Toward an Integrative and Fine-grained Insight in Motivating and Demotivating Teaching Styles: The Merits of a Circumplex Approach
A Circumplex Approach toward Motivating and Demotivating Teaching

Abstract

We adopt a Self-Determination Theory framework to offer an integrative and fine-grained analysis of four key dimensions of teachers’ classroom motivating style (i.e., autonomy support, structure, control, and chaos) to resolve existing controversies in the literature, such as how these dimensions do and do not relate to each other and to educationally-important student and teacher outcomes. Six independent samples of secondary school teachers ($N = 1332$; $Mage = 40.9$ years) and their students ($N = 1735$, $Mage = 14.6$ years) read 12 ecologically valid vignettes to rate these four dimensions of teachers’ motivating styles, using the Situation-in-School (SIS) questionnaire. Multidimensional scaling analyses of both the teacher and the student data indicated that motivating and demotivating teaching practices could best be graphically represented by a two-dimensional configuration, with practices differing in terms of need support and directiveness. In addition, eight subareas (two subareas per each dimension of motivating style) were identified along a circumplex model: participative, attuning, guiding, clarifying, demanding, domineering, abandoning, and awaiting. Correlations between these eight subareas and a variety of construct validation and outcome variables (e.g., student motivation, teacher burnout) followed an ordered sinusoid pattern with the attuning and guiding subareas yielding the strongest positive correlates with desirable outcomes and the strongest negative correlates with undesirable outcomes, while the opposite pattern was found for the domineering and abandoning subareas. The discussion focuses on the conceptual implications and practical advantages of adopting a circumplex approach and sketches a number of important future directions.
Educational Impact and Implications Statement

The present study suggests that rather than categorizing secondary school teachers as either motivating or demotivating, a more gradual approach toward teaching is warranted. A gradual approach reveals that an attuning and guiding approach yield the most motivating effect, whereas a domineering and abandoning approach undermine students’ motivation and learning. Additionally, it sheds light on how the pitfalls of certain teaching practices (e.g., offering choice, monitoring whether students live up to expectations) can be avoided.

*Keywords*: autonomy support; multidimensional scaling; structure; self-determination theory; teaching styles.
Teachers play a major role in children’s engagement, learning, and development more broadly (Wentzel, 2009). Especially critical in this process is teachers’ motivating style, that is, the practices they rely on to foster children’s motivation (Reeve, 2009; Wubbels, Brekelmans, den Brok, & van Tartwijk, 2006). A teacher’s highly structured, highly autonomy-supportive motivating style is associated with a wide range of positive and educationally-important student outcomes, such as motivation, engagement, learning, and well-being (Jang, Reeve, & Deci, 2010), while a teacher’s highly controlling motivating style is associated with a wide range of negative student outcomes (Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Haerens, Vansteenkiste, Aelterman, & Van den Berghe, 2016). Experimentally-based intervention research further shows that teachers can be successfully trained to adopt an autonomy-supportive (Aelterman, Vansteenkiste, Van den Berghe, De Meyer, & Haerens, 2014; Chatzisarantis & Hagger, 2009) and structuring (Cheon, Reeve, & Vansteenkiste, 2017) motivating style, to the benefit of both their students and themselves (Reeve, 2016).

Although teachers generally hold the belief that an autonomy-supportive teaching style is beneficial for students’ sustainable motivation, engagement, and learning (Aelterman et al., 2016; De Meyer et al., 2016; Reeve et al., 2014), they also fear that too much autonomy support might undermine structure and lead to demotivating chaos. At the same time, teachers sometimes express anxiety about providing too much structure, fearing that it might lead to demotivating control. In the present research, we adopt a Self-Determination Theory framework (SDT; Ryan & Deci, 2017; Vansteenkiste & Ryan, 2013) to examine how the various dimensions of a teacher’s classroom (de)motivating style (i.e., autonomy support, control, structure, and chaos; see Table 1) are related to each other from a more integrative perspective, and we suggest that a finer-grained analysis of motivating style is necessary to make further progress in this area of research and practice. More specifically, we suggest that
within each of these four broader teaching styles there is room for differentiation into more specific subareas, and it is in these subareas that the different teaching styles begin to overlap. To illustrate, some aspects of autonomy support are likely to be closely related and complementary to structure (e.g., attuning to students’ preferences) while other aspects of autonomy support lean closer to chaos (e.g., encouraging students to take the lead in their learning). Similarly, we suggest that some aspects of structure are likely to be closely related and complementary to autonomy support (e.g., guiding students’ progress) while other aspects of structure are closely related to control (e.g., monitoring whether students meet expectations).

To gain such integrative and fine-grained insights in teachers’ (de)motivating style, we adopted a circumplex approach. Specifically, we relied on multidimensional scaling analysis (Borg, Groenen, & Mair, 2013), a more descriptive analytical strategy that generates a visual insight in how different teaching styles (i.e., autonomy support, structure, control, chaos) and identified subareas relate to each other by situating them into a multidimensional structure based on their pattern of proximities or similarities. To test the validity of the obtained dimensional configuration, we examined in six independent samples of secondary school teachers (total N = 1332) and students (total N = 1735) whether the obtained solution would converge across teachers and students and we investigated via correlational analyses whether the identified styles and the more finer-grained subareas would be associated in a systematic way with a wide range of adaptive and maladaptive aspects of both students’ and teachers’ functioning.

**Teacher Autonomy Support and Control**

At the heart of SDT is the postulation of three basic psychological needs, that is, the needs for autonomy (i.e., experiencing a sense of volition), competence (i.e., experiencing a sense of effectance), and relatedness (i.e., experiencing a sense of connection). Congruent
with its presumed growth-promoting role of the psychological needs, abundant research has shown that the satisfaction of these needs relates to engagement, well-being, and development, while their frustration relates to disengagement, ill-being, and even psychopathology (Ryan & Deci, 2017; Ryan, Deci, & Vansteenkiste, 2016; Vansteenkiste & Ryan, 2013).

In light of the central role of these needs, dozens of studies have addressed the question how teachers can nurture students’ psychological needs. Historically, teachers’ provision of autonomy support received most attention in the SDT-literature, with cross-sectional (e.g., Deci, Schwartz, Scheinman, & Ryan, 1981), longitudinal (e.g., Jang, Kim, & Reeve, 2016; Reeve, 2013), observational (e.g., Stroet, Opdenakker, & Minnaert, 2015), interventional (Cheon, Reeve, & Moon, 2012), and experimental studies (e.g., Mouratidis, Vansteenkiste, Lens, & Sideridis, 2011) all pointing out that autonomy support fosters need satisfaction and brings multiple benefits, including more deep-level learning, engagement, and well-being. When being autonomy-supportive, teachers adopt a curious, open, and flexible attitude, which allows them to better empathize with and nurture learners’ emerging interests, values, and preferences (see Table 1).

Several components of autonomy-supportive teaching have been identified, including taking the students’ perspective and welcoming their input (Jang, Reeve, & Halusic, 2016), offering choices (e.g., Patall, Cooper, & Wynn, 2010), providing a meaningful rationale (e.g., Assor et al., 2002), following students’ pace (Reeve & Jang, 2006), using invitational language (e.g., Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004), nurturing inner motivational resources such as task interest (e.g., Tsai, Kunter, Lüdtke, Trautwein, & Ryan, 2008; Patall, Dent, Oyer, & Wynn, 2013) and accepting expressions of negative affect (Reeve, 2009). In experimental studies (e.g., Savard, Joussemet, Pelletier, & Mageau, 2013; Reeve, Jang, Hardre, & Omura, 2002), these different components have typically been
isolated, while questionnaire-based studies more often made use of either a composite measure involving the assessment of multiple autonomy-supportive components each assessed with a limited set of items (e.g., Jang et al., 2010) or a single autonomy-supportive component thereby using a more extensive set of items (e.g., Patall, Vasquez, Steingut, Trimble, & Pituch, 2016).

In contrast, when being controlling, teachers adopt a tunnel-view in which their own agenda and expectations get prioritized, which leads them to exert pressure on learners to act, think, or feel in specific ways (see Table 1). Teachers can exert such pressure in a variety of ways, with some strategies involving external control (e.g., threatening with sanctions; yelling, intimidating, and offering behaviorally-contingent rewards; Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011), others involving more internal control (e.g., guilt-induction; shaming; Soenens & Vansteenkiste, 2010), and still others involving just plain pressuring and forceful language (e.g., directives; Assor et al., 2005). Research has increasingly indicated that the absence of teacher autonomy support does not by definition denote the presence of teacher control (e.g., Haerens, et al., 2015; Jang et al., 2016). For teachers to be perceived as controlling, they need to more directly suppress students’ psychological needs and interfere with their volitional functioning. Congruent with a presumed dual process model, previous studies have found teacher control to be especially predictive of amotivation (e.g., De Meyer et al., 2014), oppositional defiance (Haerens et al., 2015) and disengagement (Jang et al., 2016), while teacher autonomy support simultaneously predicts students’ positive adjustment and functioning.

**Teacher Structure and Chaos**

While autonomy-supportive teaching is especially critical to foster autonomy need satisfaction, structure fosters children’s competence (Skinner, Zimmer-Gembeck, & Connell, 1998). When providing structure, teachers adopt a process-oriented attitude, thereby trying to
align activities and expectations with children’s emerging skills while suggesting strategies and offering help, so that learners feel competent to master classroom learning activities (Vansteenkiste & Soenens, 2015; see Table 1). Like autonomy support, structure consists of several components, some of which are directly supportive of learners’ competence and some of which are more indirectly relevant (Haerens, et al., 2013; Mouratidis, Vansteenkiste, Michou & Lens, 2013; Ryan & Deci, 2017). One key feature of structure involves communicating clear expectations and guidelines for desirable behavior (e.g., being cooperative) and undesirable behavior (e.g., not disturbing others while they are working), while a second involves providing step-by-step directions as to how to attain those desired expectations (Jang et al., 2010; Vansteenkiste et al., 2012). The setting and monitoring of clear expectations and guidelines is considered a precondition for learners to develop a sense of effectiveness. That is, when the learning objectives are unclear or learners are not informed about which steps are required to meet them, they do not feel capable of successfully achieving these objectives. Moreover, such practices help learners to perceive the classroom environment as predictable and safe, which is indispensable to effective classroom management (Evertson & Weinstein, 2006; Gable, Hester, Rock, & Hughes, 2009).

Other components of structure include offering desired help and guidance during activities (Jang et al., 2010), adjusting tasks’ difficulty levels in accordance with children’s skills (Belmont et al., 1988), providing positive informational feedback during and after task completion (Koka & Hein, 2005; Mouratidis, Vansteenkiste, Lens, & Sideridis, 2008), and expressing confidence in students’ capabilities (Reeve, 2006). These components may be more directly nurturing learners’ competence as the provision of positive feedback directly signals learners’ effectiveness and the offer of tailored help and adjustment of task difficulty better guarantee that children develop a sense of effectiveness in carrying out the task, and hence yield a stronger motivating impact. Such practices are tailored directly to students’
developing capacities and aim to help students in gradually achieving the learning goals and promoting a deeper level of learning. These components of structure closely correspond to other constructs in the literature, such as instructional scaffolding (van de Pol, Volman, & Beishuizen, 2010) and adaptive instruction (Aleven, Mc Laughlin, Glenn, & Koedinger, 2017). Several studies have demonstrated that teacher structure, either perceived by students (e.g., Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009) or observed by external raters (e.g., Jang et al., 2010), brings multiple benefits, including not only greater competence and perceived control (Skinner et al., 1998), but also better self-regulated learning (Mouratidis et al., 2013; Sierens et al., 2009), less depressive feelings (Mouratidis et al., 2013) and greater engagement (Jang et al., 2010), an effect that can be largely accounted for by competence need satisfaction (Mouratidis et al., 2013).

