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3

Effects of need supportive teaching on early adolescents' motivation and engagement: A review of the literature

This chapter is based on:

Stroet, K., Opdenakker, M.-C., & Minnaert, A. (2013). Effects of need supportive teaching on early adolescents' motivation: A review of the literature. *Educational Research Review*, 9, 65-87.

Abstract

In the present paper, we systematically reviewed the corpus of evidence on the effects of need supportive teaching on early adolescents' motivation and engagement for school. Based on Self-Determination Theory, we defined need supportive teaching in terms of teachers' provision of autonomy support, structure, and involvement. The results of an in-depth descriptive analysis of 71 empirical studies that were conducted since 1990 showed clear positive associations between the three dimensions of need supportive teaching and students' motivation and engagement, whereas evidence on singled-out components of need supportive teaching was less conclusive. Research on unique contributions of the three dimensions of need supportive teaching appeared scarce, as appeared longitudinal, experimental, and interview studies. Furthermore, we found that in most of the selected studies student perceptions were used to measure need supportive teaching. In the small body of studies using observations or teacher perceptions, we found much smaller or even no associations with students' motivation and engagement. Finally, the results indicated a pattern in the design of studies in the sense that a connection existed between the dimension of need supportive teaching and the outcome measure being studied.

Keywords

early adolescence
engagement
motivation
teacher-student interactions
Self-Determination Theory

3.1 Introduction

For children the interactions with their teachers matter. From different perspectives, teacher-student interactions have been connected with students' motivation and engagement for school. Teacher-student interactions are considered to be of special importance when students have just made the transition towards secondary education; a period in which for many students motivation declines (e.g. Anderman & Maehr, 1994; Van der Werf, Opdenakker, & Kuyper, 2008; Opdenakker, Maulana, & den Brok 2012; Peetsma, Hascher, Van der Veen, & Roede, 2005; Gottfried, Fleming, & Gottfried, 2001). Theoretically, the cause of this decline has been argued to be the existence of a mismatch between early adolescents' developmental stage and their learning environments (Eccles, Midgley, & Wigfield, 1993). In recent years, researchers have shown an increasing interest in the question how teacher-student interactions affect early adolescents' motivation and engagement, and now a considerable amount of empirical evidence is available on this topic (see Opdenakker & Minnaert, 2011).

An encompassing theoretical framework that connects teacher-student interactions with students' motivation and engagement is Self-Determination Theory (SDT; Deci & Ryan, 1985; 2000; Ryan & Deci, 2000). Based on SDT it can be made explicit how and why characteristics of the social context are either supportive of or thwarting students' motivation and engagement. Important in this respect is the concept of need support. Within SDT, it is assumed that three fundamental psychological human needs exist, satisfaction of which positively affects motivation and engagement (see Deci & Ryan, 1985; 2000; Ryan & Deci, 2000 for an elaborate grounding of this assumption). Importantly, based on the assumption that people have these three fundamental needs, the needs for autonomy, competence, and relatedness, in a mini-theory of SDT (Basic Needs Theory; Ryan & Deci, 2002) three dimensions of the social context are distinguished that are relevant in terms of need support. Specifically, it is argued that availability of autonomy support, structure, and involvement within the social context positively affects need satisfaction and thereby motivation and engagement.

Teachers have a central position in the social context of the classroom. Teachers guide the students in their learning process and bring the educational approach of the school into act in the classroom. Consequently, based on SDT need supportive teaching is expected to have an important positive effect on students' motivation and engagement (see also Opdenakker & Maulana, 2010). In the current article we present a fine-grained overview of the available empirical evidence on the effects of need supportive teaching on early adolescents' motivation and engagement for school. By aiming at such an overview, we want to unveil the extent to which the available evidence

supports SDT, including the gaps that remain. We have used SDT to focus our selection of studies; nevertheless, it is our purpose to include evidence from as many research traditions as possible.

In our overview of available empirical evidence, we attempt to provide an analysis based on five considerations. Below, we explain why we suggest these considerations of importance for the purpose of answering our research question, and we argue why we distinguish between different kinds of evidence. First, if need supportive teaching affects early adolescents' motivation, evidence should be indicative of an association between need supportive teaching and students' motivation and engagement. Second, need supportive teaching can be operationalized either in terms of need supportive behaviour or in terms of students' perceptions of this behaviour. In the literature, it has been argued that it is the way students perceive their learning environment that influences learning, and not the learning environment in itself (e.g. Entwistle, 1991). Ultimately, however, for the concept to make sense not only from a theoretical perspective, concrete behaviour has to be identified that makes teaching need supportive and enhances students' motivation and engagement. Hence, we consider both evidence on student perceived and observed or teacher perceived need supportive teaching to have a distinguishable purpose and relevance. Third, we consider evidence into the (unique) importance of the three dimensions of need supportive teaching, as well as their specific components, of particular relevance, as such evidence increases understanding of what it is that makes teaching need supportive. Fourth, implied in every question on effectiveness is a notion on direction of causality. Of particular relevance in this respect are experimental studies, interview studies, and longitudinal studies that link need supportive teaching with the development of students' motivation and engagement over time. Finally, if need supportive teaching affects motivation, evidence should be indicative of comparable findings for each of a variety of constructs that are used to define motivation and engagement.

Before presenting our search strategy and the results of our analysis, we elaborate on the three dimensions of need supportive teaching, and we provide a brief overview of those concepts of motivation and engagement that have guided the selection process of the current study.

3.2 Theoretical background

3.2.1 Dimensions of need supportive teaching

Below, we elaborate on the three respective dimensions of need support and give an overview of their components on the basis of prior theorising in the tradition of Self-Determination Theory. Within SDT, the distinction between three dimensions of need support originally was prompted

by the idea that three fundamental needs exist. Although each of these three dimensions of need support is still associated with a specific need, this connection is neither perfect nor unique (Connell & Wellborn, 1991). Instead, the three dimensions of need support complement each other in their effects on students' satisfaction of each of the respective needs.

3.2.1.1 Autonomy support

The first dimension of need supportive teaching we discuss is autonomy support, as opposed to autonomy suppression. This dimension is associated with the need for autonomy, which finds its' origin in the inherent desire people have to be causal agents, to experience volition, and to act in accordance with their sense of self. For students to feel autonomous, it is crucial to experience their engagement in learning as a self-chosen act that reflects their own authentic needs and values. In other words, students who experience autonomy in their willingness to engage in learning, experience this willingness as unpressured. Feeling autonomous is not the same as feeling independent of others; autonomously initiated actions can be initiated either independently or in response to a request of significant others.

Based on prior theorising by Belmont, Skinner, Wellborn, and Connell (1992), by Assor and Kaplan (2001), and by Reeve, Jang, Carrell, Jeon, and Barch (2004) autonomy support can be distinguished into several components. First, teaching is autonomy-supportive when it provides students with choice, whereas teaching is autonomy-suppressive when it is controlling (Belmont et al., 1992) or intruding (Assor & Kaplan, 2001). Providing choice includes enabling students to choose tasks they perceive as at least somewhat interesting or important (Assor & Kaplan, 2001; Belmont et al., 1992), and nurturing of inner resources, for example by finding ways to incorporate students' interests and preferences (Reeve et al., 2004). Second, teaching is autonomy-supportive when it fosters relevance (Assor & Kaplan, 2001; Belmont et al., 1992), whereas teaching is autonomy suppressive when it forces meaningless and uninteresting activities (Assor & Kaplan, 2001). Teachers can foster relevance by identifying the value of tasks, lessons, or behaviour (Reeve et al., 2004). Third, teaching is autonomy-supportive when teachers show respect (Assor & Kaplan, 2001; Belmont et al., 1992), allow criticism (Assor & Kaplan, 2001), and use informational instead of controlling language that pressures students (Reeve et al., 2004), whereas teaching is autonomy-suppressive when it shows disrespect or suppresses criticism (Assor & Kaplan, 2001). An example of allowing criticism is the acceptance of reaction to negative affect (Reeve et al., 2004).

