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What Teachers Say and Do to Support Students' Autonomy During a Learning Activity

Johnmarshall Reeve
University of Iowa

Hyungshim Jang
University of Wisconsin–Milwaukee

Teachers with an autonomy-supportive style rely on different instructional behaviors to motivate their students than do teachers with a controlling style. In the present investigation, the authors tested which of these instructional behaviors actually correlated positively or negatively with students' autonomy. The authors used Deci, Spiegel, Ryan, Koestner, & Kauffman's (1982) teacher–student laboratory paradigm to randomly assign 72 pairs of same-sex preservice teachers into the role of either teacher or student. From videotapes of the 10-min instructional episode, raters scored 11 hypothesized autonomy-supportive behaviors and 10 hypothesized controlling behaviors. Correlational analyses confirmed that students perceived the functional significance of 8 instructional behaviors as autonomy supports and 6 instructional behaviors as autonomy thwarts. The discussion focuses on the interpretation and classroom implications of these data.

Keywords: autonomy, autonomy support, motivating style, instructional behaviors, self-determination theory

Students' classroom motivation reflects both intrapersonal and interpersonal processes (Turner & Patrick, 2004). Motivation is intrapersonal in the sense that students harbor personal orientations and beliefs that affect their motivation and performance (e.g., interest, achievement goals; Elliot, 1999; Tobias, 1994). Motivation is interpersonal in the sense that the quality of a student's intrapersonal motivation depends, in part, on the quality of the relationship provided by the teacher (e.g., how involved and how supportive the teacher is; Eccles & Midgley, 1989; Furrer & Skinner, 2003; Turner et al., 1998). To understand how students' motivation reflects interpersonal processes, researchers have investigated the interpersonal styles that teachers adopt to motivate their students (Deci, Schwartz, Sheinman, & Ryan, 1981; Vallerand, Fortier, & Guay, 1997). According to self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000, 2002), teachers' motivating styles can be conceptualized along a continuum that ranges from a highly controlling style through a somewhat controlling or somewhat autonomy-supportive style to a highly autonomy-supportive style. In the present article, we used the self-determination theory conceptualization of teachers' motivating styles to investigate rather precisely what teachers say and do when they support students' autonomy as well as what teachers say and do when they hinder it.

Autonomy and Autonomy Support

Student motivation revolves around the concept of intentionality (Deci & Ryan, 1987). An intention is a determination to engage in a particular behavior, and it is equivalent to being motivated to act. An example of a student's intention to act might be "I intend to write my paper." Such an intention sometimes originates from within and is fully endorsed by the student's sense of self. When this is so, intentions reflect high autonomy and are associated with autonomous types of motivation (e.g., intrinsic motivation and identified regulation in self-determination theory; Ryan & Deci, 2002). Alternatively, this same intention might be coerced, seduced, or manufactured by an external causality (e.g., a teacher's directive, an extrinsic reward), or it might originate from a pressure-inducing intrapsychic force such as an ego involvement. When this occurs, intentions reflect low autonomy and are associated with controlled types of motivation (e.g., external regulation and introjected regulation in self-determination theory; Ryan & Deci, 2002). Thus, students' intentional behavior—their motivated action—can be initiated and regulated autonomously, or it can be initiated and regulated in a controlled, nonautonomous way.

Autonomy represents an inner endorsement of one's actions—the sense that one's actions emanate from oneself and are one's own (Deci & Ryan, 1987). It is the capacity to have one's motivation emerge from internally locused and volitional sources of motivation rather than from an externally locused (e.g., external regulation) or a nonvolitional (e.g., introjected regulation) causality (Deci & Ryan, 1985; Reeve, Nix, & Hamm, 2003). When autonomously motivated, students report an internal locus of causality, feeling free (high volition), and a sense of choice over their actions (Reeve et al., 2003). An internal perceived locus of causality is the perception that behavior originates from, and is regulated by, oneself; its opposite is an external perceived locus of causality. Volition represents the perception of high psychological freedom during an activity; its opposite is feeling pressured or ego involved. Perceived choice over one's actions reflects an ongoing decision-making flexibility to choose what to do, how to do it, and whether to do it; its opposite is a rigid assignment. Autonomy is therefore an experience of an internally locused, volitional intention to act that can be measured through self-reports of an internal

Johnmarshall Reeve, Department of Psychological and Quantitative Foundations, University of Iowa; Hyungshim Jang, Department of Educational Psychology, University of Wisconsin–Milwaukee.

Correspondence concerning this article should be addressed to Johnmarshall Reeve, Department of Psychological and Quantitative Foundations, 361 Lindquist Center, University of Iowa, Iowa City, IA 52242. E-mail: johnmarshall-reeve@uiowa.edu

perceived locus of causality, high volition, and a perceived choice over one's actions.

Autonomy support is the interpersonal behavior one person provides to involve and nurture another person's internally focused, volitional intentions to act, such as when a teacher supports a student's psychological needs (e.g., autonomy, competence, relatedness), interests, preferences, and values. Asking students what they want (e.g., asking for their input into the lesson plan) is an autonomy-supportive behavior because the teacher seeks to identify students' psychological needs and integrate them into the day's lesson. Giving students time to work on a problem in their own way is an autonomy-supportive behavior because the teacher allows students' interests and preferences to guide their classroom activity. Likewise, providing a rationale to explain why a rule exists or why an apparently uninteresting activity is truly worth students' attention is an autonomy-supportive behavior because it allows students' sense of valuing to guide their classroom activity. Overall, autonomy support revolves around finding ways to nurture, support, and increase students' inner endorsement of their classroom activity (Reeve, 2006; Reeve, Deci, & Ryan, 2004).