Historically, compared to SDT investigations of teacher autonomy support, the notion of structure emerged more recently on researchers’ agenda, with scholars particularly focusing on sorting out the question whether autonomy-supportive teaching can go hand in hand with the provision of structure or is rather at odds with it. The support of learners’ autonomy is potentially compatible with the structuring of learners’ behavior and school tasks, yet the way of doing so can vary, as structure can be introduced in an autonomy-supportive (e.g., by providing rationales) or in a controlling (e.g., by threatening students who don’t follow teachers’ guidelines) way. Consistent with such theorizing, past research has begun to suggest that autonomy support and structure can go hand in hand as exemplified in the obtained positive correlations between these two styles (Jang et al., 2010; Vansteenkiste et al., 2012) and interaction effects in which the benefits of structure to students’ self-regulated learning are more pronounced when structure is provided in an autonomy-supportive way (Curran, Hill, & Niemiec, 2013; Sierens et al., 2009).
The role of chaos has been largely neglected in the SDT literature (but see Skinner, Johnson, & Snyder, 2005 in the parenting domain). When being chaotic, teachers not only fail to successfully adjust their instruction to the developmental pace and growth potential of learners, they may even actively interfere with their students’ competence development (see Table 1). Although little is known about the specific features of a chaotic teaching style, like the other three styles, chaos likely also consists of various components. Teachers come across as chaotic when they are contradictory about their requirements and expectations for learners, such that students experience the learning environment as confusing. As a result, they may feel less capable and certain of how to proceed. Chaos can also take the form of permissiveness (Baumrind, 2012) where teachers fail to stick to introduced guidelines and rules, thereby creating a laisser-faire climate. Finally, teachers may leave students to their own devices, presumably because teachers feel unable or have given up to provide the required assistance. If students notice that their teacher has abandoned them, they may especially doubt their skills and even start questioning themselves as a learner.

Gaps and Pressing Issues

Although substantial progress has been made to understand the effects of teacher-provided autonomy support, structure, and control, four important gaps in this literature can be identified. We suggest there is a need for (a) a more integrative approach, (b) conceptual and operational refinement, (c) an ecologically valid measure and (d) a more intensive study of teacher-student convergences/discrepancies.

First, a more integrative perspective is currently lacking, presumably because the majority of studies assessed only one (e.g., autonomy support) or two (e.g., autonomy support and structure; autonomy support and control) (de)motivating teaching styles, with teacher chaos being largely ignored. Yet, the simultaneous assessment and analysis of all four motivating and demotivating styles is critical to better understand their interrelation. That is,
by studying each of these four styles simultaneously, it may become more intelligible how these styles relate to each other in a more integrative picture. For instance, it becomes clearer which motivating and demotivating styles are more or less likely to co-occur.

Second, there is a need for increased conceptual refinement, thereby differentiating the overarching styles (i.e., autonomy support, control, structure, and chaos) into subareas. Although each motivating and demotivating style has been broken down into different components at the conceptual level (Vansteenkiste & Soenens, 2015), little is known about how these components cluster together in a specific subarea at the empirical level. One reason for this is that the number of items being used to assess different components is rather limited (e.g., Soenens & Vansteenkiste, 2005), such that there is little room for operational decomposition. A handful studies have assessed diverse components of a given style, with each component being assessed with multiple items. To illustrate, Assor et al. (2002) and Patall, Dent, Oyer, and Wynn (2013) indicated that autonomy-supportive teaching can be empirically deconstructed into different components (e.g., choice provision, rationale provision, perspective taking) and De Meyer, Soenens, Aelterman, De Bourdeauhuij, and Haerens (2016) reported that controlling teaching falls apart into more externally controlling (e.g., threatening with sanctions) and more internally controlling practices (e.g., guilt-induction; shaming). Moreover, the predictive validity of the retained components varied, with especially the provision of a meaningful rationale and perspective taking carrying the most motivating (Assor et al., 2002) and the use of internally controlling strategies carrying the most demotivating effect (De Meyer et al., 2016). Thus, by using a broader set of items to assess each of the motivating and demotivating styles, we aimed to adopt a more fine-grained approach, which comes with greater conceptual clarity and improved insights in the predictive validity of different motivating and demotivating practices. That is, it is instructive
to examine which components cluster in a subarea and whether identified subareas yield differential predictive power.

Third, several of the available measures on (de)motivating teaching styles lack ecological validity. Items such as ‘I always try to change my students’ (psychological control; Soenens, Sierens, Vansteenkiste, Dochy, & Goossens, 2012) or ‘I give my students a lot of choices regarding schoolwork’ (autonomy support; Belmont, Skinner, Wellborn, & Connell, 1989) are formulated in a generic way. As a result, it for instance remains unclear regarding which aspect of the schoolwork (e.g., type of assignment; amount of work) teachers offer choice (see also Agbuga, Xiang, McBride, & Su, 2016). For questionnaires to carry higher ecological validity, they need to be embedded in a more authentic situation, as described in a vignette. In addition to their higher ecological validity (Evans et al., 2015), vignettes also allow for a more accurate estimation of between-student differences in the perception of teaching practices compared to more generic measures. Specifically, in the latter, between-student differences might reflect differences in students’ perception of the same teacher behavior in a given situation or differences in the type of situations students have in mind when rating their teacher. In contrast, in the case of vignettes the situations are kept constant, thereby more purely tapping into between-student differences in perceptions of teachers’ responses in a given situation. Although such vignette-based measures were used in the early developments of SDT (i.e., Problems in School Questionnaire; Deci et al., 1981), the situations used were exclusively problem-focused and the responses only tapped into autonomy support and control.

Fourth, most of the previous studies on a (de)motivating teaching style involved either students (e.g., Van der Kaap-Deeder et al., 2017) or teachers (Sosic-Vasic, Keis, Lau, Spitzer, & Streb, 2015), which prevents scholars from examining the degree of teacher-learner convergence. Because the perceptions of teachers and students – even within the same class –
are idiosyncratic, as both interpret events through their own individual lenses (Broekkamp, Van Hout-Wolters, Rijlaarsdam & Van den Bergh, 2002; Könings, Seidel, Brand-Gruwel, & van Merriënboer, 2014), the convergence (i.e., correlation) between a teacher-rated and learner-perceived (de)motivating teaching style may get suppressed. Indeed, past research has shown that the convergence across teachers and students is rather modest (Aelterman et al., 2014; see den Brok, Bergen, & Brekelmans, 2006 for an overview), and similar discrepancies have been observed in the domains of sports (Macquet & Stanton, 2014) and parenting (Korelitz & Garber, 2016). In addition to these teacher-learner convergence, there is also a paucity of studies examining whether teachers and students hold on average a similar or dissimilar view on (de)motivating teaching.

Present Research

In the present study, we sought to gain more integrative and refined insights in the relation between various motivating and demotivating teaching practices. To achieve this double aim of integration and refinement, we made use of data-analytical approaches that allow, first, examining how motivating and demotivating teaching styles relate to one another when assessed simultaneously, and second, identifying whether components meaningfully cluster within each teaching style into different subareas. Multidimensional scaling (MDS; Borg et al., 2013) has great potential in this respect. It provides a graphical representation of (dis)similarities between items as distances between points in a geometrical space, with high correlations (or small dissimilarities) between items being represented by small distances between points in the geometrical space. Components of each teaching style are situated within clusters or subareas in the geometrical representation, and relationships between the different components are represented by the distances between these subareas (ranging from adjacent if highly correlated to opposite if negatively correlated).
Rather than making use of generic items devoid of a concrete context, in the present research we made use of a vignette-based instrument, entitled the Situations-in-School (SIS) Questionnaire, with items tapping into teachers’ autonomy-supportive, controlling, structuring, and chaotic responses to specific situations. We sought to provide evidence for the SIS’s internal validity (Aim 1), construct validity and reliability (Aim 2) and predictive validity (Aim 3), thereby pursuing five directional hypotheses.

**Aim 1: Internal Validity.** We used multidimensional analyses to identify the divergences and compatibilities between the four a-priori identified teaching styles (i.e. autonomy support, structure, control, and chaos). Specifically, we hypothesized that the four teaching styles would be represented as a two-dimensional *circumplex* with four quadrants, each representing one teaching style. As autonomy support and structure are considered motivating (i.e., need-supportive) teaching styles, we hypothesized that they would be related, and thus would be represented adjacent to one another within the geometrical representation. Similarly, we expected control and chaos to be related as both are considered demotivating (i.e., need thwarting) teaching styles. As such, the first dimension would reflect the degree to which teachers are need-supportive or need thwarting. The second dimension would reflect the level of teacher directiveness (see also Koestner, Powers, Milyavskay, Carbonneau, & Hope, 2015). Because teachers are more directive when they either provide structure (e.g., setting expectations) or are controlling (e.g., demanding cooperation), these two styles were expected to be adjacent to one another. Similarly, because teachers are, relatively speaking less directive when they adopt an autonomy-supportive (e.g., providing choice) or chaotic (e.g., leaving students on their own) style, these two styles were also expected to be adjacent. Moreover, based on the SDT-literature we expected clear opposition between autonomy support and control, and between structure and chaos, so that they would
be represented opposite from one another within the geometrical representation (Hypothesis 1a) (see Figure 1 for a graphical representation of the hypothesized model).

Given that various critical defining components of the four teaching styles were measured, we examined whether there was room for differentiation within each of these broader styles (Hypothesis 1b). To illustrate, we expected structure to fall apart in an area containing practices such as the setting of expectations and monitoring, which constitute preconditions for competence-development to take place, and an area clustering practices such as providing help, expressing confidence, and giving positive feedback, that are more directly supportive of learners’ competence (e.g., Haerens et al., 2013). Similarly, autonomy support was expected to fall apart in a subarea involving the offer of choice and the welcoming of students’ input, and a subarea involving practices where the teacher is attuning to students’ interests, feelings and wishes by providing a meaningful rationale or empathizing with negative affect. So, we anticipated on a theoretical basis that the four quadrants could be refined into subareas. We further expected that some of these subareas would lean closer to other styles. For instance, when compared to items tapping into teachers’ empathizing with students’ feelings, teachers’ provision of choice was expected to be situated more closely to a subarea reflective of a chaotic style.

In line with the assumptions underlying a circumplex model and testifying to the internal validity of the scale, we expected that the each identified subarea would correlate most strongly with its two adjacent subareas and become decreasingly positive and even increasingly negative as one moves along the circle to more distant and eventually the opposing subarea (Hypothesis 2). Finally, we explored whether the obtained dimensional configuration would emerge both among teachers and students and we investigated the degree of stability across the obtained configurations in both groups.
Aim 2: Psychometric Properties and Construct Validation. We examined the psychometric properties of the scales by testing the reliabilities of the four teaching styles and identified subareas, their association with social desirability responding, and their relation with commonly used teaching style measures in the literature (TASCQ, Belmont et al., 1988; PCT, Soenens et al., 2012; TRS, Reeve et al., 2004). In terms of construct validity, we expected the four teaching styles and their respective subareas to correlate most strongly with the corresponding validation measures. Similar to the ordered pattern of correlations obtained among identified subareas themselves and apart from the hypothesized peak between a specific subarea and a corresponding validation measure, we hypothesized that correlations would become decreasingly positive and even negative as one gradually moves from one subarea to another along the circumplex model (Hypothesis 3). Next, given that in one sample both teachers and students filled out the SIS, we examined the degree of convergence in the identified areas across both informants (i.e., teachers and students). In light of past work (e.g., Broekkamp et al., 2002), we expected low levels of convergence between teachers and students (Hypothesis 4a). In addition, substantial mean-level differences between teacher- and student-reports were expected, with teachers reporting to engage in more need-supportive and less need-thwarting teaching behaviors compared to what their students would perceive and report (Hypothesis 4b).

