



Personality-based antecedents of teachers' autonomy-supportive and controlling motivating styles[☆]

Johnmarshall Reeve^a, Hye-Ryen Jang^a, Hyungshim Jang^{b,*}

^a Korea University, South Korea

^b Hanyang University, South Korea



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ABSTRACT

We sought to identify teachers' personality-based antecedents that tend them toward an autonomy-supportive or controlling motivating style. We assessed both aspects of teachers' motivating styles at the beginning of the semester (T1, Time 1) and again after all teachers had completed a semester-long intervention (T2) to learn how to become more autonomy supportive and less controlling. At the start of the semester, 42 full-time elementary-grade teachers (25 females, 17 males) completed a packet of questionnaires to self-report their core traits (the big five) and eight surface traits (e.g., causality orientations, authoritarianism) that we hypothesized would predict one motivating style or the other, while their 633 students self-reported their autonomous motivation. Regression-based analyses revealed four findings: (1) High levels of openness to experience and agreeableness both individually predicted teachers' T1 autonomy-supportive motivating style; (2) high levels of control causality orientation and authoritarianism both individually predicted T1 controlling motivating style; (3) high levels of autonomy causality orientation and personal growth initiative both individually predicted a post-intervention change in T2 autonomy-supportive motivating style; and (4) high level of control causality orientation predicted a post-intervention change in T2 controlling motivating style. These findings suggest a robust relation between personality and teachers' motivating styles.

1. Introduction

Motivating style is the interpersonal tone and face-to-face behavior teachers routinely use to engage their students in the learning activities they provide (Reeve, 2009, 2016). In a self-determination theory (SDT) analysis (Ryan & Deci, 2017), motivating style was first conceptualized as a single construct in which a teacher's style could be placed on a bipolar continuum with a highly autonomy-supportive style on one end and a highly controlling style on the other (Deci, Schwartz, Sheinman, & Ryan, 1981). Recent empirical findings, however, now suggest that the autonomy-supportive and controlling styles exist as two separate dimensions (Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011; Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015). This is because it was discovered that (1) the two styles were only modestly negatively correlated, (2) a low level in one motivating style did not imply or lead to a high level in the other style; (3) autonomy support strongly predicted students' need satisfaction and adaptive functioning (e.g., engagement, prosocial behavior) but only weakly predicted their (low) need frustration and maladaptive

functioning (e.g., disengagement, antisocial behavior), and (4) teacher control strongly predicted students' need frustration and maladaptive functioning but only weakly predicted (low) need satisfaction and adaptive functioning (Bartholomew et al., 2011; Cheon, Reeve, & Song, 2016; De Meyer et al., 2014; Gunnell, Crocker, Wilson, Mack, & Zumbo, 2013; Haerens et al., 2015). The conclusion reached was that these are two distinct and somewhat independent processes with autonomy support vitalizing the “brighter” side of students' motivation and functioning and teacher control galvanizing the “darker” side of students' motivation and functioning (Bartholomew et al., 2011).

Autonomy support is the delivery of instruction through an interpersonal tone of support and understanding that appreciates, vitalizes, and supports students' psychological needs for autonomy, competence, and relatedness (Reeve, 2016). This tone is communicated to students through supportive prosody (i.e., higher pitch, slow speech rate, mild voice quality; Zougkou, Weinstein, & Paulmann, 2017) and acts of instruction such as taking the students' perspective, creating opportunities for their input and initiative, offering learning activities in need-satisfying ways, providing rationales for requests, and acknowledging

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* Corresponding author at: Department of Education, Hanyang University, Seongdong-gu, Seoul 04763, South Korea.
E-mail address: janghs@hanyang.ac.kr (H. Jang).

and accepting expressions of negative affect as okay and understandable (Reeve, 2009). Teacher-provided autonomy support is associated with students' high-quality motivation (need satisfaction, autonomous motivation), effective classroom functioning (engagement, conceptual learning), and positive educational outcomes (high achievement, well-being) and is therefore considered to be the adaptive aspect of a teacher's motivating style (Assor, Kaplan, & Roth, 2002; Cheon & Reeve, 2015; Gunnell et al., 2013; Jang, Kim, & Reeve, 2016).

Teacher control is the delivery of instruction through an interpersonal tone of pressure that insists students think, feel, and behave in teacher-prescribed ways (Reeve, 2016). This tone generally frustrates students' psychological needs for autonomy, competence, and relatedness (Cheon et al., 2016). It is communicated through pressure-laden prosody (i.e., low pitch, loud tone, fast speech rate, harsh voice quality; Zougkou et al., 2017) and acts of instruction such as suppressing students' input and voice, offering contingent rewards, uttering pressuring and compliance-inducing language (e.g., “you must”, “you have to”), uttering directives without explanations, asserting power or dominance (e.g., yelling, intimidating), and countering and trying to change students' complaints and expressions of negative affect into something acceptable to the teacher (Bartholomew, Ntoumanis, & Thogersen-Ntoumani, 2010; Reeve, 2009). Teacher-provided control is associated with students' low-quality motivation (need frustration, amotivation, controlled motivation), ineffective classroom functioning (disengagement, superficial learning), and negative educational outcomes (antisocial behavior, ill-being) and is therefore considered to be the maladaptive aspect of a teacher's motivating style (Assor et al., 2002; Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Haerens et al., 2015; Hein, Koka, & Hagger, 2015).

1.1. Personality perspective on the antecedents to teachers' motivating styles

Many social-contextual factors explain why teachers tend to orient themselves toward either an autonomy-supportive or a controlling motivating style during instruction, including school-based factors such as time constraints, emphases on summative grading, and administrative pressure to adopt prescribed teaching methods (Pelletier & Sharp, 2009; Taylor, Ntoumanis, & Smith, 2009), teachers' perceptions of their students' classroom motivation (i.e., autonomous vs. controlled motivation; Pelletier, Seguin-Levesque, & Legault, 2002), and even the nation in which they live and teach (Downie, Koestner, ElGeledi, & Cree, 2004; Reeve et al., 2014). But little is known about the possible personality-based antecedents of teachers' classroom motivating styles. Recognizing this, we undertook the present investigation with the goal of identifying which personality-based antecedents might tend teachers toward an autonomy-supportive style and which other personality-based antecedents might tend teachers toward a controlling style.

Following several personality theorists (McCrae et al., 2000; McAdams & Pals, 2006), we make the distinction between dispositional traits and characteristic adaptations. Dispositional traits represent endogenous (genetically-based) and stable “core traits” that follow intrinsic paths of expression and development and are essentially independent of environmental influences (Asendorpf & van Aken, 2003). The “Big Five” dispositions of extraversion, neuroticism, openness to experience, agreeableness, and conscientiousness exemplify core traits. Characteristic adaptations represent malleable and experienced-based “surface traits” that are shaped by context and personal strivings and have been internalized as self-regulatory orientations in response to persisting social-contextual influences (Vansteenkiste, Niemiec, & Soenens, 2010). The inclusion of surface traits adds a developmental perspective to explain teachers' motivating styles that are not necessarily captured by core traits (Olesen, 2011).