Two Approaches to Fostering Students' Intentions to Act: Support Autonomy Versus Control Behavior

When autonomy supportive, teachers help students develop a sense of congruence between their classroom behavior and their inner motivational resources (i.e., psychological needs, interests, preferences, goals, strivings, and values). They cannot directly give students an experience of autonomy. Instead, teachers can only encourage and support this experience by identifying students' inner motivational resources and by creating classroom opportunities for students to align their inner resources with their classroom activity.

When controlling, teachers have students put aside their inner motivational resources and instead adhere to a teacher-centered agenda. To encourage students to adhere to their agendas, teachers offer extrinsic incentives, impose external goals, utter pressuring communications, make external evaluations salient, and generally influence students' ways of thinking, feeling, and behaving in ways consistent with behavior modification programs. The general idea is to establish an agenda of what students should and should not do and then shape students toward that agenda by using external contingencies and pressuring language. Hence, when controlled, students are motivated by external contingencies and pressuring language, not by their inner motivational resources.

Empirical research has shown that students with autonomy-supportive teachers, compared with students with controlling teachers, experience not only greater perceived autonomy but also more positive functioning in terms of their classroom engagement, emotionality, creativity, intrinsic motivation, psychological well-being, conceptual understanding, academic achievement, and persistence in school (Benware & Deci, 1984; Black & Deci, 2000; Boggiano, Flink, Shields, Seelbach, & Barrett, 1993; Deci & Ryan, 1985, 1987; Deci et al., 1981; Grolnick & Ryan, 1987; Hardre & Reeve, 2003; Koestner, Ryan, Bernieri, & Holt, 1984; Miserandino, 1996; Ryan & Grolnick, 1986; Vallerand et al., 1997).

Because autonomy support promotes students' positive functioning, researchers have worked to identify what specific behaviors teachers with an autonomy-supportive style enact during their instruction that differentiates their style from teachers with a relatively controlling style. One group of researchers, for instance, used Deci et al.'s (1981) Problems in Schools questionnaire to categorize autonomy-supportive versus controlling teachers and subsequently observed and recorded these teachers' different ways of instructing (Reeve, Bolt, & Cai, 1999). Other researchers have used experimental designs to randomly assign teachers into conditions that either did or did not induce a controlling style. Following this manipulation, researchers observed the different instructional behaviors of these two groups of teachers (Deci, Spiegel, Ryan, Koestner, & Kauffman, 1982; Flink, Boggiano, & Barrett, 1990). Collectively, these groups of researchers identified and categorized 21 specific instructional behaviors that differentiated teachers with an autonomy-supportive style from teachers with a controlling style (Deci et al., 1982; Flink et al., 1990; Reeve et al., 1999). Table 1 lists these 21 behaviors.

The top half of Table 1 lists the 11 instructional behaviors that are consistently displayed more frequently by teachers categorized as autonomy supportive. Some instructional behaviors support autonomy by identifying and becoming more aware of students' inner motivational resources, including time listening and asking what the student wants. Some instructional behaviors support students' internal causality and create opportunities for students to align their inner motivational resources with their ongoing classroom activity, including time allowing student to work in own way, time student talking, and creating seating arrangements to encourage students' initiative and conversation. Other instructional behaviors support autonomy by offering informational language to support students' inner resources or to build new inner resources, including providing rationales, praise as informational feedback, offering encouragements, and offering hints. Still other instructional behaviors support autonomy by enhancing teachers' sensitivity to students' experiences, including being responsive to student-generated questions and communicating perspective-taking statements.

The bottom half of Table 1 lists 10 instructional behaviors that are consistently displayed more frequently by teachers categorized as controlling. Some instructional behaviors control students' behavior by establishing the teacher's agenda, including time teacher talking and time holding/monopolizing the learning materials. Some instructional behaviors control behavior by shaping students toward teacher-prioritized behaviors and answers, including exhibiting solutions/answers and uttering solutions/answers. Other instructional behaviors control behavior by uttering controlling language that pressures students into compliance with the teacher's agenda, including uttering directives/commands, making should/got to statements, asking controlling questions, and deadline statements. Still other instructional behaviors control behavior by imposing an external evaluation on the student's learning, including praise as contingent reward and criticizing the student.

Most of the instructional behaviors listed in Table 1 fit the conceptual definitions for autonomy support and behavior control rather well. Two, however, require elaboration, namely, praise and hints. Praise is a complex instructional behavior that teachers use for many different purposes (Brophy, 1981; Candella, 1986; Henderlong & Lepper, 2002; Mueller & Dweck, 1998). In a self-determination theory analysis, teachers sometimes use praise as a controlling extrinsic reward in which their utterances of social approval and positive evaluation act as contingent rewards for right answers and acceptable behaviors, but teachers also sometimes use praise as positive informational feedback to affirm the