3.2.1.2 Structure

Second, we elaborate on the dimension of structure. This dimension is associated with the need for competence, which finds its origin in the inherent satisfaction people derive from exercising and extending their capabilities (White, 1959). The need for competence refers to the need to feel effective in on-going interactions with the social environment, while at the same time exercising and expressing one's capacities. So, to feel competent, it is necessary to have not only effective functioning but also some continual stretching of one's capacities. It is the need for competence that provides the energy for learning.

Because feelings of competence are enhanced as students feel they acquire more control over school outcomes, teachers' provision of structure is argued to enhance students' feelings of competence. Based on prior theorising by Skinner and Belmont (1993), by Jang, Reeve, and Deci (2010), and by Belmont et al. (1992), we distinguish structure into four components. First, teachers can provide structure by means of clarity; defined in terms of giving clear, understandable, explicit, and detailed instructions and framing upcoming lessons well. Second, teachers can offer students guidance in their on-going activities, for example by monitoring their work or offering help or support when needed (Skinner & Belmont, 1993; Jang et al., 2010). Third, teachers can provide students with structure by means of support and encouragement (Belmont et al., 1992), thereby making students feel they acquire more control over school outcomes. Teachers can encourage students by communicating positive expectations regarding their schoolwork. Fourth, teachers can provide students with constructive, informational feedback, thereby helping them to gain control over valued outcomes (Jang et al., 2010). Although this might seem counterintuitive, negative as well as positive informational feedback can enhance students' feelings of competence through provision of structure. Opposite to informational feedback is evaluative feedback, what is defined as making students feel pressured toward doing well. Because of its controlling aspects, both negative and positive evaluative feedback undermines students' autonomy (Deci & Ryan, 1985). However, positive evaluative feedback tends to communicate competence at the same time, thereby (partly) counteracting the negative effects of it being evaluative. Therefore, especially negative evaluative feedback is expected to have a negative effect on motivation and engagement.

3.2.1.3 Involvement

Third, we elaborate on involvement. This dimension is associated with the need for relatedness, which concerns the desire to form and maintain strong and stable interpersonal relationships (Baumeister & Leary, 1995; Bowlby, 1979; Harlow, 1958; Ryan, 1995). More specifically, the need for relatedness refers to the need to feel connected to others, to care for and to be cared for by

others, and to belong. In their review of empirical evidence on the need to belong, Baumeister and Leary (1995) propose that the need for relatedness, or, in their terms, the need to belong, has two main features. First, people need frequent personal contact that is free from conflict and negative affect, and, ideally affectively positive and pleasant. Second, people need to perceive that there is an interpersonal bond or relationship marked by stability, affective concern, and continuation into the foreseeable future. The need for relatedness can be satisfied within interpersonal relationships or through feelings of belongingness to social groups.

Within the context of (secondary) education, teacher-student relationships themselves generally are not strong and stable enough to satisfy students' needs for relatedness interpersonally. That does, however, not imply that teacher-student interactions do not affect students' feelings of relatedness at school. Rather, evidence indicates teachers' social support to have very substantial effects on students' emotions (enjoyment and anxiety), motivational beliefs, and, via emotions and motivational beliefs, achievement (Ahmed, Minnaert, Van der Werf, & Kuyper, 2010). When teachers express their involvement in students' lives, students are more likely to believe worthy of respect and cared for by others in their group and to experience feelings of belongingness. Moreover, when students perceive that their teachers do not value them and that their behaviour is unwelcome, their sense of relatedness will suffer (Osterman, 2000). Based on prior theorising by Belmont et al. (1992) we distinguish teachers' involvement into four components. First, teachers can express their involvement by showing affection. Second, teachers can express their attunement, by showing that they understand the student. Third, teachers can dedicate resources (e.g. time) to the student. Fourth, teachers can make sure that they are dependable, and available to offer support.

3.2.1.4 General level of need supportive teaching

We expect each of the three respective dimensions of need support to contribute to the general level of need supportive teaching. Furthermore, we expect that support for one dimension cannot compensate for lack of support for another dimension. Although, it might be the case that especially balanced need support contributes to the general level of need supportive teaching (Sheldon & Niemiec, 2006), based on this prior premise, we still expect each respective dimension to have a unique effect on students' motivation and engagement.

3.2.2 Motivation and engagement

Within the field of educational research, motivation and engagement for school are considered important. It is critical that students become genuinely interested in learning and are motivated to

attend school, in such a way that they acquire new knowledge and persist in learning over time. Student motivation is not only predictive of school achievement, but also of students' persistence in learning over time (Richmond, 1990). Motivation and engagement have been the focus of research from different traditions, what has led to a variety of concepts being used. Below, we provide a brief overview of those concepts of motivation and engagement that have guided the selection process of the current study. For a more extensive and complete overview, the interested reader is referred to handbooks on research on student motivation (e.g. Wentzel & Wigfield, 2009) and engagement (e.g. Christenson, Reschly, & Wylie, 2012).

First, in accordance with theories that define motivation in terms of quantity, motivation for school can be considered high when students invest in their schoolwork and show effort. Expectancy-Value Theory (e.g. Wigfield & Eccles, 2000) is based on the argument that expectancies and values determine which tasks people pursue and persist in; therefore, together, expectancies and values make up motivation. Within Expectancy-Value Theory, expectancies are defined as students' beliefs about how well they will do in an upcoming task, and values are defined as perceived qualities of the task and how those perceived qualities influence children's desire to do the task.

56 Second, in other research traditions, motivation has been defined from an attributional perspective (deCharms, 1968). In these traditions the central argument is that motivation is of better quality when it is perceived as having an internal instead of an external locus of causality. Intrinsic motivation is seen as exemplary of motivation having an internal locus of causality, as it refers to motivation for behaviour that is experienced as inherently satisfying (see e.g. Deci & Ryan, 1985). Within SDT, it is argued that the perceived locus of causality is not either internal or external, but that instead a continuum exists (Deci & Ryan, 1985; Ryan & Connell, 1989). Based on this continuum intrinsic motivation and some forms of extrinsic motivation are considered to be more autonomous, whereas the remaining forms of extrinsic motivation are considered to be more controlled. Motivation is more autonomous when the outcome to which the behaviour is instrumental is personally valuable, whereas motivation is more controlled when the outcome is not being not truly accepted as one's own.

Another motivational variable is interest. Interest refers to an individual's focused attention and/or engagement with particular events and objects. Interest is a cognitive and affective motivational variable that guides attention and develops through experience (Renninger & Hidi, 2011).

Engagement, what is considered to be an important motivational outcome measure as well, can be seen as an externalization of motivation. Engagement can be behavioural, as manifested in

for example persistence or attention, or emotional, as manifested in for example enthusiasm or enjoyment (e.g. Connell & Wellborn, 1991; Skinner, Furrer, Marchand, & Kindermann, 2008).

3.3 Method

3.3.1 Search strategy

The purpose of the current review is to present an analysis of empirical evidence on the question if need supportive teaching affects early adolescent students' motivation and engagement. To select potentially relevant studies, we conducted a search in November 2011, using the databases PsycInfo, ERIC, SocIndex, MEDLine, Communication & Mass Media Complete, and Academic Search Premier for the years 1990 to 2011. We selected references that were published in a scholarly journal and that described an empirical study. First, articles were selected if teacher-student interactions were referred to in combination with either a term referring to need support or to learning environment, and to motivation or engagement in the title, the abstract, and/or keywords. Furthermore, articles were excluded when a term referring to elementary school or university was mentioned. For an overview of the exact search terms we refer to Appendix 1 of this chapter. This initial search yielded 913 unique references.