Aim 3: Nomological Network and Predictive Validity. We examined how the broader teaching styles and identified subareas correlated with a range of external variables, including teaching motivation, burnout and need-based experiences among teachers, as well as students’ motivation, oppositional defiance, self-regulated learning and teacher evaluations. In line with the proposed circumplex model, we again expected an ordered pattern of correlations. The need-supportive areas were expected to be positively correlated with
desirable outcomes and negatively with undesirable outcomes, whereas an opposite pattern of correlations was expected for the need-thwarting subareas (Hypothesis 5).

**Method**

**Participants and Procedure**

Six independent samples of teachers ($N = 1332$) and/or students ($N = 1735$) in were used throughout the different phases of the study: four large convenience samples and two school specific samples. The demographic characteristics of each sample appear in Table 2. Table 3 provides an overview of how the samples were used to address the aims of the study, along with the variables assessed in each sample. *Sample 1* and *Sample 2* participated by completing an online assessment that was either part of a large-scale study on the school’s motivational climate ($N = 15$ schools) or was conducted in conjunction with an invited school wide talk given by one of the first authors ($N = 9$ schools). For *Sample 3*, school principals were contacted by e-mail to ask permission for their teachers to cooperate in the study. Teachers were asked to fill out an online questionnaire twice with an interval of at least two weeks. Test-retest reliability analyses were based on T1 and T2 data of 89 teachers, while the T2 data were used in the MDS analyses. *Sample 4* constituted a school specific sample of 729 students who completed an online questionnaire during the last month of the school year. *Sample 5* comprised of 56 teachers and their 1006 students of one large secondary school, who filled out a questionnaire online. Data from the teachers were linked to the data of their students, so that the convergence between both informants could be examined. *Sample 6* involved secondary school teachers from 8 different schools who followed the same online assessment procedure as used with Samples 1 and 2.

In each sample, an informed consent form explaining the purposes of the study preceded the Internet survey. Participation was voluntary and confidential and participants could drop out at any time for any reason. With respect to the student samples, a passive
parental consent method was used by distributing a letter to students’ parents explaining the purposes of the study and providing a method to retract permission. All parents gave permission for their child to participate in the study.

Measures

Teacher reports

*Teacher’s teaching style.* The Situations-in-School (SIS) Questionnaire was developed in collaboration with SDT experts and extensively pilot tested with an additional sample of 339 teachers (35.0% men; Mage = 43.2 ± 10.7 years) from 6 secondary schools. The SIS consists of a pool of 12 vignettes of situations (see Supplemental Material) representing a wide range of situations that could be grouped in different ways. A first taxonomy reflects the timing of the event, with situations dealing either with the preparation, the course or the end of a lesson. Second, while 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…”). Finally, the content dealt with also differed across situations, with some situations involving the provision of learning content (e.g., “It is time for students to practice what they have learned. You…”) and others involving the introduction or monitoring of guidelines or a code of conduct (e.g., “A couple of students have been rude and disruptive. To cope, you…”). For each of the 12 vignettes participants were provided with four different teaching behaviors that correspond to an autonomy-supportive, controlling, structuring and chaotic style. Using a 7-point Likert scale ranging from 1 (*does not describe me at all*) to 7 (*does describe me extremely well*), teachers were asked to indicate to which degree each of these four behaviors described their own style.
Social desirability. The Marlowe-Crowne Social Desirability Scale (MC-SDS; Marlowe & Crowne, 1960) was used to assess the extent to which teachers were concerned with social approval. The original 33-item questionnaire was created to measure social desirability bias, which is considered one of the most common biases affecting survey research. In the present study, teachers were asked to fill out an adapted short version of the scale consisting of 10 items (e.g., ‘I never hesitate to help someone in trouble’, ‘If I made a mistake, I’m always willing to admit it’) with a true-false response scale (Fischer & Fick, 1993). A high correlation between scores on the MC-SDS and another measure suggests that the latter is measuring a respondent’s desire to answer in socially desirable ways, whereas a low correlation suggests that the measure is relatively free of social desirability bias. Internal consistency of the scale was rather poor with Cronbach’s $\alpha = .56$, though still consistent with past findings using this scale (Fischer & Fick, 1993).

Construct validation measures. For construct validation purposes, teachers filled out the Teacher as Social Context Questionnaire – Teacher version (TASCQ; Belmont et al., 1988), the Psychologically Controlling Teaching Questionnaire (PCT; Soenens et al., 2012), and the Teaching Rating Scale (TRS; Reeve, Jang, Carrell, Jeon, & Barch, 2004).

The three composite TASCQ subscales were used to measure various components of teachers’ provision of autonomy support (12 items; choice, 3 items, e.g., ‘I try to give a lot of choices about how to do the exercise to my students’; relevance, 3 items, e.g., ‘I explain to my students why we learn certain things in school’; acknowledgement of students’ opinions and feelings, 3 items, e.g., ‘I let my students make a lot of own decisions regarding schoolwork’; and control, 3 items, e.g., ‘I have to lead my students through their schoolwork step by step’, reverse coded), structure (15 items; expectations, 4 items, e.g., ‘I talk with my students about my expectations for them; monitoring/adjustment, 4 items, e.g., ‘When my students don’t comprehend the material, I take a different approach; help/support, 3 items; ‘I
A Circumplex Approach toward Motivating and Demotivating Teaching

show my students different ways to solve problems’; and contingency, 4 items, e.g., ‘When I discipline my students, I always explain why’), and involvement (14 items; ‘I find it easy to like my students’). Items were rated on a 5-point Likert scale ranging between 1 (completely disagree) and 5 (completely agree). Internal consistencies were satisfactory with Cronbach’s alpha of .65, .79, and .81 for autonomy support, structure, and involvement, respectively.

Controlling teaching was measured with the 7-item scale for psychologically controlling teaching ($\alpha = .65$, e.g., ‘I’m less friendly to my students if they don’t see things my way’). Items were rated on a 5-point Likert scale ranging between 1 (completely disagree) and 5 (completely agree).

Finally, teachers also filled out the 20-item TRS, which was previously used to observe teachers’ autonomy support, structure, control and chaos in a study by Reeve and colleagues (2004), and for the purposes of the present study was adjusted to a self-report format. Specifically, the original bipolar items (e.g., with 1 = controlling and 7 = autonomy-supportive) of the rating sheet were decoupled as to obtain separate items for each of the four teaching styles to be rated by teachers on a 7-point Likert scale ranging between 1 (does not describe me at all) to 7 (does describe me extremely well). Cronbach’s alphas were satisfactory for autonomy support (5 items; $\alpha = .75$, e.g., ‘I use informational language’, ‘I acknowledge and accept negative feelings and irritation’), structure (5 items; $\alpha = .63$, e.g., ‘I communicate clear expectations’, ‘I provide helpful feedback’) and control (5 items; $\alpha = .67$; ‘I insist that students have to do what they have to do’, ‘I use commanding language’), but low for chaos (5 items; $\alpha = .44$, e.g., ‘I expect that students solve their problems by themselves’, ‘I await and see what my students are capable of’).

Motivation to teach. To measure teachers’ motivation to teach we relied on an adapted version of the well-established Self-Regulation Questionnaire – Academic (Ryan & Connell, 1989). The validity of the questionnaire has previously been demonstrated in terms
of theoretically anticipated associations with teachers’ teaching style and burnout (Soenens et al., 2012; Van den Berghe et al., 2014). The scale uses the stem ‘I am motivated to teach well because…’ followed by 16 items representing four subscales: intrinsic motivation (4 items, $\alpha = .90$; e.g. ‘I enjoy teaching’), identified regulation (4 items, $\alpha = .79$; e.g., ‘it is an important life goal’), introjected regulation (4 items, $\alpha = .72$; e.g., ‘I would feel bad about myself if I don’t’), external regulation (4 items, $\alpha = .71$; e.g., ‘others force me to do so’). Items were rated on a 5-point Likert scale ranging between 1 (completely disagree) and 5 (completely agree). For the purposes of the present study, we computed composite scores for autonomous ($\alpha = .89$) and controlled ($\alpha = .80$) motivation by averaging the subscales of intrinsic and identified and introjected and external regulation, respectively.

**Burnout.** Participants completed two subscales of the Dutch version (Soenens et al., 2012) of the Maslach Burnout Inventory – Educators Survey (MBI-ES; Kokkinos, 2006; Maslach & Jackson, 1986), a validated questionnaire on burnout in teachers. The subscale Emotional exhaustion (9 items, $\alpha = .91$) measures feelings of tiredness at work (e.g., ‘I feel emotionally drained from my work’). The subscale Depersonalization (5 items, $\alpha = .69$) reflects teachers’ impersonal response to students (‘I don’t really care what happens to some students’). All items were rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (totally).

**Need-based experiences.** Teachers’ experiences of need satisfaction and frustration were measured with an adapted version of the Basic Psychological Need Satisfaction Need Frustration Scale (BPNSNF; Chen et al., 2015). This 24-item scale has been validated in four samples from diverse cultural backgrounds (i.e., China, US, Peru, and Belgium; Chen et al., 2015) and assessed each need with eight items of which four items tap into need satisfaction and four items into need frustration. For the purposes of the present study, this general need-based scale was slightly adjusted by adding the stem “At school” and by slightly rewording
some of the items to better reflect the specific context of teaching. Internal consistency was good for both need satisfaction (12 items, $\alpha = .86$) and need frustration (12 items, $\alpha = .86$).

**Student reports**

*Perceptions of teachers’ teaching style.* To measure students’ perceptions of their teacher’s teaching style, the 12 vignettes of the teacher-based SIS were slightly adapted so that they tapped the degree to which students perceived each of the four behaviors as describing their class teacher’s teaching style. Students rated each teaching style in an internally consistent way: autonomy support ($\alpha = .85$); structure ($\alpha = .86$); control ($\alpha = .82$); and chaos ($\alpha = .80$).

*Rated teacher quality.* As a proximal measure of how students had experienced the school year with their head teacher, students were asked to indicate to what extent they (a) would recommend their teacher to others (Recommended; 2 items, $\alpha = .80$, e.g., ‘I would recommend my head teacher to other students’), (b) would like to be taught by their teacher again next school year (Continued education; 3 items, $\alpha = .90$, e.g., ‘I would like to be taught by my head teacher again next year’), (c) found the lessons by their head teacher clear and easy to follow (Clarity; 2 items, $\alpha = .79$), and (d) would rate their head teacher as an excellent teacher (1 item).

*Motivation to study.* Students’ motivation to study for the subject taught by their head teacher was assessed with the adapted version of the Academic Self-Regulation Questionnaire (SRQ-A; Ryan & Connell, 1989). This 20-item scale contains 4 items per regulation. Internal consistencies, as indexed by Cronbach’s alpha, were satisfactory: intrinsic motivation, $\alpha = .91$, e.g., ‘because I enjoy studying for this subject’; identified regulation, $\alpha = .81$, e.g., ‘because it’s important to me to study for this subject’; introjected regulation, $\alpha = .76$, e.g., ‘because I’ll feel guilty if I don’t study for this subject’; external regulation, $\alpha = .75$, e.g., ‘because that’s what I’m supposed to do’; and amotivation, $\alpha = .87$ (e.g., ‘Honestly, I
don’t know why I study for this subject; I have the feeling that I’m wasting my time at school’). Similar to previous research (Vansteenkiste et al., 2009) and the measure for teachers’ motivation to teach, we created composite scores for autonomous ($\alpha = .91$) and controlled ($\alpha = .79$) motivation.