Like so many aspects of effective teaching, motivating style is an acquired skill. Intervention research, for instance, shows that teachers' motivating styles are malleable and can change with guidance, experience, and deliberate practice (Cheon et al., 2016; Cheon & Reeve,

2015; Cheon, Reeve, & Moon, 2012; Tessier, Sarrazin, & Ntoumanis, 2010). Core traits may predict such skill-based patterns of behavior, as in the case of openness to experience predicting communication skills (Sims, 2017) and conscientiousness predicting academic skills (Kappe & van der Flier, 2012). Nevertheless, we see motivating styles as more closely aligned with teachers' surface traits, such as those beliefs, orientations, and regulatory styles teachers acquire by adapting to their experiences. Specifically, as explained in the next section, we focus on the three surface traits of an autonomy causality orientation, personal growth strivings, and the transformational leadership style as possible personality-based antecedents of the autonomy-supportive motivating style, and we focus on the five surface traits of a control causality orientation, the transactional leadership style, authoritarianism, closed-mindedness, and discomfort with ambiguity as possible personality-based antecedents of the controlling motivating style. Additionally, we further investigated the predictive power of core traits (the Big Five) and a number of demographic variables (e.g., years of teaching experience).

1.2. Hypothesized personality-based antecedents of the autonomy-supportive motivating style

We sought to explain both who is characteristically autonomy supportive and who is most able to benefit from an intervention experience to learn how to become more autonomy supportive. As such, the study assessed teachers' beginning of the semester (i.e., pre-intervention, or Time 1) autonomy-supportive motivating style and also teachers' end of the semester (i.e., post-intervention, or Time 2) changes in the autonomy-supportive style.

Teachers who are autonomy supportive and teachers who learn how to become more autonomy supportive with training are likely to be those who possess individual differences that orient them favorably to enacting autonomy-supportive attitudes and behaviors, such as empathy and perspective taking, believing that the primary drivers of motivation are personal interests and preferences, and strivings to improve oneself. A high level of dispositional agreeableness, for instance, might predict an autonomy-supportive style because it reflects a tendency toward warm, reciprocal interactions with others that features a good deal of listening and understanding (McAdams, Jackson, & Kirshnit, 1984). Openness to experience has also been associated with an autonomous style (Olesen, 2011; Olesen, Thomsen, Schnieber, & Tonnesvang, 2010). Mostly, however, we focused on the following three surface traits as our hypothesized personality-based antecedents of an autonomy-supportive style: autonomy causality orientation, personal growth initiative, and transformational leadership.

A causality orientation is one's understanding of what typically energizes and directs (i.e., motivates) one's own behavior, and people tend to have, more or less, some level of both an autonomy causality orientation a control causality orientation (Deci & Ryan, 1985; Ryan & Deci, 2017). An *autonomy causality orientation* characterizes the degree to which the person sees the environment as a source of information. Individuals with a high autonomy causality orientation are “interest-taking”, as they find or create opportunities in the environment for the expression and engagement of their personal needs, interests, and values (Deci & Ryan, 1985; Ryan & Deci, 2017). The presence of need-satisfying, interesting, and valued environmental opportunities therefore explains why they act. Because autonomy-supportive teaching builds instruction around mobilizing students' inner motivational resources (e.g., needs, interests, and values), we expected that the autonomy causality orientation would predict the autonomy-supportive motivating style with the logic being that teachers would likely try to motivate their students by using the same sources of motivation that motivate them.

Personal growth initiative characterizes a person's active and intentional involvement in changing as a person; it is one's strivings for self-improvement and personal growth (Robitschek et al., 2012). Because

we viewed an intervention to learn how to become more autonomy supportive to be a growth-oriented professional developmental opportunity for teachers, we expected that teachers with a high personal growth initiative would more readily capitalize on the professional developmental opportunity and, consequently, become more autonomy supportive.

Transformational leadership is a style in which a teacher (the leader) seeks to inspire students (followers) by promoting their strengths, listening to their concerns, focusing on their needs, and mobilizing their inner motivational resources (Judge & Piccolo, 2004). Because we expected teachers who endorsed a transformational leadership style to focus on students' needs and strengths, we expected the transformational leadership style to predict the autonomy-supportive motivating style.

1.3. Hypothesized personality-based antecedents of the controlling motivating style

We further sought to explain both who is characteristically controlling and who remains controlling even after participation in the intervention experience (i.e., who resists the intervention's message and recommendations). As such, the study assessed teachers' beginning of the semester (i.e., pre-intervention, or T1) controlling motivating style and also teachers' end of the semester (i.e., post-intervention, or T2) changes in the controlling motivating style.

Teachers who are controlling and teachers who remain controlling after training are likely to be those who possess individual differences that orient them favorably to enacting controlling attitudes and behaviors, such as believing that people should submit to legitimate authority, holding a favorable view on the motivational use of rewards and punishers, preferring to create a tightly-organized social environment, being intolerant to open-ended (uncertain) lesson plans, and believing that the primary drivers of motivation are environmental incentives and social expectations. We did not expect any dispositional trait to be associated with these teacher characteristics, though there is some evidence that a controlling style is associated with a low level of agreeableness (Olesen, 2011; Olesen et al., 2010). Instead, we focused on the following five surface traits as our hypothesized personality-based antecedents of a controlling style: control causality orientation, transactional leadership, authoritarianism, closed-mindedness, and discomfort with ambiguity.

A *control causality orientation* characterizes the degree to which one's attention and concerns tend to be oriented toward external contingencies and controls. Individuals with a high control causality orientation experience environments in terms of rewards and social pressures and, in doing so, often lose sight of their own needs, interests, and values (Deci & Ryan, 1985; Ryan & Deci, 2017). Because controlling teaching builds instruction around the strategic and timely offering of attractive rewards and social pressures, we expected that the control causality orientation would predict the controlling motivating style, and there is support in the literature for this prediction as teachers' control orientation has been shown to correlate with raters' scoring of their in-class controlling instructional behavior, such as demanding respect and yelling (Van den Berghe et al., 2013).

Transactional leadership is a style in which a teacher (the leader) uses directives, close supervision, and a strategic use of rewards and punishments (extrinsic motivators) to gain students' (followers') compliance to leader-prescribed behaviors and outcomes (Judge & Piccolo, 2004). Because the transactional leadership style is often called "contingent reward leadership" (Bass & Avolio, 1994), we expected it to predict the controlling motivating style, because the use of contingent rewards is a central aspect of a controlling motivating style (Bartholomew et al., 2010).

Authoritarianism is the belief that subordinates should submit to and obey authority figures (Altemeyer, 1998). Because people high in authoritarianism emphasize sameness and conformity to prevailing social

norms, submission to legitimate authority, and the necessity of using coercion to ensure conformity (Altemeyer, 1996), we expected authoritarianism would predict the controlling motivating style.

Closed-mindedness and discomfort occasioned by ambiguity are two facets of the need for closure. Individuals high in the need for closure have intolerance for uncertainty and aversion to ambiguity. Because these two individual differences lead people to prefer simplified instructional scripts that produce high predictability (Kruglanski, 1989; Webster & Kruglanski, 1994), we expected both closed-mindedness and intolerance for ambiguity would predict the controlling motivating style.