To refine our selection of articles, we further reduced the number of selected articles by hand. We only included an article in our final selection if one (or more) of the presented studies examined the relationship between need supportive teaching and motivation or engagement, and if the paper was concerned with early adolescents attending a form of secondary education. We made an exception to the last mentioned criterion for countries or regions where students stay in elementary school until after they are fourteen, because we considered research among early adolescents in these countries or regions valuable in answering our research question. Based on this exception one study from Slovenia was included after all. Furthermore, papers concerning motivation for physical education or arts were excluded, because of the special position of these two subjects within the school curriculum.

The main group of excluded references consisted of articles in which the term 'motivation' was mentioned in the abstract, but in reference to either the motivation of the authors (e.g. "we were motivated.."), or of teachers. Another substantial part of articles was excluded because the research was not done among early adolescents (age 10-14) after the transition towards secondary education, but among older or younger students, or in a laboratory setting. Finally, a small group of articles was excluded because the research did not incorporate need supportive teaching at all,

or not in relation to students' motivation or engagement. As the meaning of terms associated with need supportive teaching is not unequivocal, and differences exist between research traditions in terms of their interpretation, articles were included in the final selection only after inspection of respectively questionnaire items, coding categories, or interview questions. The final selection yielded a total of 71 references. See Table 1 and 2 for an overview of the operationalizations of need supportive teaching (Table 1) and motivation and engagement (Table 2) used in these studies.

In the remainder of this article we present our in-depth analysis of these papers as well as a discussion of the findings. For the purpose of unveiling the extent to which the available evidence supports SDT, including the gaps that remain, we immediately connect our research findings to the five considerations we suggest to be of relevance for research into need supportive teaching (see Section 3.1).

Table 1 Need Supportive Teaching

Dimension & Author(s)	Measure
<i>Autonomy support</i>	
General measure	
Chirkov & Ryan (2001)	SP: Autonomy support and control; e.g.: "My teachers help me choose my own direction"; G
Hardré & Reeve (2003)	SP: LCQ; e.g.: "My teachers provide me with choices and options"; "My teachers convey their confidence in my ability to become what I want to become"; G
Jang, Reeve, & Deci (2010)	OBS: Autonomy support; observation scheme Reeve et al., 2004; C (1 lesson per class)
Reeve, Jang, Carrell, Jeon, Barch (2004)	Manipulation: 1 hour session on being autonomy supportive and self-study using website OBS: Autonomy support; observation scheme; relying on extrinsic vs extrinsic motivational resources; use of controlling vs informational language; neglects vs identities value, importance task/lesson/behavior; open vs not open to negative affect; C (1 lesson per class)
Shih (2008)	SP: LCQ; G
Shih (2009)	SP: LCQ, short version; G
Tucker, Zayco, Herman, Reinke, Trujillo, Carraway, Wallack, Ivery (2002)	SP: Fostering relevance & showing respect (RAPS); e.g.: "My teacher doesn't explain why we have to learn certain things in school"; G
Vallerand, Fortier, & Guay (1997)	SP: Autonomy support; e.g.: "I feel that my teachers pressure me to do what they want"; School autonomy; e.g.: "I feel controlled at school". G
Choice vs control	
Assor, Kaplan, & Roth (2002)	SP: Provision of choice (RAPS); e.g.: "The teacher encourages me to work in my own way"; Intrusion; e.g.: "The teacher does not allow me to work in my own pace"; C, main teacher
Marchant, Paulson, & Rothlisberg (2001)	SP: Control, Rules and Discipline strategies; e.g.: "My teacher is strict"; C
Roeser & Eccles (1998)	SP: Student autonomy; e.g.: "How often are students' ideas and suggestions used during classroom discussions?"; G
Roeser, Eccles, & Sameroff (1998)	SP: Student empowerment: Making decisions concerning seating and the selection of work partners, Sharing own ideas in classroom discussions; G
Fostering relevance vs forcing meaningless activities	
Assor, Kaplan, & Roth (2002)	SP: Fostering understanding and interest (RAPS); e.g.: "The teacher explains why it is important to study certain subjects in school"; Forcing meaningless and uninteresting activities; e.g.: "The teacher forces me to complete worksheets that do not help me to understand the material we study"; C, main teacher
Roeser, Eccles, & Sameroff (1998)	SP: Curricular meaningfulness, relevance of problems and material; C, science, English, social studies, & mathematics
Wentzel (2002)	SP: Teacher valuing of subject (e.g. mathematics); The teacher tells us why the subject is important"; C
Respect vs disrespect	
Assor, Kaplan, & Roth (2002)	SP: Allowing of criticism; e.g.: "The teacher listens to my opinions and ideas"; Suppression of criticism; e.g.: "The teacher is willing to listen only to opinions that fit her opinion"; C, main teacher
Murdock, Anderman, & Hodge (2000)	SP: Disrespect and criticism; e.g.: "Teachers usually think my opinions are wrong". G

Table 1 continued

<i>Structure</i>	
General measure	
Frey, Ruchkin, Martin, & Schwab-Stone (2009)	SP: Support (feedback, guidance, and encouragement); e.g.: "Teachers are willing to help students"; "Most of my teachers notice when I am doing a good job and let me know about it"; G
Jang, Reeve, & Deci (2010)	OBS: Structure; observation scheme Reeve, et al., 2004; confusing, unclear vs understandable, clear during introduction/directions; poor vs strong leadership; low, easy vs high, hard workload; scaffolding fully absent vs richly present; non-informative vs informative, skill building feedback; C (1 lesson per class)
Nie & Lau (2009)	SP: Behavioural control; freq. off correcting and controlling misbehaviours; G <i>Measures were completed by a randomly selected first half of the students (group 1)</i>
Tucker et al. (2002)	SP: Structure (RAPS); e.g.: "My teacher is fair with me"; "My teacher's expectations for me are way of base"; G
Yin, Lee, & Zhang (2009)	SP: Support and involvement; e.g.: "The teacher always is willing to answer students' questions"; "The teacher gives advice on students' learning process"; G
Clarity	
Bergen, van Amelsvoort, & Setz (1994)	OBS: clarity, control of teaching-related events, respect for and stimulation of student contribution; C
Knight (1991)	SP: Rule clarity; e.g. "The teacher explains what will happen when a student breaks a rule"; G
Murray (2009)	SP: Unclear expectations (RAPS); e.g.: "My teachers don't make clear what they expect of me in school"; G
Pintrich, Roeser, & De Groot (1994)	SP: Teacher effectiveness (treatment of the subject matter in a clear and interesting manner, good classroom management, and fair grading procedures); e.g.: "The teacher explains the material well"; The teacher has good control of his class"; C, class in which student took questionnaire
Wentzel (2002)	SP: Rule clarity; e.g.: "There is a clear set of rules for students to follow"; "The teacher explains what will happen if a student breaks a rule". C
Guidance	
Alfaro, Umaña-Taylor & Bámaca (2006)	SP: Academic support, help with academics; G
Knight (1991)	SP: Help and personal interest; G
Plunkett et al. (2008)	SP: Academic support; e.g.: "Teachers helped me to do well in school"; "Teachers care about my education"; G
Wentzel, Battle, Russell, & Looney (2010)	SP: e.g.: "My teacher helps me so I get done quicker"; My teacher lends me things if I need them"; C, class in which student took questionnaire
Encouragement	
Dever & Karabenick (2011)	SP: Academic press: Providing challenge and demanding effort; e.g.: "Our math teacher accepts nothing less than our full effort"; C, mathematics
Murdock (1999)	SP: Academic support: Disinterest, criticism, and encouragement, long-term expectations; G
Murdock, Anderman, & Hodge (2000)	SP: Long-term expectations; e.g.: "My teachers expect I will do well in the future"; G
Roeser, Eccles (1998)	SP: Positive expectations; "Do you believe your teachers view you as a good student?"; G
Roeser, Eccles, & Sameroff (1998)	SP: Positive expectations; "Do you believe your teachers view you as a good student?"; G
Tyler & Boelter (2008)	SP: Expectations; e.g.: "My teacher gives me enough time to think before I give an answer"; G