**Oppositional defiance.** Students’ oppositional defiance was measured with a recently developed and validated scale (Haerens et al., 2015; Vansteenkiste, Soenens, Van Petegem, & Duriez, 2014) that was adjusted to the education context. The scale assesses students’ tendencies to reject the teacher’s authority and contains 4 items: “I do exactly the opposite of what my class teacher expects me to do for this subject”, “I completely ignore what my class teacher asks me to do with respect to my schoolwork”, “I rebel against my class teachers’ expectations with respect to my work for this subject”, and “I don't care about what my class teacher expects me to do for this subject: I rather do my own thing”. Internal consistency of this scale was good with Cronbach’s $\alpha = .82$.

**Self-regulated learning.** To assess students’ self-regulated learning, five subscales of the Children’s Perceived use of Self-Regulated Learning Inventory (CP-SRLI; Vandevelde, Van Keer, & Rosseel, 2013) were used. Specifically, students were asked to fill out to what degree they relied on Surface learning strategies (4 items, $\alpha = .64$, e.g., ‘I read or recall everything again and again until I know it by heart’), Deep-level learning strategies (9 items, $\alpha = .74$, e.g., ‘I try to repeat the new material in my own words’), Planning (6 items, $\alpha = .76$, e.g., ‘Before I start my schoolwork, I decide what to do first and what later’), Monitoring (7 items, $\alpha = .71$, e.g., ‘During my schoolwork, I ask myself: “Is it working well in this way?”’) and Persistence (6 items, $\alpha = .86$, e.g., ‘Even if I would rather do other things, I make myself start my schoolwork’) when doing their schoolwork for the subject taught by their head teacher by means of a 5-point Likert scale from 1 (never) to 5 (always).

**Plan of Analysis**
To address the study aims, we always used the maximum amount of data available. As different measures were collected across samples, the number of participants involved varied across the aims and hypotheses in question. First, with respect to the internal validity (Aim 1), we examined the dimensional structure of the SIS items by relying on Multidimensional scaling (MDS; Borg et al., 2013). Euclidean distances\(^1\) between the standardized item responses were used as dissimilarity measure (which correspond to Pearson correlations between the items). We used the PROXSCAL MDS procedure of SPSS to compute the configuration with non-metrical MDS. This procedure was performed twice as to obtain a teacher-specific (using data from Samples 1, 2, 3, and 5) and student-specific (using data from Samples 4 and 5) configuration, and to examine whether the data could best be graphically represented by a two-dimensional configuration in both samples. To investigate the stability of the dimensional structure across teachers and students, we subjected the sample-specific configurations to Generalized Procrustes Analysis (GPA; Borg et al., 2013; Commandeur, 1991). GPA reflects, rotates, shifts, dilates or shrinks configurations from different samples in such a way that they correspond as closely as possible, without affecting the relative distances between items within each configuration. Further, GPA computes a centroid configuration representing the average configuration across the teacher and student samples. Next, we inspected whether we could identify the four broader teaching styles (Hypothesis 1a) and whether there is any room for further refinement within each of these broader teaching styles (Hypothesis1b). Finally, through correlational analyses, we examined the pattern of correlates between the identified areas (Hypothesis 2).

With respect to Aim 2, we explored the psychometric properties of the SIS by (a) calculating internal consistencies of the identified areas across all samples, and (b) investigating the test-retest reliability of the items by means of Pearson correlations between
T1 and T2 data of teachers in Sample 3. Construct validity was tested by investigating whether the identified areas meaningfully correlated with construct validation measures, including the TASCQ (Sample 1), PCT (Sample 1), and TRS (Sample 2) (Hypothesis 3). Further, we examined to what degree there was significant convergence between teacher- and student-reports of the SIS relying on data from Sample 5 (Hypothesis 4a). Given the hierarchical structure of the data in Sample 5, with 1006 students being nested within a smaller number of 56 teachers, we relied on multilevel regression analyses in MLwiN 2.27 (Rasbash, Steele, Browne, & Goldstein, 2009) to address this issue. Intraclass correlation coefficients (ICCs) were calculated to examine whether there was significant between-class (or between-teacher) variance in the broader teaching styles and identified subareas. Associations between student- and teacher reports were examined in distinct regression models for the broader teaching styles, as well as for the identified subareas, thereby regressing teacher-reports (i.e. independent variable) onto student-reports (i.e. dependent variable). In each model, the other teaching styles or subareas were respectively controlled for. Finally, to examine mean-level differences between teachers and students, independent sample t-testing was conducted (Hypothesis 4b).

As for Aim 3, the predictive validity was determined by evaluating the magnitudes and the pattern of correlations of the identified areas in the dimensional configuration with antecedents among teachers (e.g., motivation to teach, burnout, need-based experiences; Sample 1, 2, and 5) and outcomes among students (e.g., study motivation, oppositional defiance, self-regulated learning, and teacher evaluations; Sample 4 and 5), respectively (Hypothesis 5).

Results

Aim 1: Internal Validity.
**Dimensionality.** We examined a one- up to a six-dimensional configuration produced by the non-metric MDS analyses for the teacher and student data separately. In both data sets, the normalized raw stress and the scree test of each configuration clearly pointed to a two-dimensional representation, as was a priori expected (Hypothesis 1a). As for teacher data, the normalized raw stress declined from .064 over .013, .007, .005, .004, to .003 for a one-dimensional up to a six-dimensional solution, respectively. With respect to student data, the normalized raw stress declined from .047 over .010, .006, .004, .003 to .002 for a one-dimensional up to a six-dimensional solution, respectively.

**Robustness.** To compare the robustness of the two-dimensional configuration between teacher and student samples we applied GPA to the sample-specific configurations. Only 2% of the squared distances was lost by representing the two sample-specific configurations by a single centroid configuration. This clearly indicates that the coordinates of the individual SIS items are highly comparable between the teacher and student samples, and that the centroid configuration gives a very good representation of the internal structure for both samples. Figure 2 shows the two-dimensional representation of the SIS among teachers (Figure 2a) and students (Figure 2b).

**Interpretation of the dimensional structure.** An MDS configuration can be interpreted in two ways, that is, at the dimensional and at the regional levels. A dimensional interpretation interprets the dimensions looking at the coordinates of the items on the dimensions, while a regional interpretation looks for bounded regions within the geometrical representation each containing a qualitatively different type of items. In the centroid two-dimensional structure of the SIS items, the first dimension (i.e., x-axis) can be interpreted as need thwarting versus need support, with the control and chaos items having negative coordinates and the autonomy support and structure items having positive coordinates on this dimension. The two right-most items in Figure 2a and 2b refer to need support (“provide
A Circumplex Approach toward Motivating and Demotivating Teaching

extra help”, “accept their feelings”), while the two left-most items both refer to need thwart (i.e., “let it pass”, “don’t plan”).

The second dimension (i.e., $y$-axis) can be interpreted in terms of the level of teacher directiveness, with the control and structure items having positive coordinates and the autonomy support and chaos items having negative coordinates on this dimension. The two lower-most items in Figure 2a and 2b both refer to high directiveness (“insist they learn”, “insist they be mature”), while the two upper-most items both refer to low directiveness (i.e., “let happen what happens”, “ask for their view”). Moreover, as expected based on the SDT-literture, rotation of the two axes resulted in a dimension with autonomy support positioned most distant from control (i.e., $x$-axis), and structure positioned most distant from chaos, thereby confirming Hypothesis 1a.

In addition to the dimensional interpretation, the interpretation of the different regions was also consistent with our theorizing (Hypothesis 1a). Specifically, four broader quadrants could be distinguished, with the autonomy support items being situated in the upper right quadrant (e.g., “make lesson more enjoyable”), the structure items in the lower right quadrant (e.g., “announce expectations”), the control items in the lower left quadrant (e.g., “pound the desk”), and the chaos items in the upper left quadrant (e.g., don’t plan or organize). Providing evidence for Hypothesis 1b, a closer inspection of the position of the each item in the circumplex structure and its content revealed that each quadrant fell into two meaningful subareas. Specifically, as can be noticed in Figure 3, autonomy support items involving inviting students’ input and providing choice, which we labeled as a participative approach, clustered together, whereas items referring to nurturing students’ personal interests and preferences, fostering enjoyment, and offering a meaningful rationale cluster together in a subarea which we labeled as an attuning approach. With regard to structure, items including offering help and adjusting the learning material, were labeled as a guiding approach, and
items including communicating clear expectations and monitoring whether students live up to these expectations, were labeled as a *clarifying approach*. Control items involving highlighting students’ duties and responsibility and using (threats of) sanctions were labeled as a *demanding approach*, while items involving intensively pressuring students by means of harsh controlling strategies, such as shaming, guilt-induction or exerting power were labeled as a *domineering approach*. Finally, the two subareas of chaos were labeled as an *abandoning approach* including items referring to indifference and ignoring student activity when an action from the teacher is actually called for, and an *awaiting approach* including items referring to waiting to see how the situation evolves and letting things unfold for themselves. Moreover, we observed that these eight subareas were ordered in a circular way (i.e., circumplex structure), with an attuning approach being more related to a guiding approach and a participative approach being more related to an awaiting approach, an abandoning approach being more related to a domineering approach, and a demanding approach being more related to a clarifying approach.

Further testifying to the visually inspected differentiation between adjacent subareas, eight confirmatory factor analyses (CFA) based on maximum likelihood estimation were performed in Mplus Version 7.0 (Muthen & Muthen, 2012). Specifically, in a separate set of analyses for each pair of adjacent subareas within (e.g., participative and attuning) and across (e.g., attuning and guiding) overarching styles, items were modeled as indicators of the two factors, respectively. Each two-factor model fitted the data well, both among teachers, all $\chi^2$-values $p < .001$, $.03 < \text{RMSEA} < .08$, $.91 < \text{CFI} < .99$, $.02 < \text{SRMR} < .06$, and among students, all $\chi^2$-values $p < .001$, $.06 < \text{RMSEA} < .07$, $.90 < \text{CFI} < .95$, $.03 < \text{SRMR} < .06$, with the exception of the CFA modeling items of the clarifying and demanding approach, which showed a poorer CFI (.84 among teachers; .87 among students). Importantly, each of
A Circumplex Approach toward Motivating and Demotivating Teaching

these two-factor models had a significantly better fit than each of the one-factor models, all Δχ²(1) values significant at p < .001.

**Correlational pattern.** As can be noticed among both teachers (Table 4) and students (Table 5), autonomy support and structure were positively correlated and control and chaos were positively correlated. In addition, autonomy support was significantly negatively related to both control and chaos in the student data, while only being negatively related to chaos in the teacher data. As for structure, it was negatively related to chaos among both students and teachers, while being unrelated to control in the student data and positively related to control in the teacher data.