2. Method

2.1. Participants

Teacher-participants were the 42 full-time teachers (25 females, 17 males) who comprised the full faculty at a public elementary school in Seoul, South Korea. All teachers were certified teachers who daily taught an average of 5 classes with an average of 22 students per class. Teachers averaged 7.1 years of teaching experience (*range* = 1 to 20 years) and were, on average, 33.7 years of age (*range* = 25 to 52). Teachers taught the following grade levels: first (*n* = 8); second (*n* = 6); third (*n* = 6); fourth (*n* = 7); fifth (*n* = 7); and sixth (*n* = 8). Forty-one of the 42 teacher-participants completed all aspects of the study, including both waves of data collection and all three parts of the intervention, so the teacher retention rate was 97.6% (41/42). At the end of the study, each teacher received a gratuity equivalent to \$100.

Student-participants were the 663 students present in class when the student questionnaire was collected. Following precedent and recommendations of child development researchers (Skinner & Belmont, 1993), we administered the questionnaire only to students in grades 3, 4, 5, and 6. All students were ethnic Korean and consisted of 323 (49%) females and 337 (51%) males with 3 students not indicating a gender and 131 (20%) third-graders, 156 (23%) fourth-graders, 164 (25%) fifth-graders; and 212 (32%) sixth-graders. The purpose of collecting the student data was simply to obtain a score for students' collective autonomous motivation to be used as a statistical control in the hypothesis tests.

2.2. Procedure

One month prior to the semester, the research team met with the school principal to gain consent for the semester-long study. Following this consent, we recruited the full population of 42 teachers to participate in the study. The data collection occurred in two waves. First, during week 4 of the semester (T1), teachers completed the teacher questionnaire (to assess the two motivating styles, demographic characteristics, the big five, and the eight surface traits), while students completed the student questionnaire. Also during week 4 and after teachers completed their questionnaire, teachers participated in Parts 1 and 2 of the autonomy-supportive intervention program (ASIP). Second, during the last week of the semester (week 16, T2), teachers completed the questionnaires assessing the two motivating styles for a second time.

At both T1 and T2, the teacher questionnaire was administered in a group setting by the research team, and teachers were assured that their responses would be confidential and used only for purposes of the research study. All parts of the ASIP intervention were also conducted in a group setting with all teachers present and participating. At T1, the student questionnaire was administered by a member of the research team (not by the teacher) at the beginning of a class period. Students were asked to complete the questionnaire in response to their experiences associated with that particular class, and they were assured that their responses would be confidential and used only for purposes of the research study. This study was approved by the university's Institutional

Table 1
Measures, psychometric properties, and sample items for the eight hypothesized personality-based antecedents.

Individual difference				
Name of questionnaire	Seminal reference	Items	α	Sample item
3 hypothesized autonomy-supportive motivating style antecedents				
Autonomy causality orientation				
General causality orientations scale	Deci & Ryan, 1985	12	0.83	Seek participation: get input from others before you make the final plans.
Personal growth initiative				
Personal growth initiative scale II	Robitschek et al., 2012	16	0.94	I am constantly trying to grow as a teacher.
Transformational leadership				
Multifactor leadership scale	Avolio, Bass, & Jung, 1999	4	0.50	I am one who focuses on students' strengths.
5 hypothesized controlling motivating style antecedents				
Control causality orientation				
General causality orientations scale	Deci & Ryan, 1985	12	0.68	Take charge: make most of the decisions yourself.
Transactional leadership				
Multifactor leadership scale	Avolio et al., 1999	4	0.71	I am one who focuses on students' mistakes.
Authoritarianism				
National election study	DeBell, Wilson, Segura, Jackman, & Hutchings, 2011	4	0.68	For the following pair of qualities, which one do you think is more important for a student to have? Curiosity or good manners?
Closed mindedness				
Need for closure scale	Webster & Kruglanski, 1994	8	0.74	I feel irritated when one person disagrees with what everyone else in a group believes.
Discomfort occasioned by ambiguity				
Need for closure scale	Webster & Kruglanski, 1994	8	0.77	It's annoying to listen to someone who cannot seem to make up his or her mind.

Review Board and all participants were treated in accordance with the guidelines recommended by the university and by the American Psychological Association.

2.3. Autonomy-supportive intervention program (ASIP)

The design and implementation of the intervention followed the recommendations for the effective implementation of a short-term professional developmental opportunity (e.g., alignment with teachers' training needs, participant-centered setting, demonstration of recommended behaviors, and providing opportunities for both practice and group discussion; Desimone, 2009; Lauer, Christopher, Firpo-Triplett, & Buchting, 2014). Part 1 of the ASIP was a 2 1/2-hour morning informational workshop to introduce autonomy-supportive and controlling teaching, to offer empirical evidence on the benefits of autonomy support and the costs of teacher control, and to introduce and recommend the following six autonomy-supportive instructional behaviors: Take the students' perspective; support students' psychological needs during instruction; use invitational language; provide explanatory rationales for teacher requests; display patience; and acknowledge and accept students' expressions of negative affect (for more information, see Reeve, 2009, 2016).

Part 2 was a 3-h, same-day afternoon workshop that focused on the "how to" of the six recommended autonomy-supportive instructional behaviors. Each recommended act of instruction was first described by the research team and modeled with multiple permutations via brief video clips. Teachers then practiced and refined the enactment of each instructional behavior—while receiving guidance, scaffolding, and feedback from the research team—until they felt sufficiently skilled to try each act of instruction in their own classrooms.

Part 3 was a 2-hour afternoon peer-to-peer group discussion that took place in the ninth week of the semester, about one month after teachers completed Parts 1 and 2 and after teachers had sufficient actual classroom experience with trying out the recommended instructional behaviors. During the group discussion, teachers shared their classroom experiences in trying to offer a more autonomy-supportive and a less controlling motivating style, reported on how their students reacted to each style, and exchanged their experienced-based tips, suggestions, and strategies as to how to teach in more autonomy-

supportive and less controlling ways.

2.4. Measures

For each questionnaire except Authoritarianism,¹ we used a 1–7 response scale (1 = *strongly disagree*, 7 = *strongly agree*). We had available to us a previously-used and validated Korean translated version of almost all the questionnaires, but we used Brislin's (1980) back-translation procedure for those that we did not. We translated these English measures into Korean using a professional English-Korean translator. Once translated, two graduate students who were native Korean and fluent in both languages carried out separate English back-translations, discussing any discrepancies that emerged until reaching a consensus translation.

2.4.1. Autonomy-supportive and controlling motivating styles

We assessed the autonomy-supportive and controlling motivating styles with two complementary measures—namely, the Teaching Scenarios questionnaire and the Situations in Schools questionnaire. Both measures include separate scales to assess both the autonomy-supportive and controlling motivating styles.