Table 1 continued

Wentzel (2002)	SP: High expectations, opportunity, and choice; e.g.: "The teacher calls on me to answer questions"; "The teacher trusts me"; C
Wentzel, Battle, Russell, & Looney (2010)	SP: Expectations for academic engagement; e.g.: "The teacher calls on me to answer questions"; "The teacher expects me to learn new things"; G
Woolley, Strutchens, Gilbert, & Martin (2010)	SP: Expectations; e.g.: "My teacher thinks (I/all students) can understand math"; C, mathematics
Feedback	
Kelly (2007)	OBS: Properties of teachers' questions and responses that provoke thought and analysis (authentic question; discussion; multiple responses; high level questions) and postpone evaluation (uptake; opening up; not closing down; elaborate response)
Knight (1991)	SP: Feedback: Teachers let students know how well they are doing; G
Rakoczy, Klieme, Bürgermeister, & Harks (2008)	OBS: Evaluative feedback during periods of student work; short clear feedback indicating whether a response is correct or incorrect; observation scheme; C, mathematics OBS: Informational feedback; providing cues on how to proceed; observation scheme; C, mathematics
Wentzel (2002)	SP: Negative feedback; e.g.: "The teacher makes me feel bad when I do not have the right answer"; C
<i>Involvement</i>	
General measure	
Brewster & Bowen (2004)	SP: Caring, encouraging, willing to work with students; e.g.: "My teachers really care about me"; "I am respected and appreciated by my teachers"; G
Daly, Shin, Thakral, Selders, & Vera (2009)	SP: Affection & dedication of resources: Support, cared for, respected, and involved; G
Martin, Marsh, McInerney, Green, & Dowson (2007)	SP: Interpersonal relationships; e.g.: "In general, I get along well with my teachers"; G
Murray (2009)	SP: Involvement (RAPS); e.g.: "My teachers like to be with me"; "My teachers have plenty of time for me"; G
Phelan, Davidson, & Cao (1991)	INT: With teachers; concerning effects of patterns of transition between multiple worlds (family, peer, school) on engagement OBS: Classroom; concerning teacher-student interactions and interactions among peers
Rosenfeld, Richman, & Bowen (2000)	SP: Support; e.g.: "My teachers really care about me"; G <i>Based on amounts of teacher, peer, and parent support students were divided over eight support configurations</i>
Ryan & Patrick (2001)	SP: Support; e.g.: "Does your math teacher try to help you when you are sad or upset?"; C
Ryan, Stiller, & Lynch (1994)	SP: Felt security, e.g.: "Although I trust my teachers, I still have my doubts"; Emotional utilization, e.g.: "When I am feeling happy, or have good news, I go to my teachers"; School utilization, e.g.: "If I were having trouble understanding a subject at school, I would talk it over with my teachers"; Emulation; e.g.: "I try to model myself after my teachers"; G
Tamutiene (2008)	INT: Individual, semi-structured with 17 children (grade 7-12); concerning use of social motivation, loss of learning of motivation, and choice of being absent from school INT: Focus group with 45 children (grade 5-11); concerning use of social motivation, loss of learning of motivation, and choice of being absent from school
Tucker et al. (2002)	SP: Involvement (RAPS); G
Proximity	
Bergen, van Amelsvoort, & Setz (1994)	SP: Proximity; Questionnaire on Teacher Interaction (QTI); e.g.: "This teacher is friendly"; "This teacher looks down on us"; C

Table 1 continued

Den Brok, Levy, Brekelmans, & Wubbels (2006)	SP: QTI; C
Den Brok, Wubbels, Veldman, & van Tartwijk (2009)	SP: QTI, short version; C
Lapointe, Legault, & Batiste (2005)	SP: QTI, short version; proximity and influence (not relevant); C
Maulana, Opdenakker, den Brok, & Bosker (2011)	SP: QTI; C
Affection	
Davis & Lease (2007)	Peer Perception: Third person perception of teacher liking; 1 item per classmate; 'How much do you think your homeroom teacher likes each student?'; C, homeroom teacher
Dever & Karabenick (2011)	SP: Caring; e.g.: "Our math teacher cares about how we feel"; C, mathematics
Khamis, Dukmak, & Elhoweris (2008)	SP: Disciplining and emotional support; G
Košir, Sočan, & Pečjak (2007)	SP: Personal support; e.g.: "My teacher really cares about me"; G TP: Liking of students; 1 item for each student Peer perception: Relationship with teachers; 'Name three or less classmates that have the best relations with teachers'; 1 item
Nie & Lau (2009)	SP: Behavioural care: Freq. of a teacher showing warmth, concern, and acceptance to students; G <i>Measures were completed by a randomly selected first half of the students (group 1)</i>
Voelkl (1995)	SP: School warmth; feelings between students and teachers; e.g.: getting along with teachers, school spirit, interest in students, praise of effort; G
Wentzel (2002)	SP: Fairness; e.g.: "The teacher treats some kids better than others"; C
Wentzel, Battle, Russell, & Looney (2010)	SP: Emotional support; e.g.: "My teacher likes me as much as he/she likes other students"; C, classroom students were in at the time of the data collection
You & Sharkey (2009)	SP: Teacher support; e.g. "Teachers are interested in students"; G
Dependability	
Lee (2007)	SP: Cognitive trust (not relevant), Affective trust; e.g.: "Teachers in this school look out for me"; G
Roeser, Eccles, & Sameroff (1998)	SP: Emotional support; "How often do you feel you can depend on your teacher to help you if you have a social or personal problem at school?"; G
Belongingness	
Close & Solberg (2008)	SP: Connection to Teachers and to School; e.g.: "Teachers here care about their students"; "I have friends here at this school"; G
Faircloth & Hamm (2005)	Peer Perception: Friendship nominations SP: Time spent in extracurricular activities; Bonding with Teacher; Care and Support; Perceived discrimination based on ethnic group membership; e.g.: "There is a teacher I could go to if I got into trouble"; "My teachers care about how I am doing"; <i>Together these scales measure belongingness</i>
Goodenow (1993)	SP: Class belonging vs alienation; e.g.: "I often feel out of place in this class"; G; with regard to both teachers and students
<i>Autonomy support, structure, & involvement</i>	
Combined measure	