Table 1
Operational Definitions for the Teachers' 21 Instructional Behaviors

Instructional behavior	Operational definition
11 hypothesized autonomy-supportive instructional behaviors	
Time listening	Cumulative number of seconds the teacher carefully and fully attended to the student's speech, as evidenced by verbal or nonverbal signals of active, contingent, and responsive information processing.
Asking what student wants	Frequency of questions asking specifically about what the student wanted or desired, such as "Which pattern do you want to start with?"
Time allowing student to work in own way	Cumulative number of seconds the teacher invited or allowed the student to work independently and to solve the puzzle in his or her own way.
Time student talking	Cumulative number of seconds the student talked.
Seating arrangements	Whether or not the teacher invited the student to sit in the chair nearest to the learning materials.
Providing rationales	Frequency of explanatory statements as to why a particular course of action might be useful, such as "How about we try the cube, because it is the easiest one."
Praise as informational feedback	Frequency of statements to communicate positive effectance feedback about the student's improvement or mastery, such as "Good job" and "That's great."
Offering encouragements	Frequency of statements to boost or sustain the student's engagement, such as "Almost," "You're close," and "You can do it."
Offering hints	Frequency of suggestions about how to make progress when the student seemed to be stuck, such as "Holding the puzzle in your hands seems to work better than laying it on the table" and "It might be easier to work on the base first."
Being responsive to student-generated questions	Frequency of contingent replies to a student-generated comment or question, such as "Yes, you have a good point" and "Yes, right, that was the second one."
Communicating perspective-taking statements	Frequency of empathic statements to acknowledge the student's perspective or experience, such as "Yes, this one is difficult" and "I know it is a sort of difficult one."
10 hypothesized controlling instructional behaviors	
Time teacher talking	Cumulative number of seconds the teacher talked.
Time holding/monopolizing learning materials	Cumulative number of seconds the teacher physically held or possessed the puzzle.
Exhibiting solutions/answers	Number of puzzle solutions the teacher physically displayed or exhibited before the student had the opportunity to discover the solution for himself or herself.
Uttering solutions/answers	Frequency of statements revealing a puzzle solution before the student had the opportunity to discover it for himself or herself, such as "The cube's done this way—like this."
Uttering directives/commands	Frequency of commands such as do, move, put, turn, or place, such as "Do it like this," "Flip it over," or "Put it on its side."
Making should/ought to statements	Frequency of statements that the student should, must, has to, got to, or ought to do something, such as "You should keep doing that" and "You ought to . . ."
Asking controlling questions	Frequency of directives posed as a question and voiced with the intonation of a question, such as "Can you move it like I showed you?" and "Why don't you go ahead and show me?"
Deadline statements	Frequency of statements communicating a shortage of time, such as "A couple of minutes left" and "We only have a few minutes left."
Praise as contingent reward	Frequency of verbal approvals of the student or the student's compliance with the teacher's directions, such as "You're smart" or "You are really good at playing with blocks."
Criticizing the student	Frequency of verbal disapprovals of the student or the student's lack of compliance with the teacher's directions, such as "No, no, no, you shouldn't do that."

Note. Each quotation above represents an actual statement made by one of the participant teachers in the study.

student's progress, improvement, or task mastery (Kast & Connor, 1988; Ryan, Mims, & Koestner, 1983). This distinction between praise as a controlling reward versus praise as informational feedback is made outside the self-determination theory literature as well, though slightly different terminology is used, such as ability praise versus effort praise, ability feedback versus process feedback, or reinforcing response learning versus feedback for skill learning (Koestner, Zuckerman, & Koestner, 1987; Mayer, 2003; Mueller & Dweck, 1998). Another instructional behavior that requires elaboration is offering hints. Hints represent a teacher's instructional effort to provide students with information when they are stuck (Grolnick, 2001, 2003). Unlike controlling instructional behaviors, such as giving directives, uttering helpful hints is an act of instruction that supports the student's own learning processes. Specifically, a teacher giving helpful hints is an act of instruction that allows the student to maintain an internal locus during learning, unlike other teaching tactics (directives) that are more likely to induce a shift in perceived locus of causality from internal (self-determined) to external (teacher determined).

The Research Problem and Hypotheses

It is highly informative to know what teachers with an autonomy-supportive or a controlling style are doing during instruction to motivate their students. What is not yet known, however, is whether the behaviors favored by teachers with an

autonomy-supportive style actually predict enhanced perceptions of autonomy. It is also not known whether the behaviors favored by teachers with a controlling style actually predict thwarted perceptions of autonomy. For instance, it is informative to know that teachers with an autonomy-supportive style listen more and that teachers with a controlling style utter directives more, but it is not necessarily clear just how or why students benefit from being listened to and how or why students suffer from being directed to do one thing rather than another. Consequently, identifying what teachers with an autonomy-supportive style and what teachers with a controlling style do during instruction explains only a portion of the story in trying to understand why students motivationally benefit or suffer from their teacher's style.

Thus, the question of whether these 21 behaviors, when enacted during instruction, actually promote or interfere with students' experiences of autonomy remains unanswered. Functionally speaking, just because teachers with an autonomy-supportive style engage more frequently in a particular behavior does not fully justify categorizing that instructional behavior as an autonomy-supportive one. If time listening does not nurture students' sense of autonomy, it is not an autonomy-supportive behavior—even if teachers with an autonomy-supportive style spend significantly more time listening to their students than do teachers with a controlling style. Before such an act of instruction can be categorized as an autonomy-supportive behavior, it is critical to confirm that the act of instruction is positively associated with students' perceived autonomy. The same logic holds for potentially controlling behaviors. Before an act of instruction can be categorized as a controlling behavior, it is critical to know that the act of instruction is negatively associated with students' perceived autonomy.