On the two-page *Teaching Scenarios* measure (Reeve et al., 2014), teachers first read a 263-word essay (see Reeve et al., 2014, Table 1, page 96) that provided a prototype of autonomy-supportive teaching that then asked the following four items to assess extent of agreement with that approach to teaching: "This approach to teaching describes how I teach my students on a daily basis; This approach to teaching nicely describes what I do during class; This is an accurate and true description of what I do during my teaching; and I do *not* teach this

¹ The Authoritarianism scale was the only scale that did not use a 1–7 response scale, so we describe its response scale here. All four items began with the same stem, which was: "Please tell use which one you think is more important for a child to have:" and respondents were asked to choose between two options. The four option pairs were as follows: "independence or respect for elders"; "obedience or self-reliance"; "curiosity or good manners"; and "being considerate or well behaved". Respondents who value "respect for elders", "obedience", "good manners", and being "well-behaved" score at the maximum of the authoritarian scale (4), while those who value "independence", "self-reliance", "curiosity", and "being considerate" score at the minimum (0).

way” (reverse scored). Teachers next read a 262-word essay on the second page that provided a prototype of controlling teaching that then asked teachers to complete the same four items assessing extent of agreement with that approach to teaching (with the order of the two essays being counterbalanced). Teachers completed the 4-item personal endorsement of autonomy-supportive teaching (α 's at T1 and T2 = 0.92 and 0.88) and the 4-item personal endorsement of controlling teaching (α 's = 0.94 and 0.92) in an internally consistent way. The Teaching Scenarios measure has been used successfully in past research to assess teachers' autonomy-supportive and controlling motivating styles (Reeve et al., 2014; Reeve & Cheon, 2016).

The *Situations in School* questionnaire (SIS) was developed in collaboration with self-determination theory experts to assess multiple dimensions of teachers' motivating styles (Aelterman et al., 2017). The SIS presents 12 daily classroom situations that deal with different aspects of the preparation or delivery of the day's lesson plan. Some situations depicted a problem which requires the teacher to intervene and remedy the situation (e.g., “At a difficult point in the lesson students begin to complain. In response, you...”), other situations involved a non-problematic situation in which the teacher takes a more proactive role (e.g., “You are thinking about classroom rules. So you...”), while other situations involved the provision of learning content (e.g., “It is time for students to practice what they have learned. You...”). For each vignette, the SIS offers four different teaching behaviors that correspond to an autonomy-supportive, controlling, structuring, or chaotic style, and teachers indicate the degree to which each behavior describes their own style. Scores from the 12 response options representing each scale are averaged to create the four scores, though we used only the autonomy support and controlling scales in the present study. Teachers completed the 12-item autonomy support (α 's = 0.82 and 0.84) and the 12-item control (α 's = 0.87 and 0.93) scales in an internally consistent way. Teacher scores on the SIS questionnaire have been shown to correlate with other measures of autonomy support and control (i.e., the Teacher as Social Context Questionnaire, TASCQ, Belmont, Skinner, Wellborn, & Connell, 1988) and to predict students' perceptions of teachers' autonomy-supportive and controlling teaching (Aelterman et al., 2017).

Teachers' scores on the two autonomy-supportive style questionnaires were positively intercorrelated [$r(41) = 0.49, p < 0.001$, at T1; $r(41) = 0.49, p < 0.001$, at T2], and teachers' scores on the two controlling style questionnaires were also positively intercorrelated [$r(41) = 0.56, p < 0.001$, at T1; $r(41) = 0.59, p < 0.001$, at T2]. Given these positive intercorrelations and given that both scales were developed by SDT experts to assess the same constructs, we averaged the autonomy-supportive scores from both questionnaires into a single score (one for T1, a second for T2), and we averaged the controlling scores from both questionnaires into a single score (one for T1, a second for T2).

2.4.2. Core trait measures

Teachers completed the Big Five Inventory (John & Srivastava, 1999) to self-report their endorsement of the big five traits of *extraversion* (8-items, $\alpha = 0.90$, “I see myself as someone who is talkative.”), *neuroticism* (8-items, $\alpha = 0.88$, “I see myself as someone who worries a lot.”), *openness to experience* (10-items, $\alpha = 0.74$, “I see myself as someone who likes to reflect, play with ideas.”), *agreeableness* (9-items, $\alpha = 0.73$, “I see myself as someone who is helpful and unselfish with others.”), and *conscientiousness* (9-items, $\alpha = 0.82$, “I see myself as someone who perseveres until the task is finished.”).

2.4.3. Surface trait measures

The teacher questionnaire measured the eight surface traits listed in Table 1 (in addition to the Big Five traits). We used the Causality Orientations Scale to assess both the autonomy and control causality orientations. The *autonomy causality orientation* assesses the extent to which the person believes that his or her behavior (in life in general, not

in regard to teaching in specific) is initiated and regulated primarily by internal causalities (e.g., interests, personal goals), while the *control causality orientation* assesses the extent to which the person believes that behavior is initiated and regulated primarily by environmental causalities (e.g., rewards, social demands). We used the Personal Growth Initiatives II scale to assess the *personal growth initiative*, which assesses the person's strivings for self-improvement and personal growth. We used the Multifactor Leadership Scale to assess both the transformational and transactional leadership styles. The *transformational leadership style* represents an approach to management in which the supervisor strives to transform supervisees into becoming leaders themselves, while the *transactional leadership style* represents an approach to management in which the supervisor gives out contingent rewards. We assessed *authoritarianism* with the National Election Study survey, which assesses the extent to which the person believes that subordinates (i.e., children) should submit to and obey authorities (i.e., teachers). We used the Need for Closure scale to assess both closed-mindedness and discomfort occasioned by ambiguity. *Closed-mindedness* assesses the extent to which the person desires a quick, decisive, simple answer or perspective on a topic, while *discomfort occasioned by ambiguity* assesses the person's preference for order and predictability.

2.4.4. Teachers' demographics and students' autonomous motivation (statistical controls)

Teachers reported their gender, grade level taught, and years of teaching experience on the teacher questionnaire. The students of each teacher completed an 8-item questionnaire ($\alpha = 0.95$) assessing their collective (class-wide, or class average) level of autonomous motivation that included four items assessing intrinsic motivation (e.g., “This class is enjoyable”) and another four items assessing identified regulation (e.g., “This class is important to me.”).

3. Results

3.1. Preliminary analyses

Missing data were rare ($< 0.5\%$), so we used the expectation-maximization (EM) algorithm to produce a multiple imputed data set (generating 200 iterations). All values for skewness and kurtosis were less than $|0.9|$, indicating little deviation from normality.

3.2. Effectiveness of ASIP

Because the study did not employ an experimental design (all teachers were in the experimental group), we used a repeated measures regression (i.e., pre-post comparison) to assess whether teachers' motivating styles changed from the beginning (before the intervention) to the end (after the intervention) of the semester. On average, teachers did report becoming significantly more autonomy supportive (M_s , 4.57 vs. 5.01), $F(1, 40) = 14.78, p < 0.001, \eta_p^2 = 0.27$, though they reported becoming only marginally less controlling (M_s , 3.95 vs. 3.75), $F(1, 40) = 2.79, p = 0.103, \eta_p^2 = 0.07$.