Table 1 continued

Katz, Kaplan, Gueta (2010)	SP: Need support; e.g.: “The teachers provide us choice of tasks in homework”; “The teacher matches the difficulty level of the task to each of us”; “The teacher gives us the feeling that she respects us even if we do not succeed in homework”; C, bible studies SP: Need for need support; e.g.: ‘I need choice of task in homework’; C, bible studies
Klem & Connell (2004)	SP: Need support (RAPS); C; 16% of the students fall within the optimal range of need support, 22% is in the risk category, the other 62% is neither in the risk, nor in the optimal category
Lam, Cheng, & Ma (2009)	SP: <i>Structure & Autonomy support</i> : Cognitive support; challenge, real-life significance, curiosity, autonomy, recognition, evaluation; project specific; e.g.: “Our teacher lets us work on a topic of the right level, neither too difficult nor too easy”; <i>Involvement</i> : Affective support; e.g.: “My teacher likes me and cares about me”; C, project teacher
Murdock & Miller (2003)	SP: Caring: Respect & fairness, long-term expectations, competence/commitment; e.g.: “My teachers expect I will do well in the future”; G
Skinner, Furrer, Marchand, & Kindermann (2008)	SP: Involvement, structure, & autonomy support; e.g.: “My teacher doesn’t seem to enjoy having me in her class”; “My teacher doesn’t make clear what she expects of me in class”; “It seems like my teacher is always telling me what to do”; G TP: Involvement, structure, & autonomy support; e.g.: “Teaching this student is not very enjoyable”; “I try to be clear with this student about what I expect of him/her in class”; “I let this student make a lot of his/her own decisions regarding schoolwork”; G
Spaulding (1995)	Manipulation: Psychological presence of the teacher; 2 conditions: writing for English teacher vs writing for researcher; C
Wesely (2009)	INT: Reflection on language learning experiences; individual; semi-structured INT: Rank ordering favorites and least favorites in learning French; group; semi-structured
Zimmer-Gembeck, Chipuer, Hanisch, Creed & McGregor (2006)	SP: Autonomy support, involvement, structure; “Teachers want to know how I think about school and how I do things”; “Teachers let me know they like me”; “My teachers explain the reasons for our classroom rules”; G
Separate measures	
Roeser, Eccles, & Sameroff (1998)	Autonomy support: Choice and relevance; Structure: Encouragement; Involvement: Dependability
Tucker, Zayco, Herman, Reinke, Trujillo, Carraway, Wallack, Ivery (2002)	Autonomy support: Autonomy support; Structure: Structure; Involvement: Dependability
<i>Autonomy support & Involvement</i>	
Combined measure	
Hardré & Sullivan (2008)	SP: <i>Autonomy support (relevance & respect)</i> : Teacher autonomy support: Fostering relevance, respect; <i>Involvement</i> : Support for academic success; e.g.: “In this class mistakes are considered a sign that students can’t learn”; “I feel understood by my teacher”; C
Marchant, Paulson, & Rothlisberg (2001)	SP: <i>Autonomy support</i> : Choice; <i>Involvement</i> : Affection; responsiveness: Interest in and support for students; e.g.: “My teacher believes I have a right to my own opinion”; “My teacher makes me feel good about what I achieve in school”; C
<i>Structure & Involvement</i>	
Combined measure	
Berti, Molinari, & Speltini (2010)	SP: Sense of injustice: Actual experiences of classroom justice (communication in class, principle of equality, principle of effort and need) subtracted from ideals of classroom justice (same topics); e.g.: “A teacher informs his/her students on how s/he makes decisions”; “A teacher is nice and friendly with his/her students”; C
Chua, Wong, & Chen (2009)	SP: <i>Involvement</i> : Affection; <i>Structure</i> : Guidance; e.g.: “The Chinese language teacher goes out of his/her way to help me”; C
De Bruyn (2005)	SP: <i>Involvement</i> : Affection & attunement; <i>Structure</i> : Role strain; e.g.: “Teacher don’t treat me fairly”; “Many teachers don’t know me”; G

Table 1 continued

Garcia-Reid (2007)	SP: Teacher support; SSP; e.g.: "My teachers really care about me"; "My teachers expect me to do my best all the time"; G
Garcia-Reid, Reid, & Peterson (2005)	SP: Teacher support; SSP; G
Green, Rhodes, Hirsch, Suárez-Orozco, & Camic (2008)	SP: <i>Structure</i> : Guidance; <i>Involvement</i> : Affection; academic & emotional support from adults and teachers at school; e.g.: "There is at least one adult in school I can always count on"; "Teachers do not treat me with respect"; G
Košir, Sočan, & Pečjak (2007)	SP: Teacher academic support; e.g.: "My teacher likes to help me learn"; G
Murray (2009)	SP: Affection and clarity; Closeness-trust (RAPS); e.g.: "When I am with my teachers, I feel good"; "The rules in my classroom are clear"; G
Thijs & Verkuyten (2009)	Manipulation: Description of three hypothetical teachers that are high in structure & involvement (authoritarian type), low in structure & involvement (authoritarian type), or high in structure but low in involvement (authoritarian type)
Van Ryzin, Gravely, Roseth (2009)	SP: Emotional and academic support; e.g.: "My teachers really care about me"; "My teachers want me to do my best in schoolwork"; G
Wentzel (1997)	SP: Social and academic support; CLM; e.g.: "My teacher really cares about me"; "My teacher cares about how much I learn"; G
Wentzel (1998)	SP: Social and academic support; CLM; G
Separate measures	
Dever & Karabenick (2011)	Structure: Encouragement; Involvement: Affection
Murray (2009)	Structure: Clarity; Involvement: General
Nie & Lau (2009)	Structure: General; Involvement: Affection
Wentzel, Battle, Russell, & Looney (2010)	Structure: Guidance, Encouragement; Involvement: Affection

Table 2 Motivation & engagement

Outcome & Author(s)	Measure
Engagement	
Assor et al. (2002)	SP: Behavioral and Cognitive Engagement in Schoolwork Scale; C, main teacher
Brewster & Bowen (2004)	SP: Engagement: Problem behaviour in school, school meaningfulness; G
Chua et al. (2009)	SP: Motivation/involvement in classroom learning tasks; C
Daly et al. (2009)	SP: Engagement; G
De Bruyn (2005)	TP (mentor): Engagement: Attentiveness; C
Garcia-Reid (2007)	SP: Engagement; G
Garcia-Reid et al. (2005)	SP: Engagement; G
Green et al. (2008)	SP: Academic engagement; G
Hardré & Sullivan (2008)	SP: Engagement; C
Jang et al. (2010)	OBS: Collective Behavioral Engagement, Observation Scheme; Task involvement and influence attempts; C SP: Engagement: Behavioural, cognitive, emotional; C, concerning the previous lesson
Kelly (2007)	OBS: Engagement: Participation in classroom discourse; number of instances of asking and answering questions by individual students; C, four lessons per class
Khamis et al. (2008)	SP: Desire to participate in the learning process, extent of participation, & vigorousness; G
Klem & Connell (2004)	SP: Engagement (RAPS); ongoing engagement, reaction to challenge; G TP: Engagement (RAPS); attentiveness, coming to class prepared, doing more than required; C
Košir et al. (2007)	SP: Behavioral and Cognitive Engagement in Schoolwork Scale; G TP: Adapt. Behavioral and Cognitive Engagement in Schoolwork Scale; C Peer perception: 'Name three or less classmates that are most engaged in lessons'
Martin et al. (2007)	SP: Motivation and engagement: Adaptive cognitions, adaptive behaviours, impeding/maladaptive cognitions, maladaptive behaviours; G
Murdock (1999)	TP: Engagement in school tasks: Attendance, class participation, assignment completion; G
Murray (2009)	SP: Engagement (RAPS); G
Nie & Lau (2009)	SP: Engagement: Attention, effort, and participation in classroom activities; G
Phelan et al. (1991)	INT/OBS: See table 1, 'involvement', 'general'
Reeve et al. (2004)	OBS: Collective Behavioral Engagement, Observation Scheme; C
Rosenfeld et al. (2000)	SP: School engagement; G
Ryan & Patrick (2001)	SP: Engagement: Self-regulated learning and disruptive behaviour; C
Ryan et al. (1994)	SP: Academic engagement vs disaffection; G
Shih (2008)	SP: Behavioural engagement, emotional engagement, & boredom; G
Skinner et al. (2008)	SP: Engagement vs disaffection: Behavioural and emotional; G
Spaulding (1995)	OBS: Behavior while writing: Task-related behavior; C SP: Length of essay; Evaluation of the essays; Evaluation of the task; Audience of essays
Thijs & Verkuyten (2009)	SP: Situational engagement; items referring to three descriptions of a hypothetical teacher
Tucker et al. (2002)	SP: Engagement (RAPS); emotional engagement, centrality of school, effort, attention, beyond the call; G
Tyler & Boelter (2008)	SP: Engagement: Emotional, behavioural, cognitive; G
Van Ryzin et al. (2009)	SP: Engagement vs disaffection: Behavioural and emotional; G
Voelkl (1995)	SP: Classroom and academic participation: Attendance, preparation; misbehaviour ; G TP: Classroom and academic participation: Absent-tardy, not-engaged; G
You & Sharkey (2009)	SP: Engagement: Participation in school-related activities; G
Zimmer-Gembeck et al. (2006)	SP: Engagement: Behavioural, emotional; G