The purpose of the present investigation was to identify which of the 11 previously reported instructional behaviors favored by teachers with an autonomy-supportive style (listed in the upper half of Table 1) actually correlate positively with students' perceptions of autonomy and which of the 10 previously reported instructional behaviors favored by teachers with a controlling style (listed in the lower half of Table 1) actually correlate negatively with students' perceptions of autonomy. In addition, we conducted a preliminary analysis to confirm a positive association between students' perceived autonomy and a set of outcomes selected to index their positive functioning during the learning activity, including interest–enjoyment, behavioral engagement, and objective performance.

Method

Participants

Participants were 72 pairs of same-sex preservice teachers (62 pairs of women, 10 pairs of men) enrolled in a teacher certification program at a large midwestern university. Most participants were Caucasian White (86%), 10% were African American, and 4% were Hispanic. Academic classifications included 40% sophomores, 32% juniors, 25% seniors, and 3% postbaccalaureates. Participants were recruited from an undergraduate educational psychology course and received extra credit for their participation.

Procedure

We adopted the teacher–student paradigm first introduced by Deci et al. (1982). After arriving at the laboratory, participants signed a consent form and were randomly assigned into the role of either the teacher or the student. Before situating the teacher, the experimenter escorted the student down the hallway to a waiting room containing a number of contemporary magazines. The experimenter then returned to escort the teacher to the experimental room. In the experimental room was a large rectangular table with two seats positioned side by side. On one side of the large table there was the experimental task, which was a three-dimensional manipulative puzzle, called Happy Cubes, that can be shaped into a number of interesting and complex patterns (Reeve, 1989). Next to this side of the large table there was a smaller table that held the seven possible three-dimensional puzzle patterns. The experimenter asked the teacher to take 10 min to become familiar with the task and to plan an instructional strategy. After the teacher's 10-min introductory period with the puzzle, the experimenter walked back down the hallway to the student and asked him or her to join the teacher in the experimental room. Because the teacher was in the room before the student arrived, the teacher was responsible for the seating arrangements. Teachers could sit in the chair nearest the puzzle and patterns, or teachers could invite the student to sit in the chair near the puzzle and patterns as the student entered the room. This seating decision constituted the instructional behavior seating arrangements. The experimenter told the student that his or her role was to "learn how the puzzle worked and to try to solve some or all of its solutions." The experimenter told the teacher that his or her role was to help the student learn about the puzzle and how to solve it in "whatever way you see fit." Following these instructions, the experimenter left for an adjacent room. The instructional episode lasted 10 min and was videotaped (with the pair's awareness and consent). After the 10 min, the experimenter returned, administered a postsession questionnaire to assess the two dependent measures of perceived autonomy and interest–enjoyment, debriefed the pair, and allowed interested pairs to watch their videotaped interaction. All 72 pairs of participants gave their consent to use the videotaped interaction for the purpose of the study.

Dependent Measures

Overall, we scored three sets of dependent measures: teachers' instructional behaviors, students' perceived autonomy, and students' outcomes. Perceived autonomy and interest–enjoyment were scored from the students' postsession questionnaires, whereas teachers' instructional behaviors and students' engagement and performance were scored by raters viewing the student–teacher interaction from the videotaped recordings.

Students' perceived autonomy. We conceptualized perceived autonomy as a state-like experience consisting of the three intercorrelated subjective qualities of an internal perceived locus of causality, volition (i.e., unpressured sense of freedom), and perceived choice over one's actions (Reeve et al., 2003). To do so, we used the 9-item Perceived Self-Determination (PSD) scale (Reeve, 2002; Reeve et al., 2003). On the PSD scale, three items assess an internal perceived locus of causality (e.g., "While puzzle solving, I felt I was doing what I wanted to be doing"), three items assess volition (e.g., "While puzzle solving, I felt free"), and three items assess perceived choice over one's actions (e.g., "Throughout the puzzle solving, I had choices about what I would do next"). All 9 items were rated on a 7-point unipolar response scale ranging from 1 (*not at all*) to 7 (*very much*), and the overall scale had high internal consistency (alpha = .87). Scores from the PSD scale have been shown to be valid in that they (a) are sensitive to experimental manipulations known to affect perceptions of autonomy, such as provision for choice and exposure to an autonomy-supportive environment (Reeve et al., 2003), and (b) predict intrinsic motivational outcomes, such as intrinsically motivated behavior during a free-choice period (Reeve et al., 2003).

Students' outcomes. We assessed three student outcomes: interest–enjoyment, engagement, and performance. To assess interest–enjoyment, we used the self-report intrinsic motivation scale (Williams, Wiener, Markakis, Reeve, & Deci, 1994). The scale uses a 7-point unipolar response scale ranging from 1 (*not at all*) to 7 (*extremely*) and includes the following six items: "The puzzle is very interesting"; "The puzzle is an

enjoyable activity"; "The puzzle held my full and constant attention"; "The puzzle is fun"; "I felt a constant curiosity as I solved the puzzle"; and "The puzzle is a pleasant, happy task to do." In the present study, the scale had high internal consistency (alpha = .93). Scores from this scale have been shown to be valid in that they are sensitive to manipulations of interest and enjoyment (Reeve, 1989, 1993) and predict behavioral measures of intrinsic motivation in both laboratory (Reeve et al., 2003) and field (Williams et al., 1994) settings.