3.3. Descriptive statistics and intercorrelations

The descriptive statistics and intercorrelations among the T1 and T2 autonomy-supportive motivating styles, the T1 and T2 controlling motivating styles, the three teacher demographics, students' collective autonomous motivation, the big five core traits, the three hypothesized autonomy-supportive surface traits, and the five hypothesized interpersonal control surface traits appear in Table 2. Scores for T1 and T2 autonomy support correlated significantly with two of the big five traits (openness to experience, agreeableness), all three hypothesized autonomy-supportive antecedents, and with one statistical control (years of teaching experience). Scores for T1 and T2 control correlated significantly with none of the big five traits, all five hypothesized

Table 2
Descriptive Statistics and Intercorrelations among all 21 study variables.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
Outcome measures														
1. T1 autonomy support motivating style	–													
2. T2 autonomy support motivating style	0.56	–												
3. T1 controlling motivating style	–0.38	–0.25	–											
4. T2 controlling motivating style	–0.26	–0.49	0.74	–										
Statistical controls														
5. Teacher gender (male = 0, females = 1)	–0.11	0.09	0.24	0.14	–									
6. Teacher grade level taught	–0.11	–0.05	0.09	0.26	–0.11	–								
7. Teacher years of teaching experience	–0.33	–0.26	0.05	0.03	0.10	–0.01	–							
8. Students' autonomous motivation	0.21	0.09	–0.11	–0.11	–0.13	–0.27	–0.01	–						
Big five personality predictors														
9. Extraversion	0.15	0.12	–0.20	–0.20	0.06	0.13	0.03	–0.21	–					
10. Neuroticism	–0.29	–0.16	0.25	0.30	0.23	0.04	–0.06	0.05	–0.54	–				
11. Openness to experience	0.43	0.37	–0.12	–0.19	–0.10	–0.07	–0.03	–0.18	0.26	–0.12	–			
12. Agreeableness	0.36	0.29	–0.20	–0.27	0.24	–0.08	0.12	–0.11	0.42	–0.38	0.25	–		
13. Conscientiousness	0.16	0.33	–0.03	–0.18	0.10	0.17	0.09	–0.02	0.47	–0.46	0.22	0.56	–	
Hypothesized autonomy-supportive predictors														
14. Autonomy causality orientation	0.45	0.59	–0.24	–0.27	0.07	–0.12	–0.08	0.02	0.41	–0.23	0.37	0.39	0.21	–
15. Personal growth initiative	0.51	0.68	–0.22	–0.31	0.16	0.00	–0.29	–0.10	0.43	–0.42	0.49	0.50	0.61	0.50
16. Transformational leadership	0.27	0.48	–0.23	–0.27	0.28	–0.02	–0.12	–0.17	0.44	–0.22	0.26	–0.46	0.44	0.58
Hypothesized interpersonal control predictors														
17. Control causality orientation	–0.15	–0.23	0.60	–0.59	–0.12	0.09	0.10	–0.17	–0.30	0.24	0.10	–0.16	–0.07	–0.02
18. Transactional leadership	–0.13	–0.43	0.26	0.31	–0.09	–0.02	0.11	0.01	–0.45	0.33	–0.15	–0.16	–0.43	–0.43
19. Authoritarianism	–0.09	–0.15	0.54	0.40	0.24	–0.19	–0.13	–0.30	–0.02	–0.04	–0.04	0.10	0.02	–0.12
20. Closed-mindedness (need for closure)	–0.48	–0.41	0.37	0.34	–0.08	–0.10	–0.08	0.08	–0.50	0.41	–0.39	–0.48	–0.30	–0.48
21. Discomfort w/ambiguity (need for closure)	–0.32	–0.11	0.35	0.34	0.18	0.06	0.12	–0.06	–0.40	0.32	–0.10	–0.25	–0.16	–0.21
<i>M</i>	4.57	5.01	3.95	3.76	0.61	3.51	7.10	4.00	4.25	3.37	4.99	5.15	4.83	5.50
<i>SD</i>	0.86	0.70	1.03	1.06	0.49	1.80	4.85	0.38	1.14	1.01	0.68	0.76	0.82	0.72
<hr/>														
Variable			15.	16.	17.	18.	19.	20.	21.					
Outcome measures														
1. T1 autonomy support motivating style														
2. T2 autonomy support motivating style														
3. T1 controlling motivating style														
4. T2 controlling motivating style														
Statistical controls														
5. Teacher gender (male = 0, females = 1)														
6. Teacher grade level taught														
7. Teacher years of teaching experience														
8. Students' autonomous motivation														
Big five predictors														
9. Extraversion														
10. Neuroticism														
11. Openness to experience														
12. Agreeableness														
13. Conscientiousness														
Hypothesized autonomy-supportive predictors														
14. Autonomy causality orientation														
15. Personal growth initiative			–											
16. Transformational leadership			0.55	–										
Hypothesized interpersonal control predictors														
17. Control causality orientation			–0.20	–0.18	–									
18. Transactional leadership			–0.43	–0.44	0.42	–								
19. Authoritarianism			–0.02	–0.04	0.27	0.16	–							
20. Closed-mindedness (need for closure)			–0.53	–0.42	0.43	0.32	–0.04	–						
21. Discomfort w/ambiguity (need for closure)			–0.08	–0.16	0.43	0.37	0.12	0.36	–					
<i>M</i>			4.94	5.18	3.98	3.70	1.84	5.03	4.50					
<i>SD</i>			0.84	0.69	0.73	0.96	0.46	0.68	0.87					

N = 41. Boldface correlation coefficients are significant, *p* < 0.05.
Range for all variables, 1–7, except for authoritarianism, which was 0–4.

controlling style antecedents, and none of the statistical controls.

3.4. Predicting initial autonomy-supportive motivating style

To predict teachers' pre-intervention T1 autonomy-supportive

motivating style, we conducted a hierarchical regression. On the first step, we entered teachers' gender, grade level taught, and teaching experience, students' collective autonomous motivation, and the big five dispositional traits. This preliminary 9-predictor simultaneous regression was significant overall, $F(9, 31) = 4.17, p < 0.001$

Table 3
Regressions to predict teachers' T1 and T2 autonomy-supportive motivating style.

Predictor variable	T1 autonomy-supportive motivating style					T2 autonomy-supportive motivating style				
	B	SE B	β	t	p	B	SE B	β	t	p
Constant	- 1.10	1.95				0.55	1.47			
T1 autonomy support motivating style	-	-				0.19	0.14	0.23	1.36	0.183
Statistical controls—student variables										
Students' collective autonomous motivation	0.79	0.31	0.35	2.56	0.015	0.04	0.25	0.02	0.16	0.873
Statistical controls—teacher variables										
Teacher gender	0.06	0.25	0.03	0.22	0.826	0.05	0.20	0.03	0.24	0.815
Years of teaching experience	- 0.06	0.02	- 0.36	2.93	0.006	0.00	0.02	0.00	0.02	0.981
Grade level taught	0.06	0.07	0.12	0.83	0.411	0.01	0.05	0.03	0.26	0.793
Big five personality traits										
Extraversion	- 0.10	0.12	- 0.13	0.82	0.421	- 0.16	0.10	- 0.26	1.65	0.110
Neuroticism	- 0.27	0.14	- 0.31	1.85	0.073	0.04	0.12	0.06	0.32	0.748
Openness to experience	0.56	0.17	0.45	3.32	0.002	- 0.03	0.16	- 0.03	0.21	0.833
Agreeableness	0.45	0.18	0.40	2.48	0.019	- 0.13	0.15	- 0.14	0.87	0.391
Conscientiousness	- 0.24	0.18	- 0.23	1.35	0.188	0.10	0.16	0.12	0.65	0.520
Hypothesized individual differences										
Autonomy causality orientation						0.38	0.14	0.40	2.71	0.011
Personal growth initiative						0.43	0.18	0.51	2.37	0.025

Table 4
Regressions to predict teachers' T1 and T2 controlling motivating style.