Expectancy

Davis & Lease (2007)	SP: Motivation: Self-esteem questionnaire; G; SP: Self-efficacy (adapt. MSLQ); C, 5 subjects
Faircloth & Hamm (2005)	SP: Efficacious Attributions for Academic Success; C, 4 subjects SP: Self-competence attributions; C, 4 subjects
Goodenow (1993)	SP: Academic expectancies; C
Hardré & Sullivan (2008)	SP: Perceived ability (ATL); C SP: Success expectancies; C
Hardré et al. (2007)	SP: Perceived ability (ATL); C
Knight (1991)	SP: Academic self-concept; C, language arts
Lapointe et al. (2005)	SP: Self-efficacy (MSLQ); C
Marchant et al. (2001)	SP: Academic Competence Scale; G
Murdock & Miller (2003)	SP: Academic self-efficacy (PALS); G
Murdock et al. (2000)	SP: Academic self-concept; current evaluation and future expectations; G
Murray (2009)	SP: Competence; G
Pintrich et al. (1994)	SP: Self-efficacy (MSLQ); C
Roeser & Eccles (1998)	SP: Academic Self-Concept; G
Roeser et al. (1998)	SP: Academic competence; C
Ryan & Patrick (2001)	SP: Academic self-efficacy (PALS); C
Woolley et al. (2010)	SP: Academic self-efficacy (PALS); C, mathematics

Value

Davis & Lease (2007)	SP: Intrinsic value (adapt. MSLQ); C, 5 subjects
Faircloth & Hamm (2005)	SP: Valuing of school: School valuation, reasons for trying hard, effort; C, 4 subjects
Goodenow (1993)	SP: Intrinsic value; C
Hardré & Sullivan (2008)	SP: Perceived instrumentality of the instruction (ATL); C
Hardré et al. (2007)	SP: Perceived instrumentality of the instruction (ATL); C
Lapointe et al. (2005)	SP: Intrinsic value (MSLQ); C
Murdock & Miller (2003)	SP: Intrinsic value (MSLQ); C
Murdock et al. (2000)	SP: Valuing of educational success; G
Pintrich et al. (1994)	SP: Intrinsic value (MSLQ); G
Roeser & Eccles (1998)	SP: Valuing of education; G
Roeser et al. (1998)	SP: Valuing of Academics: Academic importance, intrinsic reasons for going to school, perceived utility of school as a pathway to later opportunities; C

Effort

Goodenow (1993)	TP: Effort; C, English
Hardré & Sullivan (2008)	SP: School Investment Scale; C
Hardré et al. (2007)	SP: School Engagement and Effort Scale; C
Kelly (2007)	SP: Effort on classroom assignments; C, English
Murdock & Miller (2003)	TP: Effort and academic persistence; C, 5 core subjects
Murdock et al. (2000)	SP: Effort: Freq. of attending school, participating in class, completing homework, and studying for exams; G
Wentzel (1997)	SP: Academic effort; C, 4 subjects

Interest

Den Brok et al. (2009)	SP: Interest; C
Dever & Karabenick (2011)	SP: Interest; C, math
Rakoczy et al. (2008)	SP: Working interest minus dispositional interest; C, mathematics

Wentzel (1998)	SP: Interest in school (SMS); G TP: Interest in class; C
Wentzel (2002)	SP: Interest in class (SMS); C
Wentzel et al. (2010)	SP: Interest in class (SMS); C
Woolley et al. (2010)	SP: Interest (MSLQ)
Autonomous & controlled motivation	
Chirkov & Ryan (2001)	SP: Autonomous and controlled motivation (SRSQ-A); G
Close & Solberg (2008)	SP: Adapt. SRSQ-A; G
Hardré & Reeve (2003)	SP: SRSQ-A; G
Katz et al. (2010)	SP: Autonomous vs controlled reasons for doing homework ; C, bible studies
Maulana et al. (2011)	SP: Questionnaire on Motivational Dimensions; C, mathematics, English
Ryan et al. (1994)	SP: SRSQ-A; G
Shih (2008)	SP: SRSQ-A; G
Shih (2009)	SP: SRSQ-A; G
Tucker et al. (2002)	SP: Perceived autonomy (RAPS); G
Vallerand et al. (1997)	SP: Internally and externally regulated motivation, amotivation; G
Intrinsic & extrinsic motivation	
Lam et al. (2009)	SP: Intrinsic motivation; C, project-based learning
Lee (2007)	SP: Intrinsic and extrinsic motivation; G
Motivation	
Alfaro et al. (2006)	SP: Academic motivation; G
Bergen et al. (1994)	SP: Enjoyment, value, efficacy, effort; C, Dutch, English, Mathematics
Berti et al. (2010)	SP: Motivation: Interest, attention, desire to learn; G
Den Brok et al. (2006)	SP: Pleasure, effort, confidence, relevance; C, English
Frey et al. (2009)	SP: Academic Motivation; G
Plunkett et al. (2008)	SP: Academic motivation; G
Tamutiene (2008)	INT: see 'need support', 'involvement', 'general'
Wesely (2009)	SP: Students' language learning motivation; C, French
Yin et al. (2009)	SP: Intrinsic value; self-efficacy; test anxiety; strategy use; self-regulation (MSLQ); G

3.4 Results

We have organised our findings along the three dimensions of need support (autonomy support, structure, and involvement), and their respective components. For each dimension, first, we present our analysis of those studies that concern associations between student perceptions of need supportive teaching and motivation and engagement (Section 3.4...1), hence, studies that have measured need supportive teaching via observations or teacher perceptions (Section 3.4...2), and longitudinal, intervention, and interview studies (Section 3.4...3) will be presented. The

results from these latter types of studies are presented separately, as these studies are more directly concerned with the direction of causality. In this section, longitudinal studies are included only when students' motivation or engagement is measured at least two times, with the final measure of need supportive teaching preceding the final of these measures. Within each section, first those studies that are concerned with general need support are presented, and second studies that focus on one or more specific components of need support. See Table 3 for an overview of the results.

3.4.1 Autonomy support

3.4.1.1 Associations student perceived autonomy support with motivation and engagement

With respect to the general level of autonomy support, evidence suggests a positive association with students' autonomous motivation and their engagement. In two studies, students were asked about their perceptions of teachers' general level of autonomy support, using items such as: "My teachers help me choose my own direction" (high autonomy support), or "I feel controlled at school" (low autonomy support). The results of these studies indicate a positive relationship between the general level of autonomy support and autonomous motivation (Chirkov & Ryan, 2001; Vallerand, Fortier, & Guay, 1997). This finding is supported by evidence from studies in which students' scores on the respective components of autonomy support are aggregated (Hardré & Reeve, 2003, Shih, 2008; 2009). Furthermore, using this aggregated measure, autonomy support is found to be predictive of engagement (Shih, 2008). Finally, one study shows the association between autonomy support and students' autonomous motivation to be mediated by the degree to which students perceive their needs for autonomy and competence to be satisfied at school (Vallerand et al., 1997).