By breaking down the four broader areas in eight subareas, the pattern of correlates became clearer. In fact, as hypothesized (Hypothesis 2), evidence was obtained for an ordered pattern, with each subarea being most strongly correlated with the adjacent subareas and the pattern becoming decreasingly positive and increasingly negative as one moves along the circle. To illustrate, the attuning approach correlated most strongly with the participative and guiding approaches, with the strength of these correlations further declining as one moves away from these adjacent subareas. Correlations became negative in case subareas were situated in further away of one another in the circumplex. The correlations situated on the diagonal are indicative of the strength of the correlation between each pair of adjacent subareas (see also Figure 3). Although each of these correlations was positive, the correlation between the participative and awaiting subarea, and between the clarifying and demanding subarea was somewhat less pronounced compared to the correlations between each other pair of adjacent subareas. This suggests that there is a wider gap between need-supportive and need thwarting teaching practices. Moreover, the positive correlation between the two subareas of chaotic teaching was less pronounced when compared to the correlation between two subareas of the other three dimensions, suggesting that the two subareas of chaotic
teaching are more strongly differentiated compared to the subareas of the other distinguished quadrants.

**Aim 2: Psychometric Properties and Construct Validation**

**Reliabilities.** Tables 4 and 5 show that, across both samples, internal consistencies were acceptable to good for the four quadrants (.78 < $\alpha$ < .82 and .80 < $\alpha$ < .86 for teachers and students, respectively) as well as for the eight identified subareas. Specifically, Cronbach’s alpha for the subareas ranged between .73 < $\alpha$ < .82 and .71 < $\alpha$ < .86 for teachers and students, respectively. One exception was the 3-item participative subarea ($\alpha_{\text{teacher}} = .50$, $\alpha_{\text{student}} = .53$), which had fairly poor internal consistency.

To investigate the test-retest reliability of the SIS items we correlated T1 and T2 data of teachers ($N = 89$) in Sample 3. The results indicated that test-retest reliability was high with correlations ranging between .48 and .80 (see Table 4). Need thwarting practices (.71 < $r$ < .80) appeared to be more stable over time than need-supportive practices (.48 < $r$ < .68), both at the level of the quadrants and the subareas. The subareas of structure in particular were somewhat less consistent (guiding $r = .48$, clarifying $r = .56$).

**Construct Validity.** We tested whether the identified areas were meaningfully associated with other measures of autonomy support, structure, control, and chaos. Three sets of findings deserve being highlighted. As can be noticed in Table 6, the strongest pattern of correlates emerged for each scale’s corresponding construct validation measure (indicated in bold), thereby confirming Hypothesis 3. To illustrate, the broader autonomy support area as well as its two subareas (i.e., participative and attuning approach) correlated most strongly with two previously used measures of autonomy support (i.e., TASQ and TRS). A similar pattern could be observed for structure, control and chaos. In most cases, the broader areas as well as their constituting subareas correlated most strongly with the corresponding construct validation measure. If any exceptions emerged, the areas adjacent to a specific subarea
yielded an equally strong correlation with the construct validation measure. Interestingly, involvement correlated most strongly with the need-supportive quadrants and subareas, while being negatively related to the need-thwarting quadrants and subareas, except for a null-relation with the demanding approach. Given that the autonomy-supportive subareas also correlated with construct validation measures of structure (and vice versa), we performed supplemental analyses, thereby deconstructing the TASCQ subscales of autonomy support and structure into subcomponents and correlating these subcomponents with the eight identified subareas. Results of these more refined analyses (see Table 6b in Supplemental Material) pointed to a more differentiated pattern, especially when controlling for the adjacent subareas, and hence provide additional evidence for the discriminating construct validity of the autonomy-supportive and structuring approaches of the SIS.

**Social desirability.** The social desirability tendency of teachers correlated positively with the attuning, guiding, and clarifying approach, while being negatively related to the two chaotic approaches. Interestingly, social desirability was unrelated to the two controlling teaching approaches.

**Teacher-student Convergence.** Given that students in Sample 5 were asked to report on their experiences with their head teacher, data from the teachers could be directly linked to the data of their students as to examine the convergence between these two informants. Estimation of intraclass correlation coefficients (ICCs) indicated that there was significant between-class (or between-teacher) variance in each of the four overarching teaching styles (autonomy support: 25%, control: 24%, structure: 21%, and chaos: 11%; all \( \chi^2(1) \)-values \( p < .001 \)), as well as in the eight subareas (participative: 14%, attuning: 27%, guiding: 21%, clarifying: 17%, demanding: 23%, domineering: 20%, abandoning: 16%, and awaiting: 16%; all \( \chi^2(1) \)-values \( p < .001 \)). As can be noticed in Table 7, multilevel regression analyses further revealed that significant convergence was found for autonomy support \((\beta = .37, \chi^2(1) = \)
14.48, \( p < .001 \) and control (\( \beta = .15, \chi^2(1) = 7.81, p = .005 \)), but not for structure (\( \beta = .11, \chi^2(1) = 1.32, p = .25 \)) and chaos (\( \beta = .04, \chi^2(1) = .26, p = .61 \)). At the level of the subareas, the teacher-reported participative (\( \beta = .13, \chi^2(1) = 4.04, p = .04 \)), attuning (\( \beta = .43, \chi^2(1) = 14.87, p < .001 \)) and demanding (\( \beta = .17, \chi^2(1) = 10.55, p < .001 \)) approaches converged with students’ perceptions of these respective subareas, but no significant convergences were found for the other subareas. Such modest convergences are consistent with Hypothesis 4a.

In addition, as expected (Hypothesis 4b), results of independent-sample t-tests in Sample 5 indicated that there were significant mean-level differences between teachers and students for the four overarching teaching styles (i.e., quadrants) as well as for the eight subareas. Specifically, teachers reported to be significantly more autonomy-supportive and structuring, while being less controlling and chaotic than they were seen by their students (all t-values \( ps < .001 \)). A similar picture emerged at the level of the subareas (all \( t \)-values \( .00 < p < .03 \)^2, with the only exception that no teacher-student differences were found for the participative approach (\( t(1058) = -.07, p = .94 \)).

**Aim 3: Nomological Network and Predictive Validity**

To determine the predictive validity of the SIS, we examined whether the four broader areas as well as the eight subareas related in predictable ways with hypothesized antecedents among teachers and outcomes among students, respectively. As expected (Hypothesis 5), Table 6 shows that the broader areas of autonomy support and structure were positively correlated with autonomous motivation to teach and experiences of need satisfaction, and negatively correlated with burnout and need frustration among teachers, whereas an opposite pattern of correlations was found for the areas of control and chaos. More interestingly, correlations between teacher antecedents and the eight subareas formed a sinusoidal pattern (see Figure 4a for an example). For example, teachers’ autonomous motivation to teach was most positively related to the attuning and the guiding approach, while being most negatively
related to the abandoning approach. Similar results were obtained for teachers’ experiences of need satisfaction at school. In contrast, maladaptive teacher variables, including symptoms of burnout, experiences of need frustration and, albeit to a lesser extent, also controlled motivation yielded an opposite pattern of correlations. For example, depersonalisation was most positively correlated to the domineering and abandoning approach, while being most negatively related to the attuning and the guiding approach. The other correlates fell in between these extremes, gradually shifting as one moves along the circumplex.

Concerning the student outcomes, the expected pattern of results was evident (Hypothesis 5). Specifically, Table 8 shows that the broader areas of autonomy support and structure were positively correlated with desirable outcomes and negatively with undesirable outcomes, whereas an opposite pattern of correlations was observed for the broader areas of control and chaos. In addition, a similar ordered pattern of correlations between student outcomes and the eight subareas could be observed (see Figure 4b for an example using students’ ratings of teacher quality). The strongest correlates were obtained for rated teacher quality. For example, whether students would recommend their teacher to other students, would like to receive continued education from their class teacher next year, found the lessons clear and easy to follow, and would rate their class teacher as an excellent teacher, were all positively correlated to the attuning and the guiding approach, while being most strongly negatively related to the abandoning and domineering approach. Similar results were obtained for students’ autonomous motivation and all aspects of self-regulated learning (e.g., surface learning strategies, deep-level learning strategies, planning, monitoring, and persistence), whereas an opposite pattern of correlations was found for students’ amotivation and oppositional defiance. Interestingly, students’ controlled motivation was positively related to all subareas on the circumplex with the exception of a guiding approach, though correlations were strongest with the demanding and domineering approach.
**Supplemental Work: Towards an Optimized Scale**

Although we provided evidence for the robustness and validity of the two-dimensional representation of the SIS, we need to acknowledge a few lingering gaps with the 12 vignettes. Initially, the items for the 12 vignettes were generated from the conceptual definitions and defining features of the autonomy-supportive, structuring, controlling and chaotic teaching styles as widely described in the literature. Then, based on the data of large teacher- and student-samples, it became clear that the defining features grouped themselves together into two subareas per overarching teaching style. However, some subareas seemed to be better represented with a larger number of items than were other subareas. Particularly, the participative approach featured only three items and Cronbach’s alpha coefficient for this same scale was fairly low, thereby potentially undermining its predictive validity. In order to meet these shortcomings, we decided to further refine the instrument by adding three more vignettes that included the underrepresented subareas. The final SIS including 15 vignettes (i.e. 60 items) and the scoring key can be found in the Supplemental Material. For the comfort of the reader, the three added vignettes are indicated in green font.

To examine the internal validity of this optimized instrument, an additional independent teacher sample \((N = 486)\) was surveyed (i.e., Sample 6; see Table 2 and 3), in which participants were asked to fill out the 15 vignettes of the SIS. Similar to the findings of the 12-vignette version, multidimensional scaling analyses (Borg et al., 2013) revealed that the (de)motivating practices could best be graphically represented by a two-dimensional configuration, accounting for 98% of dispersion. The identical eight subareas could be identified along a circumplex model and, as can be noticed in Table 8, correlations between these distinguished subareas followed a similar ordered pattern as with the 12 vignettes. By the addition of three vignettes, internal consistencies were acceptable to good for all subareas,
A Circumplex Approach toward Motivating and Demotivating Teaching

including the participative approach, with Cronbach’s alpha ranging between $0.69 < \alpha < 0.90$ (average $\alpha = 0.80$).

**Discussion**

School principals, teachers, and parents all share the contention that the nurturance of children’s engagement, learning, and development requires teachers to adopt a facilitating motivating style. As a result, a great deal of attention has been devoted to what the critical components of such a motivating style exactly are (Reeve, 2009) and what teachers do when they rely on demotivating practices (e.g., Van den Berghe et al., 2013). Yet, at least within the Self-Determination Theory literature, this body of work has remained somewhat fragmented, with scholars focusing on a limited number of motivating or demotivating components (e.g., choice) or styles (e.g., teacher autonomy support). Relying on multidimensional scaling analysis, the present study aimed to draw a more integrative and refined picture by, first, assessing a variety of need-supportive and need thwarting practices simultaneously in response to specific situations as depicted in vignettes and, second, by examining the relations between different teaching practices, both within and across different styles. A number of promising findings emerged.

**Towards More Integrative Insights in (De)motivating Teaching**

A central aim of the study was to examine how a variety of teaching practices relate to one another. Consistent with our expectation we found evidence for a two-dimensional circumplex structure (see Figures 2 and 3) with a horizontal axis denoting the extent to which teaching practices are supportive (i.e., autonomy support and structure), relative to thwarting (i.e., control and chaos), of students’ basic psychological needs, while the vertical axis reflects the degree to which the teacher is highly directive (i.e., structure and control) or leaves more room for students to take the lead (i.e., autonomy support and chaos). These two constituting dimensions provide a more integrative picture of the key teaching styles.
A Circumplex Approach toward Motivating and Demotivating Teaching

discerned within SDT, while also allowing for a more detailed description of the similarities and dissimilarities between them. To illustrate, while both structure and autonomy support load on the need supportive side of the horizontal axis, they differ in their level of directiveness, with the teacher being more directive in the case of the use of structure, in comparison with the use of autonomy-supportive practices. As another example, while the teacher is highly directive in the case of both teacher control and structure, controlling teaching is, relatively speaking, more need thwarting compared to the provision of structure.