Predictor variable	T1 controlling motivating style					T2 controlling motivating style				
	B	SE B	β	t	p	B	SE B	β	t	p
Constant	- 2.66	2.48				- 0.12	2.30			
T1 controlling motivating style	-	-				0.54	0.16	0.52	3.47	0.002
Statistical controls—student variables										
Students' collective autonomous motivation	0.47	0.36	0.17	1.32	0.197	0.21	0.34	0.07	0.60	0.551
Statistical controls—teacher variables										
Teacher gender	0.56	0.28	0.27	2.00	0.055	0.19	0.30	0.09	0.65	0.523
Years of teaching experience	0.01	0.02	0.07	0.59	0.559	- 0.01	0.02	- 0.02	0.21	0.836
Grade level taught	0.10	0.07	0.17	1.36	0.185	0.13	0.07	0.22	1.84	0.076
Big five personality traits										
Extraversion	0.04	0.13	0.05	0.34	0.738	0.10	0.13	0.11	0.77	0.449
Neuroticism	0.03	0.16	0.03	0.19	0.854	0.02	0.15	0.02	0.11	0.914
Openness to experience	- 0.06	0.18	- 0.04	0.31	0.760	- 0.16	0.18	- 0.10	0.85	0.403
Agreeableness	- 0.35	0.19	- 0.26	1.80	0.082	- 0.03	0.20	- 0.02	0.16	0.876
Conscientiousness	0.09	0.19	0.07	0.49	0.630	- 0.25	0.19	- 0.19	1.31	0.201
Hypothesized individual differences										
Control causality orientation	0.69	0.19	0.49	3.74	0.001	0.46	0.22	0.32	2.06	0.049
Authoritarianism	1.06	0.30	0.47	3.55	0.001					

($R^2 = 0.55$), with individually significant effects for students' high collective autonomous motivation ($\beta = 0.35, p = 0.015$), (few) years of teaching experience ($\beta = -0.36, p = 0.006$), high openness to experience ($\beta = 0.45, p = 0.002$), and high agreeableness ($\beta = 0.40, p = 0.019$). On the second step, we used the forward selection procedure to test if any of the three hypothesized surface traits (autonomy causality orientation, personal growth initiative, transactional leadership) could explain additional unique variance in T1 autonomy-supportive motivating style. None was able to do so. For exploratory (rather than for hypothesis-testing) purposes, we conducted an additional step by using the forward selection procedure to test if any of the five “cross-over” surface traits associated with the controlling motivating style (control causality orientation, transactional leadership, authoritarianism, closed-mindedness, and discomfort with ambiguity) might explain additional variance in T1 autonomy-supportive style above and beyond the already-entered variables, but none was able to do so. Results from the final 9-predictor regression to predict the T1 autonomy-supportive motivating style appear on the left side of Table 3.

3.5. Predicting post-intervention changes in the autonomy-supportive motivating style

To predict teachers' post-intervention changes in T2 autonomy-

supportive motivating style, we conducted a second hierarchical regression. On the first step, we entered T1 autonomy-supportive motivating style, the same four statistical controls, and the big five dispositional traits. This preliminary 10-predictor simultaneous regression was significant overall, $F(10, 30) = 2.32, p = 0.037 (R^2 = 0.44)$, but the only individually significant effect was for T1 autonomy-supportive motivating style ($\beta = 0.44, p = 0.039$). On the second step, we again used the forward selection procedure to test if any of the three hypothesized individual differences could explain additional unique variance in T2 autonomy-supportive motivating style. Two personality-based antecedents were able to do so. This 12-predictor regression was significant overall, $F(12, 28) = 4.53, p < 0.001 (R^2 = 0.66)$, and the amount of variance accounted for by the 12-item regression increased significantly over the 10-item regression ($\Delta R^2 = 0.22, p < 0.001$). Individually significant effects emerged for a high level of the autonomy causality orientation ($\beta = 0.40, p = 0.011$) and a high level of personal growth initiative ($\beta = 0.51, p = 0.025$). For exploratory purposes, we again used the forward selection procedure to test if any of the five “cross-over” surface traits associated with the controlling style might explain additional variance in the T2 autonomy-supportive style above and beyond the already-entered variables, but none was able to do so. Results from the final 12-predictor regression to predict the T2 autonomy-supportive motivating style appear on the right side of

Table 3.

3.6. Predicting initial controlling motivating style

To predict teachers' pre-intervention T1 controlling motivating style, we conducted a third hierarchical regression. On the first step, we entered the four statistical controls (i.e., teachers' gender, grade level taught, teaching experience, students' collective autonomous motivation) and the big five dispositional traits. This preliminary 9-predictor simultaneous regression was not significant overall, $F(9, 31) = 0.84$, $p = 0.583$ ($R^2 = 0.20$) and no variable was able to enter as an individually significant predictor. On the second step, we used the forward selection procedure to test if any of the five hypothesized surface traits could explain unique variance in T1 controlling motivating style. Two individual differences were able to do so. This 11-predictor regression was significant overall, $F(11, 29) = 5.26$, $p < 0.001$ ($R^2 = 0.67$), and the amount of variance accounted for by the 11-item regression increased significantly over the 9-item regression ($\Delta R^2 = 0.47$, $p < 0.001$). Individually significant effects emerged for a high level of the control causality orientation ($\beta = 0.49$, $p < 0.001$) and a high level of authoritarianism ($\beta = 0.47$, $p < 0.001$). We again used the forward selection procedure to explore if any of the three “cross-over” surface traits associated with the autonomy-supportive style might explain additional variance in T1 controlling style, but none was able to do so. Results from the final 11-predictor regression to predict the T1 controlling motivating style appear on the left side of Table 4.

3.7. Predicting post-intervention changes in the controlling motivating style

To predict teachers' post-intervention changes in T2 controlling motivating style, we conducted a fourth and final hierarchical regression. On the first step, we entered T1 controlling motivating style, the same four statistical controls, and the big five dispositional traits. This preliminary 10-predictor simultaneous regression was significant overall, $F(10, 30) = 5.33$, $p < 0.001$ ($R^2 = 0.64$), but the only individually significant effect was for T1 controlling motivating style ($\beta = 0.72$, $p < 0.001$). On the second step, we again used the forward selection procedure to test if any of the five hypothesized individual differences could explain additional unique variance in T2 controlling motivating style. One additional individual difference was able to do so. The final 11-predictor regression was significant overall, $F(11, 29) = 5.75$, $p < 0.001$ ($R^2 = 0.69$), and the amount of variance accounted for by the 11-item regression increased significantly over the 10-item regression ($\Delta R^2 = 0.05$, $p = 0.049$). Individually significant effects emerged for T1 controlling motivating style ($\beta = 0.52$, $p = 0.002$) and a high level of the control orientation ($\beta = 0.32$, $p = 0.049$). We again used the forward selection procedure to explore if any of the three “cross-over” surface traits associated with the autonomy-supportive style might explain additional variance in T1 controlling style, but none was able to do so. Results from the final 11-predictor regression to predict the T2 controlling motivating style appear on the right side of Table 4.