For all three specific components of autonomy support, evidence from small numbers of studies is indicative of positive associations with students' motivation and engagement. First, in one study by Assor, Kaplan, and Roth (2002) *all respective components* of autonomy support were taken into account simultaneously, thereby, for each component, distinguishing between its autonomy suppressive and its autonomy supportive part. The results indicate that only fostering relevance (autonomy supportive part component 'relevance') and showing disrespect (autonomy suppressive part component 'respect') are uniquely associated with students' engagement.

Further evidence concerning the effects of specific components of autonomy support mostly stems from studies investigating teachers' provision of *choice vs control*. Evidence from two intertwined studies using the same longitudinal dataset shows that student perceived provision of choice in grade 8 is positively related to changes in expectancy between grade 7 and grade 8, but

not to changes in students' valuing of education (Roeser & Eccles, 1998), whereas a specific aspect of provision of choice, namely student empowerment, is not related to changes in expectancy, nor value (Roeser, Eccles, & Sameroff, 1998). Furthermore, Marchant, Paulson, and Rothlisberg (2001) find control (opposite to choice) to be negatively related to expectancy.

Finally, some evidence is available concerning the effects of other aspects of autonomy support. While Wentzel (2002) finds a positive association between students' perceptions of their teachers as *fostering relevance* and interest, Roeser et al. (1998) find fostering relevance in grade 8 to be related to changes in expectancy and value between grade 7 and grade 8. Furthermore, Tucker, Zayco, Herman, Reinke, Trujillo, Carraway, and Wallack (2002) find a combined measure of *fostering relevance and showing respect* to be related to autonomous motivation as well as engagement. Focusing on the continuation of the effects of showing respect in grade 7 after a period of two years with other teachers, Murdock, Anderman, and Hodge (2000) do not find associations with change in expectancy between grade 7 and 9, value in grade 9, nor effort in grade 9¹.

3.4.1.2 Association observed autonomy support with motivation and engagement

The evidence described above stems from studies in which teacher autonomy support is measured by asking students how autonomy supportive they perceive their teacher to be. Additional evidence is available from one study in which autonomy support is measured via observations by trained raters. The results of this study indicate a positive association of observed autonomy support with both observed and student perceived engagement (Jang et al., 2010), although the magnitude of the latter association appears to be smaller than the associations reported in Section 3.4.1.1.

3.4.1.3 Longitudinal and intervention studies on autonomy support

Finally, evidence is available from one intervention study by Reeve et al. (2004). In this study it is shown that trained raters tend to rate the behaviours of teachers who have learned to incorporate autonomy support in their motivating style as more autonomy supportive. Furthermore, the level of autonomy support appears to be predictive of changes in the ratings of collective engagement between the pre-measure and the post-measures that took place 4 weeks and 9 weeks after the intervention.

¹ The focus on the continuation of effects over time implies that the results of this study cannot be interpreted as lack of support for the existence of an association per se.

Table 3 Effect Measures

Author(s)	Country, Target group, Grade, & N	Analysis	Variables, & Effect measures
Alfaro, Umaña-Taylor & Bámaca (2006)	US; Latino; 9-10; 310	SEM	Guidance – motivation $\beta = -.26$ (boys) / $\beta = .29$ (girls) Control: parent & peer support
Assor, Kaplan, & Roth (2002)	Israel; (lower) middle class; 6-8, 364	SSA; regression	Choice $\beta = .19$, ns / Control $\beta = .10$, ns / Fostering relevance $\beta = .24$ / Forcing meaningless act. No effect (preliminary analysis) / Respect $\beta = -.01$, ns / Disrespect $\beta = -.15$ – engagement Control: choice; fostering relevance; respect; disrespect
Bergen, van Amelsvoort, & Setz (1994)	The Netherlands; overrepresentation higher tracks; 7-9; 468	Correlations (class level)	Involvement $r = .45$ / Clarity $r = -.03$, ns – motivation
Berti, Molinari, & Speltini (2010)	Italy; 9-12; 400	Regression	Structure & involvement $R^2 = .11$ (injustice in communication $\beta = -.26$, -injustice in equality $\beta = -.16$, injustice in effort and need $\beta = .08$, ns) – Motivation
Brewster & Bowen (2004)	US; at risk for school failure, Latino; 6-12; 633	Regression	Involvement – engagement (Problem behaviour (neg. effect) $R^2 = .017$ school meaningfulness $R^2 = .098$) Control: demographics; parent support
Chirkov & Ryan (2001)	US and Russia; 9-12; 236 (US: 116; Russia: 120)	SEM	Autonomy support – autonomous motivation (intrinsic motivation $\beta = .57$, identified regulation $\beta = .30$) / controlled motivation (external regulation $\beta = -.20$, introjected regulation $\beta = -.01$, ns)
Chua, Wong, & Chen (2009)	Singapore; high track; 9; 1,460	Correlations	Affection & guidance – engagement $r = .40$, $\beta = .09$ (individual) / $r = .37$, $\beta = .06$ (class) Control (): student cohesiveness; involvement; task orientation; cooperation; equity
Close & Solberg (2008)	US; Urban; 9-10; 427	SEM	Belongingness – autonomous motivation $\beta = .66$ / controlled motivation $\beta = -.06$, ns
Daly, Shin, Thakral, Selders, & Vera (2009)	US; low income, ethnically diverse; elementary/middle school; 7-8; 123	Correlations; regression	Involvement – engagement $r = .29$, $\beta = .15$ Control: demographics; neighbourhood crime and incivilities; family support; peer support
Davis & Lease (2007)	US; rural; mainly white; 6-7; 344	Correlations	Affection – expectancy (expectations $r = .33$, school self-esteem $r = .34$) / – value $r = .21$
De Bruyn (2005)	The Netherlands; pre-university track; 7; 749	Correlations	Structure & involvement – engagement (TP) $r = .23$
Den Brok, Levy, Brekelmans, & Wubbels (2006)	The Netherlands; overrepresentation pre-university track; 9; 1,041	Multilevel analysis	Involvement (class) – motivation (Δ between fall and spring; pleasure $ES = .12$, relevance $ES = .04$, confidence $ES = .08$, effort $ES = .14$) Control: achievement; influence; number of lesson minutes per week
Den Brok, Wubbels, Veldman, & van Tartwijk (2009)	The Netherlands; urban, ethnically diverse; 8-11; 1,451	Multilevel analysis	Interest – involvement $ES = .156$
Dever & Karabenick (2011)	US; ethnically diverse working class area; 7-12; 3,602	HLM	Encouragement – interest (individual $r = .29$, class $\beta = .56$) / Affection – interest $r = .27$ (individual) / $\beta = .14$, ns (class) Control (class): demographics; affection/encouragement