The present findings are in line with previous work within the Interpersonal Theory (Wubbels et al., 2006). Specifically, the dimension ‘affiliation’ or ‘proximity’, which involves the contrast between ‘opposition’ and ‘cooperation’, is in line with the need support – need thwarting dimension. In addition, the dimension ‘control’ or ‘influence’ in the Interpersonal Theory, reflecting the contrast between dominance and submission, is reflected by the extent to which the teacher is directive and taking the lead as observed in the present data.

Notably, the SIS was found to yield high test-retest reliability, and the obtained circumplex structure was remarkably consistent across teacher and student reports, as a direct comparison of both two-dimensional configurations resulted in a minimal loss of fit. However, this does not mean that students share the opinion of their teachers. Only autonomy support and control were found to – though modestly – significantly converge with the corresponding styles as perceived by the students. Such low correspondence between teachers and students is in line with previous research in the educational domain (den Brok et al., 2006), as well as in other contexts (Korelitz & Garber, 2016; Macquet & Stanton, 2014). Further, in terms of mean-level differences and similarities, teachers scored higher on the need-supportive styles and lower on need thwarting styles compared to student. This finding provides further support for the idiosyncrasies of teachers’ and students’ personal perspective on the same situation (Könings et al., 2014).
Next, the investigation of social desirability effects revealed that especially teachers' ratings of structure and chaos correlated with the tendency to answer in a socially desirably way. Presumably, teachers know that structure is perceived to be essential in the classroom, which may lead them to over-report their structuring teaching and under-report their chaotic teaching. Indeed, mean scores were found to be highest for teacher-reported structure, while being lowest for chaos. Interestingly, social desirability was unrelated to controlling teaching, suggesting that these tendencies may not bias teachers’ reports of the use of pressuring strategies. Perhaps this is the case because at least some teachers hold the belief that controlling strategies provide optimal ways to motivate students and to produce maximal performance (Reeve, 2009).

One critical conceptual point concerns the relation between the teaching styles that stand in opposition to each other in the circumplex. After 45-degree rotation of the two retained dimensions, they can be reinterpreted as representing the provision of autonomy support, relative to control, and the provision of structure, relative to chaos. The circular structure in Figure 3 may even suggest that autonomy support and control and structure and chaos stand, by definition, in stark opposition to each other. Yet, this is not necessarily the case. Indeed, it is important to emphasize that the distance between the overarching styles in the circle is a reflection of their relative and not their absolute distance. That is, when considered in conjunction with other (de)motivating practices, teacher control appear to stand most in contradiction with teacher autonomy support and teacher chaos with teacher structure, yet at the absolute level, a different set of findings emerges. Specifically, autonomy support and control were either unrelated (teachers) or slightly negatively related (students), while structure and chaos were only minimally negatively related among both teachers and students. Such findings suggest that, across situations as captured through the vignettes in the
present study, teachers may well rely on a combination of both controlling and autonomy-supportive (Haerens et al., 2017) or structuring and chaotic teaching practices.

Such findings are congruent with the postulation (Bartholomew et al., 2011; Ryan & Deci, 2017; Vansteenkiste & Ryan, 2013) and empirical demonstration (Haerens et al., 2015; Jang et al., 2016) of a dual process model, which suggest that teacher autonomy support and control may constitute a ‘bright’ and ‘dark’ pathway to students’ optimal functioning (Haerens et al., 2015). The reason for postulating such a dual-route model is that teachers who are perceived to be low on autonomy support are not necessarily pressuring and controlling, as a more active thwarting of the psychological needs is required for a teacher to be experienced as controlling. Also, the lack of teacher control does not imply that the teacher promotes learners’ autonomy, as autonomy-supportive teaching requires a more active involvement from the teachers’ side.

Towards a More Refined Insight

The use of MDS analyses not only provided a helicopter-viewpoint on (de)motivating teaching styles, but equally produced more refined insights as each of the four overarching styles could be partitioned into two subareas (i.e., regions). Furthermore, consistent with the obtained circumplex structure, the eight distinguished subareas yielded a remarkably ordered (i.e., sinusoid) pattern of correlates among each other, that is, the correlations between a specific subarea and adjacent scales were strongest and positive, while these correlations decreased in strength and even became negative once moving to more distant subareas. The correlation between adjacent areas varied between .20 and .68, and between .22 and .77 across teachers and student reports, respectively, with the highest correlations emerging in the areas tapping into either need-supportive or need thwarting teaching. Said differently, there was a tendency for the need-supportive and need thwarting subareas to cluster more strongly together, such that the difference between the more need-supportive to the more need
thwarting subareas and vice versa was somewhat wider, as reflected in correlations between adjacent subareas (i.e., clarifying and demanding; participative and awaiting; see Figure 3).

Equally congruent with this circumplex approach, a similar sinusoid pattern of correlates emerged when considering the motivational (e.g., autonomous teaching motivation; psychological need satisfaction) and affective (e.g., burn-out) functioning of teachers as well as the motivational (e.g., amotivation) functioning and learning outcomes of students (e.g., teacher evaluations, self-regulated learning). Overall, the attuning and guiding approach yielded the strongest positive correlates with desirable outcomes and the strongest negative correlates with undesirable outcomes, while the opposite pattern was found for the domineering and abandoning approach, both among teachers and students. To give one example, the more the students felt that teachers attuned their teaching to their preferences and offered appropriate guiding, the more they rated their teacher positively (i.e., $r = .65$), that is, they would highly recommend the teacher and would like to get continued education from him or her. In contrast, to the extent that students perceived their teacher to rely on an abandoning style, the more they would like to ‘run away from them’ and the less they would recommend them to others. In what follows, we move along the circle, thereby discussing (dis)similarities between different subareas (also see Appendix for a detailed description of the eight identified subareas).

**Moving along the Circumplex**

During workshops on need-supportive teaching, teachers often express the concern that an autonomy-supportive approach results in chaos, with children taking the lead in the class and teachers needing to renounce their authority position thereby giving in vis-à-vis to overly assertive children. Looking at the obtained circumplex, this concern is legitimate. Autonomy-supportive teaching parted into two different subareas, the one labeled as a participative and the other as an attuning approach. When p, teachers allow student to
provide suggestions, encourage their initiative, and provide choice. Specifically, items within this subarea had to do with students being able to provide input regarding classroom rules and being able to choose which homework to make. Presumably, because the student is more in charge in this case, this subarea is situated next to the *awaiting approach* that is part of the overarching chaos style. Although waiting to see how the situation evolves may be functional on some occasions, in new or problematic situations children will likely benefit from teachers’ leadership and directiveness. Depending on how teachers reorganize such a problematic situation may determine how positively they are evaluated. Their awaiting approach may leave teachers vulnerable to give up trying and shift towards a different activity altogether (constituting an abandoning approach) or they could ask for the input of the students, starting a dialogue (constituting a participative approach). Clearly, such a participative approach is more positively evaluated by the students as it correlated positively with teacher ratings, autonomous study motivation and various indicators of self-regulated learning, while the awaiting approach yielded null-relations with these outcomes and even correlated positively with oppositional defiance.

Importantly, teachers’ concern that a potential pitfall of autonomy support is chaos does not apply to both distinguished autonomy-supportive subareas equally. The attuning approach was situated further away from the awaiting approach and leaned more closely to the *practices* tapping into teacher structure. When teachers are attuning, they may also foster students’ autonomy, yet, in a different way than when they are participative. A participative approach would promote greater autonomy through perceived choice, while an attuning approach may promote greater autonomy through a sense of volition (Reeve, Nix, & Hamm, 2003). That is, by attuning the content of the learning material to students’ interests or indicating how learning tasks align with what learners find personally relevant and meaningful in their own lives, learners may start to more volitionally engage in the learning
or more willingly comply with classroom rules (Jang, 2008; Reeve & Jang, 2006; Vansteenkiste et al., 2017). Indeed, a critical component within this subarea is the teacher taking the child’s frame of reference to identify his/her emerging interests and preferences to optimally tailor their instruction and learning material to these inner resources. In such cases, teachers are more strongly taking the lead in comparison with the offer of choice, which explains why the attuning approach is somewhat more directive than the participative approach. Further, relative to the participative approach, an attuning approach correlated more strongly with students’ rated teacher quality, autonomous motivation, and self-regulated learning, presumably because an attuning approach is more directly need-nurturing. Indeed, Assor et al. (2002) reported that whereas the provision of choice fosters students’ interest and enjoyment, especially the provision of a meaningful rationale carries the most motivating effect, as indexed by unique associations with students’ behavioral and cognitive engagement in the classroom.

Moving along the circle, the subarea situated next to the attuning approach, guiding, was experienced as highly motivating by students. To optimally guide learners’ competence development, teachers can – much as they do when attuning the learning material - best take the learners’ frame of reference, thereby adjusting the nature of the task, the amount of help, feedback, and encouragement according to learners’ skill-level (Vansteenkiste & Soenens, 2015). Both the attuning and guiding approach yielded the most pronounced positive correlates with external outcomes, presumably because they both maximize children’s experienced need satisfaction and thus can be considered immediate need-nurturing areas. Interestingly, while some teachers believe that attuning and guiding may require considerable energy from their side – even more energy than when they demand cooperation - the present findings do not confirm such beliefs. In fact, emotional exhaustion and depersonalization were both negatively correlated with teacher-reported guiding and attuning.
Next to guiding, the *clarifying* approach constituted the second subarea of teacher structure. Although the correlates between the clarifying, relative to the guiding, approach and student outcomes were very similar, both may be different in terms of their need-supportiveness. One possibility is that the setting of expectations for learning and disciplined behavior and their subsequent monitoring constitutes a need-enabling condition instead of being directly need-nurturing. That is, without clear expectations from their teachers learners do not know what is required to build a sense of competence and without sufficient teacher monitoring students may remain stuck when struggling with learning tasks. Thus, the lack of expectation setting and subsequent monitoring may come with feelings of need frustration and failure in particular; yet, their very presence does not guarantee that children become more skilled at the activity. In contrast, when teachers provide positive feedback to learners (a teaching practice within the guiding approach), they may more readily experience a sense of competence satisfaction (Mouratidis et al., 2008; Vallerand & Reid, 1984).

Interestingly, compared to the guiding approach, the clarifying approach was situated closer to the controlling area and, more specifically, to teachers being *demanding*. Such findings echo (some) teachers’ concern that a structuring teaching style may come across as pressuring to students. Indeed, a potential pitfall when setting expectations is that teachers become rigid and overly script students’ behavior. Especially when children fail to live up to teachers’ expectations, teachers may risk reasoning more from their own instead of the learners’ perspective, thereby potentially even bypassing the learners’ perspective. Longitudinal research could examine whether teachers begin to shift from a clarifying to a more demanding approach as they increasingly face students being disobedient, with them not finding an adequate response to correct the misbehavior. Notably, the setting of expectations and its monitoring, which involves a high level of directiveness, does not need to come with a more pressuring approach (Vansteenkiste et al., 2012). Even when being
**Circumplex Approach** toward Motivating and Demotivating Teaching

directive, teachers can act in an autonomy-supportive way, for instance, by providing a meaningful rationale for expectations or acknowledging and accepting students’ negative affect as understandable and as okay.