To assess engagement, we used an engagement rating scale that assesses the following five aspects of students' engagement during a learning activity: attention, effort, persistence, verbal participation, and positive emotion (Reeve, Jang, Carrell, Jeon, & Barch, 2004). For each of the five ratings, raters used a 7-point unipolar response scale ranging from 1 (*not at all*) to 7 (*extremely*). This engagement rating scale is based on Wellborn's (1991) theoretical conceptualization of student engagement (see also Connell & Wellborn, 1991) and has been validated in that raters' scores of students' engagement on this measure correlate positively with students' self-reported engagement (Jang & Reeve, 2005). From their viewing of the videotapes, raters scored each of the five aspects of engagement reliably (all $rs_{interrater}$ were greater than .70). To create a single, overall engagement score for each student, we followed Reeve, Jang, et al.'s (2004) procedure and calculated the equally weighted average of the five items (alpha = .81). High scores reflect student engagement, whereas low scores reflect student disaffection or disengagement.

To assess performance, raters scored the number of puzzles the student correctly solved by himself or herself ($r_{interrater}$ = .87; possible range = 0–7 solutions), which we operationally defined as the number of solutions the student solved successfully without the teacher's guiding words or hands (following Reeve et al.'s, 1999, operational definition of this same performance measure). If the student and teacher were manipulating the puzzle together at the time it was solved, the solution was not counted—because the teacher partly gave the student the answer/solution (following Deci et al.'s, 1982, rubric). If the teacher solved the puzzle by himself or herself, then that instructional act of physically demonstrating a solution to the student was scored as an instance of exhibiting solutions/answers (see Table 1).

Teachers' instructional behaviors. Table 1 provides the operational definitions for each of the teachers' 21 instructional behaviors. More than one instructional behavior could occur at the same time (e.g., the teacher could at the same time utter a directive and hold the instructional materials). The instructional behavior of deadline statements occurred too infrequently to yield a meaningful distribution of scores, so we were unable to include this behavior in our analyses. Of the remaining 20 behaviors, 5 were scored in terms of duration of time, so each of these measures had a possible range of 0 to 600 s. The interrater reliabilities for these instructional behaviors were as follows: time listening ($r_{interrater}$ = .76), time allowing student to work in own way ($r_{interrater}$ = .82), time student talking ($r_{interrater}$ = .89), time teacher talking ($r_{interrater}$ = .73), and time holding/monopolizing the learning materials ($r_{interrater}$ = .94). The instructional behavior seating arrangements (e.g., whether the teacher offered the student the seat near the learning materials) was scored categorically as "yes" or "no" ($r_{interrater}$ = 1.00). The instructional behavior exhibiting solutions/answers had a possible range of 0 to 7 ($r_{interrater}$ = .87). The remaining 13 behaviors reflected the teachers' utterances and were scored in terms of frequency of occurrence, so each behavior had a possible range of 0 upward. The interrater reliabilities for these instructional behaviors were as follows: asking what student wants ($r_{interrater}$ = .86), providing rationales ($r_{interrater}$ = .76), praise as informational feedback ($r_{interrater}$ = .81), offering encouragements ($r_{interrater}$ = .82), offering hints ($r_{interrater}$ = .79), being responsive to student-generated questions ($r_{interrater}$ = .83), communicating perspective-taking statements ($r_{interrater}$ = .78), uttering solutions/answers ($r_{interrater}$ = .83), uttering directives/commands ($r_{interrater}$ = .90), making should/ought to statements ($r_{interrater}$ = .81), asking controlling questions ($r_{interrater}$ = .87), praise as contingent reward ($r_{interrater}$ = .77), and criticizing the student ($r_{interrater}$ = .73).

Two trained raters independently scored each behavioral measure (teachers' instructional behaviors, students' engagement, and students' performances) from eight separate viewings of the videotape. On the first viewing, the rater used a stopwatch to score the five duration-based instructional behaviors (e.g., number of seconds of time listening). On the second viewing, the rater scored the frequency-based instructional behaviors (e.g., number of times of asking what student wants). On the third viewing, the rater scored the student's puzzle-solving performance (e.g., how many of the seven patterns the student solved). On the fourth viewing, the rater scored the five aspects of the student's engagement (attention, effort, persistence, verbal participation, and positive emotion). After these four viewings, the rater then repeated all four ratings at a later date to double check the original ratings. One rater scored all dependent measures for all 72 pairs. A second rater independently scored a random sample of one third (i.e., 26; 36%) of the sessions so that interrater reliabilities could be estimated.

Results

Did Perceived Autonomy Correlate Positively With Students' Outcomes?

To test whether students' perceived autonomy correlated positively with the three outcomes of interest–enjoyment, engagement, and performance, we used zero-order correlations. The means, standard deviations, ranges, and correlations among the four dependent measures appear in Table 2. As shown in Table 2, students' perceived autonomy correlated significantly and positively with all three outcomes of interest–enjoyment, engagement, and performance ($ps < .01$). These correlations show that perceived autonomy was associated with students' positive functioning during the learning activity.

Test of Hypotheses

Our hypothesis was that each instructional behavior favored by teachers with an autonomy-supportive style would be associated

Table 2
Means, Standard Deviations, Ranges, and Correlation Matrix for Students' Perceived Autonomy and the Set of Outcomes (Interest–Enjoyment, Engagement, Performance)

Dependent measure	*M*	*SD*	Range	1	2	3	4
1. Perceived autonomy	4.61	1.26	1.8–6.6	—	.57*	.56*	.45*
2. Interest–enjoyment	5.77	1.30	1.0–7.0		—	.47*	.37*
3. Engagement	4.61	1.24	1.8–6.8			—	.58*
4. Performance	3.66	1.84	0–7				—

Note. $N = 72$.
* $p < .01$.