4. Discussion

The present study sought to understand which personality-based antecedents tended teachers toward an autonomy-supportive style and which other personality-based antecedents tended teachers toward a controlling style. Teachers did vary considerably at the beginning of the semester in their pre-intervention (T1) tendency toward the autonomy-supportive ($M = 4.57$, $SD = 0.86$, on a 1–7 scale) and the controlling ($M = 3.95$, $SD = 1.03$, on a 1–7 scale) motivating styles. Levels of openness to experience and agreeableness predicted T1 autonomy support, while level of authoritarianism and the control causality orientation predicted T1 teacher control. We also sought to investigate

which personality-based antecedents might function as a catalyst for using the ASIP experience as a professional developmental opportunity to meaningfully upgrading the quality of one's classroom motivating style (i.e., become more autonomy supportive, less controlling). Levels of the autonomy causality orientation and personal growth initiative predicted a T2 increase in the autonomy-supportive style, while level of the control causality orientation predicted the post-intervention T2 maintenance of the controlling style.

4.1. Who was characteristically autonomy supportive?

Several variables explained teachers' high, rather than low, pre-intervention T1 autonomy-supportive motivating style. One antecedent was having autonomously-motivated students. This suggests that teachers tend toward an autonomy-supportive motivating style to the extent that their students tend toward autonomous motivation. A second antecedent was having little teaching experience. It is not clear if new teachers tend toward higher autonomy support or if veteran teachers tend toward lower autonomy support, but the former may be more likely because inexperienced preservice teachers do tend to begin the profession with a highly autonomy-supportive style but become less autonomy supportive after taking full responsibility for their own classrooms (Hoy & Woolfolk, 1990). Two big five traits were individually predictive—openness to experience and agreeableness. One reason why a high level of openness to experience may tend teachers toward an autonomy-supportive style is because openness attracts teachers to new and non-traditional ways of motivating one's students (McCrae, 1987). One reason why a high level of agreeableness may tend teachers toward an autonomy-supportive style is because it helps teachers cope with students' problems (e.g., disengagement, misconduct, poor performance) by listening, understanding, displaying patience, and accepting expressions of negative affect as okay (i.e., by relying on autonomy-supportive instructional strategies).

None of the three hypothesized personality-based antecedents uniquely predicted teachers' T1 autonomy-supportive motivating style. As shown in Table 2, both surface traits were highly, positively correlated with T1 autonomy support ($r = 0.45$, $p < 0.001$, for autonomy causality orientation, and $r = 0.51$, $p < 0.001$, for personal growth initiative), but they were not able to explain additional unique variance above and beyond the earlier-mentioned predictors. This is because both showed the same strong positive intercorrelations (i.e., shared predictive capacity) with both openness to experience and agreeableness (all four r 's ≥ 0.37 ; see Table 2).

4.2. Who became more autonomy supportive?

Two of the three hypothesized antecedents explained who was most able to capitalize on the professional developmental opportunity (i.e., the ASIP) to meaningfully upgrade the quality of their post-intervention classroom motivating style—namely, autonomy causality orientation and personal growth initiative (but not transformational leadership). Autonomy causality orientation may have predicted post-intervention gains in autonomy support because an autonomy causality orientation reflects an understanding that internal causalities (e.g., interests, personal goals) are the most reliable and effective sources of motivation. Believing this, teachers with a high level of an autonomy causality orientation likely reacted positively to the various recommended instructional strategies designed to spark students' interest and satisfy their psychological needs during instruction (e.g., vitalize students' inner motivational resources). During their intervention experience, these teachers likely discovered new instructional strategies that could reliably and effectively vitalize and satisfy students' inherent motivations.

Personal growth initiative is both a striving for personal growth as well as a developed set of skills that help make self-improvement possible (Robitschek et al., 2012). The level of personal growth initiative a

teacher possesses affects his or her responsiveness to new opportunities to grow, and it predicts how actively teachers strive to capitalize on the specific growth opportunities that come their way (Robitschek et al., 2012). In the design of our study, we conceptualized the ASIP intervention as one such potential growth opportunity for teachers. Teachers with a high level of personal growth initiative did become more autonomy supportive post-intervention, and two possible reasons why this professional development occurred was because these teachers (1) intentionally and actively involved themselves in the semester-long professional developmental opportunity (ASIP) and (2) tended to have the skill set within them to undertake such an intentional self-change in their motivating style (e.g., being ready for change, making plans for intentional personal growth, using available resources, and following through on one's plans for intentional personal growth).

The one hypothesized antecedent that did not predict a change in T2 autonomy support was transformational leadership. We suggest two possible explanations for this null effect—one that is conceptual and a second that is statistical. Conceptually, transformational leadership is leadership, and it is likely that autonomy support is not rooted in leading others but, instead, in supporting the inner direction they already possess (Kaplan & Assor, 2012). Statistically, transformational leadership was positively correlated with T2 autonomy-supportive motivating style ($r = 0.48$, see Table 2), but it was also equally positively correlated with the autonomy causality orientation and personal growth initiative (the three shared a good deal of common variance). The measure used in the present study yielded a low alpha coefficient ($\alpha = 0.50$), which also limited the predictive power of this variable. Perhaps a study with a larger sample size (i.e., more statistical power) or even a different measure (operational definition) would allow transformational leadership to emerge as an individually significant antecedent, a possibility we suggest for future research.

4.3. Who was characteristically controlling?

Two of the five hypothesized personality-based antecedents explained who was characteristically controlling—namely, control causality orientation and authoritarianism (but not transactional leadership, closed-mindedness, or discomfort with ambiguity). The control causality orientation reflects an understanding that external causalities (e.g., incentives, social demands) are the reliable and effective motivational sources of people's behavior. Believing this, it makes sense that teachers with a high level of the control causality orientation would tend to use instructional strategies that introduced environmentally-generated sources of motivation, such as directives and commands, pressuring language, and the offering of environmental sources of motivation (e.g., stickers, point systems).

Authoritarianism is characterized by the belief that students (e.g., subordinates) should submit to and obey the teacher's authority (Altemeyer, 1998). The teacher's authority or power is seen as legitimate because of higher age, social status, and professional expertise. The authoritarian personality sees the teacher's classroom exercise of authority and leadership as a constructive and orderly way to increase prescribed behaviors (e.g., do your homework) and to decrease proscribed behaviors (e.g., do not run in the hallways). Thus, a high level of authoritarianism is closely related with a conventional (i.e., teacher-centered) classroom and with a conventional (i.e., controlling) motivating style.