Apart from being demanding, a second identified subarea of teacher control is teachers being *domineering*. In both cases, teachers pressure their learners to act, think or feel in a particular way. Yet, the degree of pressure that characterizes the demanding and domineering approach may be different, with the domineering approach coming with more intense pressure and control. One potential reason for this is that domineering teachers would use more harsh controlling strategies, such as shaming, guilt-induction, or personal attack. Instead, when demanding, teachers may focus on the misbehavior of the learner, thereby making use of controlling strategies to correct their misbehavior (e.g., threatening with sanctions; promising rewards). Thus, the target (i.e., person versus behavior) of the domineering and demanding approach may be different. Such an interpretation is confirmed by the fact that the psychological control scale correlated more strongly with the domineering, relative to the demanding approach, as well as by the observation that the domineering approach yielded stronger correlates with undesirable behaviors among students. For instance, relative to the demanding approach, the domineering approach correlated positively with teachers’ experiences of need frustration and emotional exhaustion. Among students, the domineering approach correlated more strongly negatively with teacher evaluations and persistence, while being more strongly positively correlated with amotivation and oppositional defiance. Such a differential pattern of correlates was also reported by De Meyer et al. (2016), who found that teachers’ perceived use of internally controlling strategies (e.g., guilt induction, shaming) correlated more strongly with indicators of poor motivation compared to the perceived use of externally controlling strategies (e.g., threatening with sanctions).
Moving further along the circle, rather interestingly, the domineering approach correlated moderately positively with the *abandoning approach*. The common feature of both is likely their need thwarting properties; more than the demanding and awaiting subareas, these two approaches yielded the most undesirable pattern of correlates. If teachers were perceived to score high on these approaches, students not only reported low autonomous motivation, they also felt amotivated and they strongly negatively evaluated their teacher. Such a pattern of findings suggests that these approaches relate to a maladaptive motivational pattern, presumably because they engender feelings of intense need frustration. It is interesting to notice that both of these approaches may – at least among some teachers – go hand in hand. That is, the domineering approach may be perceived as the ultimate ‘rescue ring’ by teachers, who have attempted to discipline disobedient children. Rather unfortunately, because such a domineering approach elicits oppositional defiance in students (Van Petegem, Soenens, Vansteenkiste, & Beyers, 2015), teachers may give up any attempt to stay further involved with their students and they may even adopt a cynical attitude towards students. Congruent with such an interpretation, the abandoning approach correlated negatively with teacher-reported involvement and positively with depersonalization and need frustration.

Finally, we are back to the awaiting approach, which formed the subarea in between the abandoning and participative approach. The less pronounced costs associated with the awaiting approach indicates that this approach may be merely need-depriving, that is, they fail to support learners’ psychological needs but do not necessarily yield a need thwarting effect. In fact, the awaiting approach correlated positively with all forms of motivation (i.e., autonomous and controlled) and lack thereof (i.e., amotivation and oppositional defiance). The motivational effects of an awaiting approach may thus be quite variable, perhaps determined by learners’ skill-level or initial interest in the activity at hand. That is, some may
come to see the awaiting approach as an opportunity to act upon their preferences and, hence, the approach elicits autonomous motivation. In contrast, perhaps those who feel helpless to begin with, may feel left to their own devices, which may elicit a mix of amotivation, oppositional defiance and controlled motivation. Clearly, this motivational mixture stands in contrast to the correlates of an abandoning approach, which yielded a truly amotivating effect and correlated more strongly with oppositional defiance.

**The Merits of a Circumplex Approach**

The present findings have important implications for current theorizing and research on motivating and demotivating teaching, as well as for daily practice. First, conceptual gains are made as the four overarching motivating and demotivating styles (i.e., autonomy support, structure, control, chaos) get differentiated into subareas (i.e., refinement) and each of these subareas is located in a circular structure that provides further conceptual depth (i.e., integration). Specifically, each subarea can be characterized according to the constituting dimensions of the circumplex. In our view, this represents a significant advancement compared to previous research. Indeed, while the dimensions of autonomy support, control, and structure have often been treated in a non-differentiated way (but see e.g., Assor et al, 2002; Patall et al., 2013) or were studied in isolation from each other (but see Sierens et al., 2009), their simultaneous examination herein allows for a more precise conceptual description of each teaching style and its constituting subareas.

The fact that the assessed (de)motivating practices can best be graphically represented by a circumplex structure suggests that a different approach towards motivating and demotivating styles is necessary and even illuminating: instead of treating them as rather distinct entities, as is the case in the *categorical approach*, the relative differences between the different subareas suggest that a more *gradual approach* towards (de)motivating teaching is warranted. That is, not all autonomy-supportive and structuring practices are equally
motivating, presumably because some of them are more directly need-nurturing and others are merely need-enabling. Such a gradual approach also appears fruitful to better understand the variation in the demotivating practices: some of the identified subareas (e.g., domineering, abandoning) may be truly need-thwarting, thereby actively undermining learners’ motivation and engagement, while other approaches (e.g., awaiting) may be merely need-depriving. That is, they fail to support learners’ psychological needs and motivation but do not necessarily yield a need-thwarting effect.

Second, research-wise, one implication of the gradual perspective in our view is that different need-supportive dimensions or different components as distinguished within a given dimension (e.g., Patall et al., 2013) do not necessarily need to “fight” for unique variance in outcomes. Indeed, scholars have increasingly pitted several need-supportive dimensions or components against each other in an attempt to examine which dimension yields the strongest predictive power. Although the decomposition of need support into its dimensions and key components is informative, the overall picture may get lost. By assessing a broad variety of teaching practices and locating these into a circular structure, it becomes more intelligible why certain practices yield stronger effects than do others. Also, such a circular structure may better align with daily teaching reality as teachers often simultaneously engage in a variety of need-supportive or need-thwarting practices in a given situation. Although as scholars we can deconstruct this complex reality thereby extracting critical (de)motivating dimensions to get better grip on reality, an endeavor we have been successfully undertaken over the past two decades, after all we need to go back to the drawing board and draw a more integrative picture.

Does this imply that each of the identified subareas cannot be related to specific outcomes or be rooted in specific characteristics of teacher functioning? No. The quest for unique correlates with both teacher and student variables continues, but demonstrating such a
unique pattern (for instance regression analyses) is not an absolute prerequisite in our view. What matters especially is that the pattern of correlates should be ordered along a continuum of decreasing magnitude as one moves away from a specific subareas to the other side of the circle again becoming increasingly positive when reverting back to the specific subarea. Such an ordered pattern of correlates is informative in its own right and lessens the need to garner evidence for unique correlates of specific subareas.

Related to this issue is that the circumplex structure can speak to the question whether observed high correlations between need-supportive dimensions (Jang et al., 2010), which may be a source of concern for some scholars, are really troublesome. The overarching teaching styles autonomy support and structure are indeed highly correlated, especially among students. Yet, rather than treating such findings as an anomaly, they are worthwhile in themselves. In fact, such high correlations provide even a stronger justification to differentiate the overarching styles into subareas, as the pattern of correlates among the autonomy-supportive and structuring subareas is dependent upon the pair of subareas under investigation. That is, especially the guiding and attuning approaches are highly correlated, presumably because they often co-occur in daily practice. That is, when providing help to a student (guiding practice), teachers may provide a rationale for the help, recognize the extra effort it takes from the student and take the pace of learning of the student into account (attuning practices). Presumably, the attuning and guiding approach are so heavily correlated because of their common need-supportive properties.

Finally, the may also yield a number of advantages for daily practice. As noted, the obtained circular structure aligns with teachers’ beliefs that autonomy support may turn into chaos or structure into control. Such findings could be shared with teachers during teacher training, which may lead them to feel better understood and be less resistant to undertake change. Also, the circumplex offers visual hints how the pitfalls of certain teaching practices
(e.g., choice, monitoring) can be avoided. That is, if too many options are offered, teachers may do well to guide children through the choice process for instance by regrouping options into higher order and lower order choice categories, in which case they combine the participative and guiding approach. Finally, the SIS could be used for diagnostic and self-reflection purposes, for instance as part of an intervention on need-supportive teaching. After completing the SIS, an individualized report could be extracted such that teachers themselves can directly position them in the circle. Such teacher reports could then be complemented with student-reports and discrepancies could be a source of reflection and discussion during the training.

**Limitations**

The present study has several limitations. First, although most of the subareas had satisfying reliabilities, the participative approach of the 12-vignette version of the questionnaire was rather poor. This was rectified in the 15-vignette version, which involved two additional situations in this subarea. That said, the psychometric properties of this 15-vignette version among students, as well as its predictive validity among teachers and students still need to be further demonstrated. Second, the present study did not include a measure of students’ need-based experiences. Since we suggested that not all teaching practices are equally need-nurturing or need thwarting, but instead some practices foster or undermine students’ needs more indirectly (i.e., need-enabling and need-depriving approaches), a critical next step in future research is to investigate the extent to which the broad teaching styles and identified subareas meaningfully relate to students’ need satisfaction and need frustration at school. Third, the situations involved in the SIS are mainly characteristic of the context of secondary education, which raises questions about the generalizability of the results for other age groups. Future studies could investigate the validity of the SIS in primary and higher education, thereby making the necessary
adjustments, so that the situations optimally match up with these contexts. Fourth, although we provided evidence for the validity of the SIS, it is advisable to complement self-reports with observations. In this respect, it is noteworthy that in a Korean version of the SIS (Cheon et al., 2017), teacher-rated practices were found to correlate with observer-rated practices.

**What is Next? Developing a Systematic Program of Research**

The identification of circumplex structure in the present study is only a first, foundational step that allows for the development of a systematic program of research on motivating and demotivating teaching styles. We discuss four critical research lines.

First, we would plead for future work that aims for cross-fertilization between the present circumplex and the broader literature on teaching practices. That is, the present circumplex structure could be further refined and enriched by locating other teaching practices, such as classroom management and cognitive activation (Klieme et al., 2009; Pianta & Hamre, 2009) in the circle, thereby helping to fill voids in the circumplex. Also, at least some components of autonomy support and structure overlap with other constructs that are examined in the literature on teacher practices, such as instructional scaffolding (van de Pol et al., 2010), adaptive instruction (Aleven et al., 2017) and perhaps even formative assessment (Black & William, 2009), so it would be instructive in future work to tap into these notions directly to see where exactly they are positioned in the circle. Conversely, once these teaching practices are situated in the circumplex, this may provide deeper insights in why certain teaching practices have been found to be effective or what can be done to increase their effectiveness. Indeed, some practices, such as scaffolding, likely involve a combination of a guiding and attuning approach. Overall then, by locating these well-researched concepts in the circumplex, the field of SDT and the teaching literature more broadly could be brought closer to each other, to the mutual benefit of both.
Notably, also existing self-report or observational scales on teacher need support and teacher need thwart available in the SDT-literature could be evaluated against the current circumplex structure. That is, different measures may tap different subareas to different degrees, thereby producing different findings. For instance, as shown herein, the psychological control scale (Soenens et al., 2012) taps primarily a more domineering approach. When meta-analyses will eventually shed light on the variability in the effects of teacher need support, the present circular structure with its identified subareas may help to better understand such variability. Finally, the SIS vignettes did not include responses tapping into teacher relatedness support and neglect/rejection, which constitute the third teaching dimension within SDT (Ryan & Deci, 2017; Skinner, 2016). Although to date, the specific components of this dimension have remained relatively understudied (but see Maulana, Opdenakker, Stroet, & Bosker, 2013), it would be interesting to add relatedness support and neglect/rejection responses as to evaluate where these responses would fall along the circle. Because these responses may match with a rather limited number of situations in the current version of the SIS, new situations may be added. Perhaps, in primary education, where teachers are relied upon more frequently to provide physical help (e.g., when a child hurts itself) or emotional support (e.g., when children is sad or feels excluded), the dimensions of relatedness support and neglect are even more important to be addressed.