Table 3
Means, Standard Deviations, Ranges, and Correlation Matrix for Students' Perceived Autonomy and Teachers' Hypothesized Autonomy-Supportive and Controlling Instructional Behaviors

Variable[a]	*M*	*SD*	Range	1	2	3	4	5	6	7	8
1. Perceived autonomy	4.61	1.26	1.8–6.6	—	.33**	.23*	.36**	.33**	.27*	.25*	.38**
Hypothesized autonomy-supportive instructional behaviors											
2. Time listening	31.1	33.7	0–186		—	.13	.20	.78**	.25*	.34**	.61**
3. Asking what student wants	0.80	1.09	0–5			—	.01	.03	.05	.14	.13
4. Time allowing student to work in own way	427.7	142.3	15–600				—	.13	.30**	.18	.37**
5. Time student talking	62.1	44.5	2–208					—	.23*	.30*	.42**
6. Seating arrangements	0.11	0.32	0–1						—	.18	.04
7. Providing rationales	0.79	1.03	0–4							—	.19
8. Praise as informational feedback	2.56	2.79	0–12								—
9. Offering encouragements	3.99	4.39	0–19								
10. Offering hints	8.04	4.03	1–18								
11. Being responsive to student-generated questions	4.48	3.45	0–16								
12. Communicating perspective-taking statements	1.54	1.98	0–9								
Hypothesized controlling instructional behaviors											
13. Time teacher talking	176.3	87.8	38–548								
14. Time holding/monopolizing learning materials	100.8	104.8	0–482								
15. Exhibiting solutions/answers	0.92	1.30	0–5								
16. Uttering solutions/answers	1.65	2.76	0–11								
17. Uttering directives/commands	6.87	8.34	0–53								
18. Making should/got to statements	1.69	1.84	0–7								
19. Asking controlling questions	0.82	1.51	0–8								
20. Praise as contingent reward	1.54	1.67	0–6								
21. Criticizing	0.38	0.66	0–3								

Note. $N = 72$.
[a] Variable 1 was scored on a 7-point Likert scale, and its possible range was 1–7; Variables 2, 4, 5, 13, and 14 were scored in terms of the duration of range occurrence during a 600-s span of time, so each of these behaviors had a possible range of 0–600; Variable 6 was scored as all or nothing, so its possible range was 0–1; Variables 3, 7–12, and 16–21 were scored in terms of the frequency of occurrence, so each of these behaviors had a possible range of 0 upward; and Variable 15 was scored as the number of puzzles out of seven, so its possible range was 0–7.
* $p < .05$. ** $p < .01$.

with a relatively high level of students' perceived autonomy, whereas each instructional behavior favored by teachers with a controlling style would be associated with a relatively low level of students' perceived autonomy. To test this hypothesis, we correlated scores on each of the teachers' 20 instructional behaviors with students' perceived autonomy. Table 3 shows the correlation matrix for these 21 dependent measures (i.e., perceived autonomy and the 20 instructional behaviors). No gender differences emerged on any measure, so we collapsed our data across the genders into a single sample.

Did each of the 11 instructional behaviors associated with autonomy support predict positively students' perceived autonomy? As shown in Table 3, all 11 instructional behaviors associated with autonomy support correlated significantly and positively with students' perceived autonomy. To conduct 11 independent tests and still protect against making a Type I error, we calculated what each testwise alpha level must be to produce an overall experimentwise ($_{exp}$) alpha level of .05. The problem was that 11 tests (with $alpha_{test} = .05$, one-tailed) inflated the experimentwise alpha to .43 (with Hays's, 1994, formula: $alpha_{exp} = 1 - [1 - .05]^{11}$). To adjust this inflated experimentwise alpha level back down to a .05 testwise level, we computed what each testwise alpha needed to be. This value was .009 (with Hays's formula: $alpha_{exp}$/number of tests, or $.05_{one\text{-}tailed}/11$). Eight of the 11 hypothesized instructional behaviors associated with autonomy support remained statistically significant when we used this more stringent test: time listening; time allowing student to work in own way; time student talking; praise as informational feedback; offering encouragement; offering hints; being responsive to student-generated questions; and making perspective-acknowledging statements.

Whereas we focused on how each individual instructional behavior correlated with students' perceived autonomy, we also considered that the instructional behaviors were intercorrelated with one another. To identify the unique contribution each instructional behavior was able to make in explaining students' perceptions of autonomy, we conducted a simultaneous multiple regression analysis. In this analysis, the dependent variable was students' perceived autonomy, and the eight predictor variables were the instructional behaviors associated with autonomy support. Three instructional behaviors contributed unique variance in explaining students' perceived autonomy, $F(3, 68) = 8.85$, $p < .01$ ($R^2 =$