Transactional leadership, closed-mindedness, and discomfort with ambiguity were all unable to explain unique variance in the controlling motivating style. It is worth highlighting, however, that all three personality-based antecedents did correlate significantly with the controlling motivating style (both at T1 and at T2). The reason these three predictors were not able to enter the regression as individual predictors, we believe, is because they were positively intercorrelated with both the control causality orientation and authoritarianism (and even with the Big Five traits). So, all five surface traits were at least somewhat

associated with the controlling motivating style, but the control causality orientation and authoritarianism were more closely associated with this style. Perhaps a study with larger statistical power (larger N) would allow these three additional predictors to explain additional variance in the controlling motivating style, another possibility we suggest for future research.

4.4. Who remained controlling? (who resisted the ASIP)

Two variables explained teachers' T2 level of the controlling motivating style. The first was teachers' T1 level of the controlling motivating style. This suggests that the controlling motivating style is relatively stable and not so open to change through professional developmental experiences, or at least that it is not as open to change in the same way that an autonomy-supportive motivating style is.

The one personality-based antecedent that explained a high level of the T2 controlling motivating style was a high level of the control causality orientation. Given this finding, we suspect that, during the intervention and throughout the semester, teachers with a high control causality orientation likely found the intervention's autonomy-supportive message to be largely inconsistent with, and even in direct conflict against, their understanding of external causalities as the motivational basis of motivation and engagement. These teachers likely disagreed with, questioned, and counter-argued against the recommended instructional strategies. That is, these teachers likely resisted the ASIP. If so, the intervention may have had little effect on teachers with a control causality orientation. Another way of interpreting this same finding, however, is to suggest that teachers with a low control causality orientation were relatively more open to the intervention's message and hence were more open to working through the process of adopting a significantly less controlling post-intervention motivating style.

4.5. Limitations

The study had three notable limitations. One limitation was the study's small sample size. To understand how much of a limitation our sample size was to reaching generalizable conclusions, we calculated what the ideal sample size would be for a F-test-based multiple regression that tested to detect three moderately potent antecedents of an outcome ($d = 0.30$) among a set of 18 total predictors (as in Tables 3 and 4) using conventional statistics ($\alpha = 0.05$, $power = 0.95$). That ideal sample size would be 63, based on Faul, Erdfelder, Lang, and Buchner's (2007) G*Power 3 software program. Because the sample size was 42, we determined that we were under-powered by about one-third. This low statistical power likely played a key role in understanding why some of the hypothesized personality-based antecedents were unable to emerge as individually significant predictors in the stepwise regressions, despite being correlated as expected with their corresponding motivating style. While recognizing this limitation and its tendency to render our conclusions conservative, it is equally important to point out that our sample featured a crucial compensatory strength—namely, that it was actually a full population and not a sample per se. Because we were able to recruit the full faculty of an elementary school, our data collection avoided the common problem of participant self-selection into (or out of) the study. Given that several personality-based antecedents did predict the motivating styles, even with our relatively low statistical power, we suggest that these new findings justify a fresh call-to-action for future motivating styles research to incorporate a “personality as antecedents” approach.

A second limitation was the lack of a no-intervention control group. We did not include a no-intervention control group in the research design, because our question was not whether the ASIP would work (because this has been demonstrated repeatedly before) but, instead, which personality-based antecedents would explain for whom the intervention would be effective and for whom it would not. The interpretive problem with the lack of a control group, however, is that T1-T2

difference scores can occur for multiple reasons unrelated to the intervention itself. Without a control group, intervention-enabled changes in the motivating styles are confounded with whatever other events might have also occurred during the semester (e.g., perhaps students became more engaged, the curriculum became more conducive to autonomy support, and so forth).

A third limitation was that we assessed the motivating styles with only self-report. This is a limitation because it raises the possibility of demand effects. We would point out, however, that students' independent reports of autonomous motivation did significantly predict teachers' autonomy-supportive motivating style (see left side of Table 3). This shows that scores from one informant (students) corresponded with scores from another informant (teachers). That said, other investigations that utilized a similar teacher-focused intervention have included rater-scored objective ratings of teachers' in-class instructional behaviors (e.g., Cheon et al., 2016), and our study would be made methodologically stronger with the addition of objective ratings of teachers' in-class motivating styles.

Collectively and overall, these three limitations—small sample size, lack of a control group, and lack of objective measures—could be overcome in a future investigation, an empirical effort that seems worthwhile given the generally positive findings from the current study.

4.6. Future research and classroom implications

The empirical study of teachers' motivating styles has been dominated by the study of social contextual factors. The positive findings from the current study, however, represent what we believe to be a new call to action to investigate how personality also affects motivating styles. Future research may investigate other personality variables not included in the present study, such as those associated with autonomous motivation to teach (e.g., autonomous motivation, need satisfaction during teaching; Roth, Assor, Kanat-Maymon, & Kaplan, 2007; Van den Berghe et al., 2014) and teachers' epistemological beliefs about the nature of learning (Roth & Weinstock, 2013). Intrinsic instructional goals (e.g., promote students' personal growth) have also recently been linked to teachers' autonomy-supportive motivating style (Jang, 2017). Social dominance orientation (Pratto, Sidanius, Stallworth, & Malle, 1994), which emphasizes social hierarchies, may also contribute to a controlling motivating style, as might a high level of public self-consciousness, which involves being aware of oneself through the evaluative eyes of others (Scheier & Carver, 1980). Extrinsic instructional goals (e.g., promote students' high test scores) have also been linked to teachers' controlling motivating style (Jang, 2017).

The findings reported in Tables 3 and 4 suggest that teacher-focused interventions on motivating style are not “one size fits all” exercises in teachers' professional development. In other words, they may be relatively more effective for some teachers and relatively less effective for others. This insight suggests a greater need to personally-tailor future interventions, as by providing more individualize feedback, more self-assessment, and more one-on-one mentoring.

The finding that teachers high in the control causality orientation largely resisted the ASIP to maintain a post-intervention controlling style suggest that the ASIP in its current form was lacking some crucial missing ingredient for these teachers. If so, future ASIPs could be re-designed to add an additional part that specifically addressed and worked through the how-to skill of becoming less controlling toward students during instruction. During such an addition, teachers could hear how students react to controlling instruction and also, if they found these student testimonials to be persuasive, how to transform their existing controlling instructional behaviors (e.g., utter directives without rationales, rely on pressuring language) into corresponding autonomy-supportive instructional behaviors (e.g., offer explanatory rationales for teacher requests, rely on invitational and change-oriented language). Whatever the remedy, the findings suggest a prerequisite

need to first address teachers' beliefs and orientations that otherwise interfere with the conceptual change process that allows teachers to upgrade the quality of their classroom motivating style not only toward greater autonomy support and but also toward lesser control.

5. Conclusion

Levels of openness to experience and agreeableness explained teachers' characteristic autonomy-supportive motivating style, while levels of an autonomy causality orientation and personal growth initiative explained their post-intervention gains in autonomy support. Levels of authoritarianism and the control causality orientation explained teachers' characteristic controlling motivating style, while level of a control causality orientation explained their post-intervention maintenance of the controlling motivating style. Taken as a whole, these findings suggest a robust relation between personality and teachers' motivating styles and, in doing so, encourage future research on the personality-based antecedents of teachers' motivating styles.

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