in better conceptual integration of the learning material compared with extrinsic goal framing. In all five cases where conceptual learning was assessed across the three field studies, participants in the intrinsic goal condition obtained superior scores compared with participants who were studying in the service of extrinsic goals. Moreover, extrinsic goal framing does not only yield immediate conceptual learning deficits but it also reduces long-term retention of the conceptual learning material, as shown in Studies 1 and 2. Presumably, intrinsic goals, because of their link with individuals' inner-growth tendencies, are more likely to lead to an open and flexible processing of the learning material, which is required for conceptual integration to occur. It is notable that the negative impact of extrinsic goal framing on conceptual learning was equally high among two samples of obese children, although the extrinsic goal content of physical attractiveness better matched with these participants' own extrinsic aspirations for being thin (Probst et al., 1995).

Furthermore, Study 3 showed that the debilitating impact of extrinsic goal framing on conceptual learning is probably due to the induction of a different approach of learning. Specifically, the attention of early adolescents in the extrinsic goal condition shifted from grasping and elaborating the content of the reading material (task involvement) toward the external signs of worth, thereby distracting participants from the learning activity itself. In addition, the present study revealed that this reduced task involvement explained, at least in part, the goal content effect on achievement, replicating an earlier finding by Vansteenkiste, Simons, Lens, Soenens, et al. (2004) among late adolescents.

In contrast to these striking effects on conceptual learning, intrinsic goal framing did not result in better rote learning compared with extrinsic goal framing. The opposite appears more likely to be true: In two of the five assessments of rote learning, we found that extrinsic goal (rather than intrinsic goal) framing positively predicted a more literal and factual memorization of the learning material. These findings fit with our hypothesis that extrinsic goals are likely to induce a more strategic approach to learning. Learning in the service of extrinsic goals prompts behavioral engagement in the activity because the learning is seen as an important route to obtain the extrinsic goal. However, individuals' engagement and attention under these extrinsic goal circumstances are more likely to be more narrowly focused and rigid, which is detrimental for their conceptual learning, but yield some positive effects for the direct memorization of learning material.

Taken together, we believe that the current results help refine other researchers' conclusion (e.g., Assor, Kaplan, & Roth, 2002; Cordova & Lepper, 1996; Deci, Eghrari, Patrick, & Leone, 1994) that instructors should contextualize learners' learning material by indicating its relevance or utility value (Eccles & Wigfield, 2002). If instructors provide a specific rationale to learners to help them understand the value of the learning, they might better indicate its intrinsic goal relevance rather than point out its extrinsic goal utility. Indeed, not all types of goal framing, in spite of increasing the perceived utility of the learning, foster conceptual learning to the same extent.

Autonomy Support Versus Internal Control

Another goal of this research was to explore whether the way these different goal contents are communicated to early adolescents affects their conceptual and rote learning. Specifically, we focused on the degree to which the social context provided opportunities for self-initiative and choice versus control. A specific type of controlling environment was studied, that is, a subtle and covert rather than an explicit and overt type of control. Specifically, we triggered the internal controlling forces that are available within early adolescents by indirectly inducing feelings of guilt ("A lot of kids feel guilty for not learning more about the four-leafed clover") and by using self-esteem contingencies ("You might feel better about yourself when you do your best to learn more about the four-leafed clover").

On the basis of SDT, we reasoned that internal control would undermine conceptual learning by inducing an external perceived locus of causality for engaging in learning. Studies 1 to 3 systematically confirmed this hypothesis, and Study 1 demonstrated that the debilitating effect of internal control on achievement is not different from the effect of external control. Furthermore, Study 3 provided insight into the explanatory mechanism underlying the internal control effect. An internally controlling communication style (as opposed to an autonomy-supportive communication style) was found to undermine children's conceptual learning because children start to regulate their task participation in a less autonomous manner. In short, the present studies both complement and extend previous SDT research by demonstrating that even subtle, implicit, and covert forms of pressure have a negative causal impact on early adolescents' task involvement and achievement.

The negative effects of internal control on learning were limited to conceptual learning. Such effects were not found for rote learning, which requires a superficial memorization of the learning material. These findings fit with our contention that internally controlling environments are likely to prompt some degree of behavioral engagement in learning. However, because the learning is unlikely to be experienced as volitional but is rather undertaken in an attempt to suppress the internal pressures that caused the learning, participants are more likely to display a narrowly focused and more superficial engagement in the learning. In two of the five assessment of rote learning, internal control even appeared to promote the memorization of learning material compared with autonomy support, and in one of two studies, internal control also contributed to a better maintenance of this factual information over time.