9	10	11	12	13	14	15	16	17	18	19	20	21
.42**	.33**	.38**	.34**	.07	−.32**	−.29**	−.39**	−.29**	−.34**	−.48**	−.11	−.16
.21	.28*	.73**	.42**	.24*	−.22	−.22	−.24*	−.21	−.19	−.15	−.01	−.20
.23*	.08	.24*	.44**	.11	−.05	−.08	−.10	−.14	−.09	−.03	.24*	−.22
.16	.32**	.12	.22	−.34**	−.90**	−.73**	−.68**	−.42**	−.35**	−.39**	−.12	−.34**
.22	.20	.66**	.25*	.29*	−.20	−.22	−.06	−.12	−.09	−.12	−.04	.01
.06	.15	.33**	.14	.02	−.26*	−.18	−.18	−.19	−.12	−.18	−.22	−.21
.28*	.18	.36**	.39**	.39**	−.22	−.22	−.10	−.11	−.16	−.12	.00	−.03
.45**	.40**	.39**	.25*	.10	−.39**	−.41**	−.33**	−.19	−.10	−.18	.11	−.07
—	.36**	.26*	.25*	.38**	−.23*	−.27*	−.07	.25*	−.05	−.02	.21	.07
	—	.21	.18	.17	−.24*	−.15	−.09	−.18	−.02	−.16	.08	−.01
		—	.52**	.33**	−.16	−.22	−.21	−.16	−.10	−.12	.05	−.08
			—	.19	−.19	−.20	−.24*	−.18	−.32**	−.21	.04	−.18
				—	.25*	.15	.37**	.35**	.29**	.17	.36**	.39**
					—	.81**	.60**	.28*	.29**	.22	.05	.26*
						—	.62**	.19	.12	.26*	.01	.30*
							—	.50**	.22	.45**	.15	.40**
								—	.18	.57**	.38**	.67**
									—	.20	.01	.29*
										—	.32**	.29*
											—	.18
												—

.53): offering encouragements (beta = .30, $p < .05$), time allowing student to work in own way (beta = .28, $p < .05$), and time student talking (beta = .24, $p = .05$).

Did each of the nine instructional behaviors associated with behavioral control predict negatively students' perceived autonomy? As shown in Table 3, six of the instructional behaviors associated with behavioral control correlated significantly and negatively with students' perceived autonomy: time holding/monopolizing learning materials, exhibiting solutions/answers, uttering solutions/answers, uttering directives/commands, making should/got to statements, and asking controlling questions. To protect an overall experimentwise alpha level of .05, we again calculated what the inflated experimentwise alpha level was for nine tests. This number was .37. When we adjusted this inflated experimentwise alpha level back down to a .05 testwise level, the calculated $\text{alpha}_{\text{test}}$ level was .011. All six of the aforementioned instructional behaviors associated with behavioral control remained statistically significant when we used this more stringent test.

To identify the unique contribution each instructional behavior was able to make in explaining students' perceptions of autonomy, we again conducted a simultaneous multiple regression analysis. In this analysis, the dependent variable was students' perceived autonomy, and the six predictor variables were the instructional behaviors associated with behavioral control. Two instructional behaviors contributed unique variance in explaining students' perceived autonomy, $F(2, 69) = 12.88$, $p < .01$ ($R^2 = .52$): asking controlling questions (beta = −.43, $p < .01$) and making should/got to statements (beta = −.24, $p < .05$).

Discussion

The purpose of our investigation was to test the extent to which one cluster of instructional behaviors favored by teachers with an autonomy-supportive style would actually correlate positively with students' perceptions of autonomy and the extent to which another cluster of instructional behaviors favored by teachers with a controlling style would actually correlate negatively with students' perceptions of autonomy. Several instructional behaviors correlated positively with students' experiences of autonomy, including listening, creating time for independent work, giving the student opportunities to talk, praising signs of improvement and mastery,

encouraging the student's effort, offering progress-enabling hints when the student seemed stuck, being responsive to the student's questions and comments, and acknowledging the student's perspective and experiences. These correlations confirm that students, on average, perceived the functional significance of these instructional behaviors as autonomy supports. Likewise, several instructional behaviors correlated negatively with students' experiences of autonomy, including monopolizing the learning materials, physically exhibiting worked-out solutions and answers before the student had time to work on the problem independently, directly telling the student a right answer instead of allowing the student time and opportunity to discover it, uttering directives and commands, introjecting should/got to statements within the flow of instruction, and using controlling questions as a way of directing the student's work. These correlations confirm that students perceived the functional significance of these instructional behaviors as autonomy thwarts.

Instructional Behaviors as Autonomy Supports or Autonomy Thwarts

If student autonomy revolves around the concept of intentionality, as argued in the introduction, then a teacher's motivating style revolves around affecting students' intentions to act during learning activities. When autonomously motivated, students' intentional behaviors emerge out of an internal locus of causality, high volition, and a sense of choice over their actions; when controlled, students' intentional behaviors emerge out of an external locus of causality, high pressure, and a sense of assignment or being told what to do. To promote an internal locus, volition, and sense of choice in their students, teachers nurture students' inner motivational resources such as their psychological needs, interests, preferences, and integrated values; to promote an external locus, pressure, and sense of assignment, teachers rely on outer motivational resources and pressuring language. With this framework, we can understand why each instructional behavior investigated in the present study was significantly associated with students' experiences of either high or low perceived autonomy.

Autonomy support connotes identifying, nurturing, and building students' inner motivational resources. Several of the validated autonomy-supportive acts of instruction can be understood as a teacher's effort to identify students' inner resources: time listening, time student talking, and communicating perspective-taking statements. Other validated autonomy-supportive acts of instruction can be understood as a teacher's effort to nurture students' inner resources: time allowing student to work in own way, praise as informational feedback, offering encouragements, offering hints, and being responsive to student-generated questions. In contrast, behavioral control connotes leading and pressuring students toward a teacher-defined way of behaving. Several of the validated controlling acts of instruction can be understood as leading students toward a teacher-defined right way of behaving: exhibiting solutions/answers, uttering solutions/answers, and time holding/monopolizing learning materials. Other validated controlling acts of instruction can be understood as pressuring language: uttering directives/commands, making should/got to statements, and asking controlling questions.