A second research line may involve the use of a person-centered approach towards teaching. The current circumplex focuses on the critical dimensions and subareas of motivating and demotivating teaching, but in daily practice teachers make use of a variety of subareas. That is, teachers differ from each other in terms of their typical motivating profile, which consists of the combination of different subareas in the circumplex. Past research (see Matosic & Cox, 2014; Haerens et al., 2017; Vansteenkiste et al., 2012) has identified such profiles using the overarching teaching styles. Yet, the observed differentiation within these
styles in the present study allows one to extend and refine the number of identified profiles in past work, thereby trying to retain the most parsimonious set of teaching profiles to explain a maximum of variation in the use of different (de)motivating subareas.

A third research line consists the continued examination of the predictive validity of the identified subareas. Although the present findings suggest that especially the degree of need-supportiveness and need thwarting that characterizes each subarea determines the strength of the association with assessed variables, this does not need to be the case. Indeed, the peaks and dips in this ordered pattern of correlates may well depend upon the construct under investigation. To illustrate, teachers who have a strong preference for predictability and clarity (i.e., desire for structure) may be more likely to score high on the clarifying subarea, with correlates with the other subareas becoming decreasingly positive or even negative in the case of the awaiting subarea. Further, while some subareas may, because of their more pronounced need-nurturing and need-thwarting properties, yield, respectively, an almost universal motivating and demotivating effect, for other subareas, especially the need-enabling and need-depriving ones, the effects may be more variable and dependent upon other factors. That is, in a research line on motivational tailoring, it may be examined for whom and under which conditions the need-enabling areas yield the most predictive power. To illustrate, in the case of the participative approach, the effect of choice may depend on a number of factors, including learner characteristics, such as their level of indecisiveness (Germeij & Verschueren, 2011), type of motivation (De Meyer et al., 2016) and their competence level (Patall, Sylvester, & Han, 2014).

A final research line may focus on the shifts in teaching approaches across the circumplex. Teachers may gradually shift along the circle away from more need-supportive to more need thwarting subareas as a function of their daily need-satisfying or need- frustrating experiences. Although such an issue deserves attention in longitudinal work, the
specification of the gradual change in different teaching subareas along a circumplex allows for a more dynamic reasoning regarding teaching style. As long as only the broader dimensions (i.e., autonomy support, control, structure, and chaos) are distinguished, the exact way how teachers may progressively shift from one style to another remained unclear. The specification of adjacent subareas now allows one to understand how teachers may “regress” (i.e., shifting from need-supportive to need thwarting teaching) or “progress” (i.e., shifting from need thwarting to need-supportive teaching). With respect to the latter, initial evidence among Korean teachers indicates that the SIS is sensitive to capture the effects of a training focused on the improvement in both autonomy-supportive and structuring and a decrease in controlling and chaotic teaching (Cheon, Reeve, & Vansteenkiste, 2017). Such shifts in (de)motivating approaches may not only be considered at the between-teacher, but also at the within-teacher level, as it is increasingly demonstrated that there exists considerable variation in teachers’ motivating approach from day to day (Patall et al., in press; Van der Kaap-Deeder et al., 2017), and even from lesson to lesson (Mouratidis et al., 2011). Such findings are promising. Importantly, shifts in teaching subareas may yield a reciprocal effect upon teachers’ own experiences. To illustrate, while a domineering and abandoning approach may stem from the experience of need frustration (Mabbe, Soenens, Vansteenkiste, Van der Kaap-Deeder, & Mouratidis, in press) and teachers’ depersonalizing attitude (Soenens et al., 2012), it is also possible that such approaches may prolong these experiences.

Conclusion

What motivating and demotivating teachers exactly do has been a source of intense examination in the past decades in the teaching and motivation literatures. Although various separate (de)motivating styles were studied in isolation within the tradition of Self-Determination Theory and beyond, the present study sheds a refreshing light on the question how these teaching styles fit together and whether they can be refined. Specifically, a two-
A Circumplex Approach toward Motivating and Demotivating Teaching

dimensional structure involving eight different regional subareas arranged along circumplex emerged, both among students and teachers. These eight subareas correlated in a systematic way among each other and with external variables, suggesting that a gradual approach toward teaching is warranted. We hope that other researchers share our excitement to help build a systematic program of research that allows teachers to gain a more precise insight in their own teaching style and to professionalize them such that they adopt a more need-supportive style, at the benefit of their students and themselves (Reeve, 2016).
A Circumplex Approach toward Motivating and Demotivating Teaching

References


Cheon, S. H., Reeve, J., & Moon, I. S. (2012). Experimentally-based, longitudinally designed, teacher-focused intervention to help physical education teachers be more
A Circumplex Approach toward Motivating and Demotivating Teaching

autonomy supportive toward their students. *Journal of Sport & Exercise Psychology, 34*, 365-396.


A Circumplex Approach toward Motivating and Demotivating Teaching

the bright and dark side of motivation. *Psychology of Sport and Exercise, 16*, 26-36. DOI: 10.1016/j.psychsport.2014.08.013


Jang, H., Reeve, J., & Deci, E.L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology, 102*, 588-600. DOI: 10.1037/a0019682


A Circumplex Approach toward Motivating and Demotivating Teaching


A Circumplex Approach toward Motivating and Demotivating Teaching


64
A Circumplex Approach toward Motivating and Demotivating Teaching


A Circumplex Approach toward Motivating and Demotivating Teaching

practice, and contemporary issues (pp. 1161-1191). Mahwah, NJ: Lawrence Erlbaum Associates.
Footnotes

¹Eucledian distances where used as association measures, rather than the more common Pearson correlations, because a MDS analysis can only work with non-negative (dis)similarity measures.

²Similar findings were obtained when inspecting overall mean-level differences between teacher- and student reports (see Table 4 and 5 for means and standard deviations) across the five samples with all $t$-values $0.00 < p < 0.04$.

³One may wonder whether these high scores for structure and low scores for chaos reflect, respectively, a ceiling and floor effect, thereby compromising the predictive validity of the scales. As can be noticed in Tables 4 and 5, the variance surrounding the means of structure and chaos (but also its constituting subareas) was substantial and no lower than in the case of control and autonomy support. Also, if ceiling and floor effects would be operative, the correlates between structure and chaos and external outcomes should have been minimal. Yet, these teaching styles and its constituting subareas were substantially related to external outcomes.
A Circumplex Approach toward Motivating and Demotivating Teaching

Table 1

*Conceptual Definitions of the Four Teaching Styles*

<table>
<thead>
<tr>
<th>Teaching Style Category</th>
<th>Conceptual Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy support</td>
<td>The teacher’s instructional goal and interpersonal tone of <em>understanding</em>. The teacher seeks to maximally identify and nurture students’ interests, preferences and feelings, so that students can voluntarily engage themselves in classroom learning activities.</td>
</tr>
<tr>
<td>Structure</td>
<td>The teacher’s instructional goal and interpersonal tone of <em>guidance</em>. Starting from the capabilities and abilities of students, the teacher provides strategies, help and assistance, so that students extent their skills and feel competent to master classroom learning activities.</td>
</tr>
<tr>
<td>Control</td>
<td>The teacher’s instructional goal and interpersonal tone of <em>pressure</em>. The teacher insists that students think, feel, and behave in a prescribed way and imposes his/her own agenda and requirements on students, irrespective of what students think.</td>
</tr>
<tr>
<td>Chaos</td>
<td>The teacher’s instructional goal and interpersonal tone of <em>laissez faire</em>. The teacher leaves students on their own, making it confusing for students to figure out what that they should do, how they should behave, and how they can develop their skills.</td>
</tr>
</tbody>
</table>
Figure 1

Graphical Representation of the Hypothesized Structure of the SIS Item
A Circumplex Approach towards Motivating and Demotivating Teaching

Figure 2a

Two-dimensional Configuration of the SIS Items among Teachers (Samples 1, 2, 3, and 5) Based on 12 vignettes
A Circumplex Approach towards Motivating and Demotivating Teaching

Figure 2b

Two-dimensional Configuration of the SIS Items among Students (Samples 4 and 5) Based on 12 vignettes

Note. Items belonging to the same subarea are indicated in the same color with participative = green, attuning = dark blue, guiding = blue, clarifying = black, demanding = red, domineering = purple, abandoning = orange, and crimson = awaiting.
A Circumplex Approach towards Motivating and Demotivating Teaching

Figure 3

Graphical Representation of the Circumplex Model

Note. Correlations between adjacent subareas among teachers (left) and students presented with ***$p < .001$. 
A Circumplex Approach towards Motivating and Demotivating Teaching

Figure 4a

*Example of Sinusoid Relations between the Eight Subareas and Teachers’ Depersonalization (Samples 1, 2 and 5)*

Figure 4b

*Example of Sinusoid Relations between the Eight Subareas and Student Rated Teacher Quality (Samples 4 and 5)*
Appendix

Descriptions of the Eight Identified Subareas

<table>
<thead>
<tr>
<th>Teaching Style</th>
<th>Subarea</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy support</td>
<td>Participative</td>
<td>A participative teacher identifies students’ personal interests by engaging in a dialogue with students and inviting them to provide input and suggestions. In addition, where possible, the teacher tries to offer (meaningful) choices in how students deal with learning activities and optimally follows their pace.</td>
</tr>
<tr>
<td></td>
<td>Attuning</td>
<td>An attuning teacher nurtures students’ personal interests by trying to find ways to make the exercises more interesting and enjoyable, accepting students’ expressions of negative affect and trying to understand how students see things. The teacher allows students to work at their own pace and provides explanatory rationales that are meaningful in the eyes of students.</td>
</tr>
<tr>
<td>Structure</td>
<td>Guiding</td>
<td>A guiding teacher nurtures students’ progress by providing appropriate help and assistance as and when needed. The teacher goes through the steps that are necessary to complete a task, so that students can continue independently and, if necessary, can ask questions. Together with the students the teacher constructively reflects on mistakes, so that they see for themselves what can be improved and how they can improve.</td>
</tr>
<tr>
<td></td>
<td>Clarifying</td>
<td>A clarifying teacher communicates expectations to students in a clear and transparent way. The teacher offers an overview of what students can expect from the lesson and monitors students’ progress in meeting the communicated expectations.</td>
</tr>
<tr>
<td>Control</td>
<td>Demanding</td>
<td>A demanding teacher requires discipline from the students by using powerful and commanding language to make clear what students have to do. The teacher points students on their duties, tolerates no participation or contradiction, and threatens with sanctions if students don’t comply.</td>
</tr>
<tr>
<td></td>
<td>Domineering</td>
<td>A domineering teacher exerts power to students to make them comply with his/her requests. The teacher suppresses students by inducing feelings of guilt and shame. While a demanding teacher tries to change students’ thoughts, feelings, and behaviors into something more acceptable to the teacher, a domineering</td>
</tr>
</tbody>
</table>
A Circumplex Approach towards Motivating and Demotivating Teaching

An approach is characterized by a ‘personal attack’ on students.

<table>
<thead>
<tr>
<th>Chaos</th>
<th>Abandoning</th>
<th>An <strong>abandoning</strong> teacher gives up on students. The teacher allows students to just do their own thing, because eventually students have to learn to take responsibility for their own behavior.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awaiting</td>
<td><strong>Awaiting</strong></td>
<td>An <strong>awaiting</strong> teacher offers a laissez-faire learning climate where the initiative fully lies with the students. The teacher tends to wait to see how things evolve, doesn’t plan too much and rather let things take their course.</td>
</tr>
</tbody>
</table>