The comparison of the four experimental conditions with a control group in Study 2 provided interesting additional insight into the precise impact of intrinsic versus extrinsic goal framing and an autonomy-supportive versus internally controlling communication style. Specifically, as predicted, the provision of both facilitating variables enhanced conceptual learning compared with the control group, whereas the provision of both debilitating factors decreased early adolescents' conceptual (but not their rote) learning compared with the control group. However, instructors who refer to intrinsic goal content in an internally controlling manner or instructors who provide an extrinsic goal rationale in an autonomy-supportive fashion do not promote early adolescents' achievement compared with instructors who do not provide any instructions at all to their pupils regarding the reasons and goals for their investment in studying. We assume that these null effects occur because the facilitating effect that goes along with autonomy support or an intrinsic goal content is neutralized by the negative impact stemming from internal control and extrinsic goal contents.

The instructions in the present research were short and in written form. In addition, the language used in the internally controlling condition was subtle and covert. Nevertheless, both goal content and communication style considerably affected early adolescents' conceptual learning, and different explanations might account for this. First, the present experiments were conducted in a naturalistic class setting, which probably helped improve the credibility of the instruction and increased their effect. Second, these effects suggest that children's motivation is easily malleable, an

observation that fits with SDT's view of motivation. According to SDT (Deci & Ryan, 2000), each person regulates his or her behavior on the basis of both autonomous and controlled reasons. Similarly, both intrinsic and extrinsic goals can guide people's actions. Because both self-regulatory styles and both goal-contents are to a certain extent available within individuals, the social environment can easily trigger one of both self-regulatory styles, or one of both goal pursuits. The present instructions seem to have primed one of both self-regulatory styles and one of both goal pursuits. The present findings illustrate that even small changes in the social environment make a considerable difference: They either nurture the growth-oriented tendencies that are available within individuals, or they erode them, as suggested by SDT (Deci & Ryan, 2000). Indeed, as growth-oriented and proactive organisms, individuals find themselves in a continual dialectal interplay with the environment that either stimulates or impedes them to flourish. Hence, the present results are hopeful because they indicate that instructors can considerably affect early adolescents' learning orientation, self-determined learning, and achievement. At the same time, the present results suggest that the environment can also block this learning process.

A final goal of this research was to examine whether the combination of autonomy support and intrinsic goal framing would produce an additional positive effect on performance among primary school early adolescents, as was found in previous studies among adolescents and college students (Vansteenkiste, Simons, Lens, Sheldon, et al., 2004). Such an interaction effect did not emerge in the present studies, and it is difficult to provide a reasonable explanation for this null finding. The present study differed from the previous experimental studies (Vansteenkiste, Simons, Lens, Sheldon, et al., 2004) where such an interaction effect was found because it either involved the manipulation of a different set of intrinsic versus extrinsic goals, or it required the engagement in a different activity under the present goal circumstances (reading activity instead of exercising), or it contained a different age group (middle instead of early adolescents). Because we can only speculate whether any of these or other factors can explain this null finding in the present studies, we believe that more research is needed to explore whether the currently obtained effect is systematic.

Limitations and Future Research

The current set of studies is not without its limitations. First, early adolescents in the present research were in fifth and sixth grades. It would be instructive to explore whether intrinsic versus extrinsic goal framing would exert a similar impact among younger children. We suspect that intrinsic versus extrinsic goal framing will only have an impact when children are cognitively able to grasp the content of the provided goal and when the provided goal is related in a meaningful and realistic way to the learning material.

Second, although a control group was included in Study 2, we could not examine the precise effect of the manipulated variables because each experimental group differed in two (rather than one) ways from the control group. For instance, to ascertain whether intrinsic goal framing per se yields beneficial performance effects, a no-goal control group is needed in which participants are approached in an autonomy-supportive or internally controlling way (see Vansteenkiste, Simons, Soenens, et al., 2004).

Third, the present research manipulated only one type of intrinsic goal (i.e., health) and one type of extrinsic goal (i.e., physical attractiveness), and used only one type of activity (i.e., reading). Another caution applies to our assessment of conceptual learning. We used a single measure of conceptual integration that was developed specifically for this material. Hence, future research might examine whether the present findings among early adolescents could be generalized across different intrinsic and extrinsic goals and across different types of activities (e.g., exercise, work; see Vansteenkiste, Simons, Lens, Sheldon, et al., 2004), and using other paradigms to assess integrated learning and concept formation.

Conclusion

The present research shows that linking early adolescents' learning to an intrinsic rather than an extrinsic goal content yields important benefits: It promotes a more integrative and conceptual processing of the learning material, presumably because intrinsic goals, with their closer link to individuals' growth tendencies, induce a more flexible, open, and committed task engagement. In addition, when early adolescents were approached in an autonomy-supportive way rather than being pressured in a subtle way to pursue these goal contents, their conceptual learning was enhanced as well. Such results were not found for rote learning, however. It appears that, on average, internally controlling contexts and extrinsic goal contexts are equally (and perhaps even more) effective in promoting a literal memorization of the learning material as autonomy supportive and intrinsic goal contexts.

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