We identified several autonomy-supportive instructional behaviors that functioned to identify and nurture students' inner motivational resources. These findings naturally open the door to a next step of research to investigate behaviors that function to build new inner motivational resources in students. From the present study, one behavior—providing rationales—fits this conceptualization well, as the instructional effort to explain why a particular course of action might be useful (e.g., why a student needs to wear goggles during a chemistry laboratory) helps students build new integrated values (what self-determination theory refers to as identified regulation and integrated regulation; Ryan & Deci, 2002). Providing rationales did significantly correlate with students' perceived autonomy, but it was significant only at the testwise level ($p < .05$) and not at the more stringent experimentwise level ($p < .009$) of significance. Hence, our findings might be limited by our decision to use only a relatively interesting activity. Had we used a relatively uninteresting lesson, instructional behaviors such as providing rationales might have been both more common and more appropriate (e.g., see Deci, Eghrari, Patrick, & Leone, 1994; Reeve, Jang, Hardre, & Omura, 2002). Thus, a next step in this line of research would be to repeat the present study while using an uninteresting learning activity.

Our results leave the causal status ambiguous in terms of the relationship between what teachers say and do and students' autonomous motivation. The positive correlation could be explained either by the effect that teachers have on students or by the effect that students have on teachers. In addition, both of these effects could underlie the significant correlations reported in Table 3. In fact, past findings lead us to suspect that both of these effects can and do occur (Pelletier, Seguin-Levesque, & Legault, 2002; Reeve, Jang, et al., 2004; Skinner & Belmont, 1993). In the present article, we focused on teachers, and we did so because a previous study that used an experimental design showed that teachers' motivating styles exerted a clear and strong influence on students' subsequent motivation and engagement (Reeve, Jang, et al., 2004). In interpreting our correlations, however, we do not argue against the idea that a student's experience and expression of autonomy might also affect the teacher's instructional behaviors. If both of these effects are in the data, as we suspect, then the magnitude of our correlations probably overestimate the effect that teachers have on students, because the correlations reported in Table 3 pool together the effects teachers had on students and the effects students had on teachers.

Our findings have implications for self-determination theory and for classroom applications of the theory, but they also speak to a larger question, namely, the question of how teachers' positive interpersonal relationships produce academic and developmental benefits for their students. In a comprehensive review of what general qualities of teaching help teachers build a positive relationship with their students (Reeve, 2006), the following four qualities emerged as positive contributors to students' learning and well-being: attunement (the process of sensing and reading students' states of being and adjusting one's instruction accordingly; De Wolff & van IJzendoorn, 1997), supportiveness (an affirmation of, and contribution to, students' capacity for self-direction; Ryan & Grolnick, 1986), relatedness (a sense of being close to students, including developing a sense of warmth, affection, and acceptance of students; Furrer & Skinner, 2003), and gentle discipline (a socialization strategy that involves explaining why a particular way of thinking or behaving is right or wrong; Kochanska, Aksan, & Nichols, 2003). Given this general context of what constitutes a developmentally constructive relationship between teachers and their students, we can ask what our findings might contribute to

this larger question about the quality of teacher–student relationships.

A few of the autonomy-supportive behaviors that we validated in the present study can be seen as acts of attunement, including time listening, time student talking, and communicating perspective-taking statements. Most validated autonomy-supportive instructional behaviors, however, can be seen as acts of supportiveness. When considered as a whole, these acts of instruction significantly advance researchers' understanding of what it means to be supportive (and unsupportive) of students' sense of autonomy.

What this discussion about the interrelationships between teachers' autonomy support and teachers' attunement and supportiveness shows is that teachers cannot directly give students a sense of autonomy. Instead, teachers can provide students with high-quality interpersonal relationships—relationships rich in attunement and supportiveness—and out of that relationship context, students can experience and begin to exercise their own sense of autonomy. What stands out about the six validated controlling instructional behaviors is their noticeable lack of correspondence with teacher qualities such as attunement and supportiveness. Instead of trying to establish and build a positive, high-quality interpersonal relationship between teacher and students, controlling instructional behaviors seem to forgo relationship-building qualities and instead represent the effort to take charge of the teaching situation so as to shape students toward the correct answers and desired ways of behaving.

Limitations and Future Research

Four methodological issues limit the application of our findings to classroom practice. First, our data were collected in a laboratory setting rather than in a classroom setting. Second, we observed one-on-one student–teacher interactions that resembled a tutoring session more than a traditional instructional setting in which one teacher instructs a group of students. Third, our instructional session lasted only 10 min rather than the more traditional classroom episode of 45–55 min. Fourth, the teachers we studied were inexperienced preservice teachers rather than veteran practicing teachers. When considered as a whole, these concerns point to the conclusion that our methodology oversimplified the complexity of the teacher–student relationship during instruction.

Given these limitations, we recognize the extent to which our chosen methodology limits the scope, authenticity, and generalizability of our findings. We therefore encourage other researchers to test the extent to which our laboratory findings might apply to more authentic and complex settings. In encouraging this empirical test, we are cautiously optimistic that our findings will be both valuable and applicable to classroom teachers because Deci et al.'s (1982) laboratory-based findings with inexperienced teachers instructing their peers (i.e., the same methodology we adopted) were subsequently replicated by Flink et al. (1990) with a classroom-based methodology with veteran teachers instructing elementary-grade students. Thus, as Flink and her colleagues were able to replicate and build on Deci and his colleagues' original work, we suspect that a future investigation in a naturalistic and authentic setting might also replicate and build on the findings reported in the present study. Still, this is an expectation that needs to be put to empirical test.

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