Table 3 continued

			SEM	
Faircloth & Hamm (2005)	US; socio-economically and ethnically diverse; 9-12; 5,494		SEM	Belongingness – expectancy $\beta = .59$ (African American) / $\beta = .30$ (Latino) / $\beta = .25$ (European American) / $\beta = .65$ (Asian) / – value $\beta = .86$ (African American) / $\beta = .75$ (Latino) / $\beta = .85$ (European American) / $\beta = .51$ (Asian)
Frey, Ruchkin, Martin, & Schwab-Stone (2009)	US; Urban; 8 (wave 1)/9 (wave 2); 652		Mancova	Structure – motivation $R^2 = .025$ Control: demographics, parental control, exposure to violence
Garcia-Reid (2007)	US; low income, Hispanic; 7; 133 girls		SEM	Structure & involvement – engagement $\beta = .30$ Control: parent support; peer support; neighbourhood safety
Garcia-Reid, Reid, & Peterson (2005)	US; low income, Latino; 7; 226		SEM	Structure & involvement – engagement $\beta = .32$ Control: parent & peer support; neighbourhood youth behaviour / safety / support; school safety
Goodenow (1993)	US; mainly European-American; 6-8; 353		Regression, Polychoric correlations	Belongingness (individual) – expectancy $R^2 = .40$ / – value $R^2 = .14$ / Belongingness (teacher behaviour) – expectancy $R^2 = .40$ / – value $R^2 = .40$ Control: expectancy/– effort (TP) $r = .20$
Green, Rhodes, Hirsch Suárez-Orozco, and Camic (2008)	US; first generation Latin American immigrant; 4-8 (at wave 1)/7-12 (wave 3); 139 (LISA)		HLM	Guidance & affection (mean over three years) – engagement (initial) $ES = .16$, ns / Guidance & affection (Δ between year 1 and year 2 / year 2 and year 3) – engagement (Δ between year 1 and year 2 / year 2 and year 3) $ES = .15$ Control: gender; study completion
Hardré & Reeve (2003)	US; rural, socio-economically challenged, white; 9-12; 483		SEM	Autonomy support – autonomous motivation $R^2 = .41$
Hardré & Sullivan (2008)	US; mainly European-American; 9-12; 625		Regression	Autonomy support (respect & relevance) & involvement – expectancy (expectations $\beta = .20$; perceived ability $\beta = .48$) / – value $\beta = .39$ / – engagement $\beta = .57$ / – effort $\beta = .45$ Control: peer support
Hardré, Crowson, Debacker, & White (2007)	US; ethnically diverse; 9-12; 900		Correlations	Structure & involvement – expectancy $r = .37$ / – value $r = .32$ / – effort $r = .35$
Jang, Reeve, & Deci (2010)	US; 20% free lunch; 9-11; 1,584		HLM	Autonomy support – engagement (OBS $\beta = .38$, SP $\beta = .19$) / Structure – engagement (OBS $\beta = .38$, SP $\beta = .06$, ns) Control: Autonomy support/ structure
Katz, Kaplan, Gueta (2010)	Israel, middle class; 4 & 8, 108		Regression, Moderated causal step procedure	Need support – autonomous motivation $R^2 = .41$ Control: controlled motivation / Need support x level of needs $R^2 = .01$, ns Control: controlled motivation; need support; level of needs
Kelly (2007)	US; 7&8; 2,051		Multilevel analysis	Feedback (authentic questions gini-coefficient = $-.055$, uptake gini-coefficient = $-.069$, high level questions gini-coefficient = $-.055$, other aspects ns) – effort Relationship not mediated by student autonomy or moderated by prior achievement / Feedback (discussion gini-coefficient = $.082$, other aspects ns) – engagement (OBS) Relationship not moderated by prior achievement / Control: demographics
Khamis, Dukmak, & Elhoweris (2008)	United Arab Emirates; 7-10; 275		Regression	Affection – Engagement $\beta = .14$ Control: demographics; beliefs about learning; parent support; peer attitudes towards learning; curriculum content

Table 3 continued

Klem & Connell (2004)	US; below average income, ethnically diverse; 6-8; 1,347		Optimal range need support – optimal range engagement (SP) 2.9 times as likely / optimal range engagement (TP) 1.5 times as likely / risk category engagement (SP) 0.3 times as likely / risk category engagement (TP) 0.5 times as likely / Risk category need support – optimal range engagement (SP) 0.3 times as likely / optimal range engagement (TP) 0.7 times as likely to be in the optimal range (compared with average) / risk category engagement (SP) 1.7 times as likely / risk category engagement (TP) 1.3 times as likely
Knight (1991)	US; urban, low income, mainly Hispanic; 6-8; 530	Regression	Feedback – expectancy $\beta = -.03$, ns / Guidance – expectancy $\beta = .12$ / Clarity – expectancy $\beta = .03$, ns
Košir, Sočan, & Pečjak (2007)	Slovenia; 7; elementary school; 404	Correlations	Affection (SP) – engagement (SP) $r = .41$, TP $r = .13$, peer perception $r = .20$ / Affection (TP) – engagement (SP) $r = .22$, TP $r = .54$, peer perception $r = .31$ / Affection (peer perception) – engagement (SP) $r = .28$, TP $r = .49$, peer perception $r = .77$ / Structure & involvement – engagement (SP) $r = .44$, TP $r = .03$, ns, peer perception $r = .12$
Lam, Cheng, & Ma (2009)	Hong Kong, 7-9, 631 (4 schools that have implemented project-based learning; 126 teachers)	HLM	Need support – intrinsic motivation $\beta = .73$
Lapointe, Legault, & Batiste (2005)	Canada; (sub)urban, middle to upper middle SES class; 7 & 8; 593	Regression	Involvement (winter) – expectancy (Δ between fall and spring) $R^2 = .09$ (learning disabled students) / $R^2 = .44$ (average students) / $R^2 = .40$ (talented students) / – value (Δ between fall and spring) $\beta = .24$ (average students) / $\beta = -.27$ (talented students) <i>Control: influence; gender</i>
Lee (2007)	Korea; 7; 317	SEM	Dependability – intrinsic & extrinsic motivation $\beta = .64$
Marchant, Paulson, & Rothlisberg (2001)	US; mainly white, working and middle class; 5-6; 230	Correlations	Choice $r = .25$ / Choice & affection $r = .39$ – expectancy
Martin, Marsh, McInerney, Green, & Dowson (2007)	Australia; slightly above average achievement and income; 7-12; 3,450	SEM	Involvement – engagement (adaptive cognitions) $\beta = .50$, adaptive behaviours $\beta = .47$, impeding/maladaptive cognitions $\beta = -.18$, maladaptive behaviours $\beta = -.41$, academic self-concept $\beta = .45$ <i>Control: demographics; parent-child relationship</i>
Maulana, Opendakker, den Brok, & Bosker (2011)	Indonesia; 7-9; 1,012	Multilevel analysis	Involvement – autonomous motivation (intrinsic motivation) $\beta = .33$, identified motivation $\beta = .30$ / –controlled motivation (introjected motivation) $\beta = .13$, ns, external motivation $\beta = .05$, ns
Murdock & Miller (2003)	US; suburban, below average income, ethnically diverse; 7-8; 206	Regression	Need support (grade 8) – expectancy (Δ between grade 7 and grade 8) $R^2 = .04$ / – value (Δ between grade 7 and grade 8) $R^2 = .15$ / – effort (grade 8; TP) $R^2 = .02$ <i>Control: parental attachment and support; peer support</i>
Murdock (1999)	US; 7; 405	Regression	Encouragement – engagement (TP) $\beta = .34$

Table 3 continued

Murdock, Anderman, & Hodge (2000)	US; (sub-)urban, lower and upper middle class; 7-9; 405 (wave 1)-238 (wave 2)	Regression	Disrespect grade 7 – effort grade 9 $\beta = -.05$, ns / – expectancy Δ between grade 7 and grade 9 $\beta = -.05$, ns / – value grade 9 $\beta = -.14$, ns / Encouragement grade 7 – effort grade 9 $\beta = .18$ / – expectancy Δ between grade 7 and grade 9 $\beta = .05$, ns / – value grade 9 $\beta = .14$, ns <i>Control: achievement; peer aspirations; economic limitations All in grade 7</i>
Murray (2009)	US; low income, urban, below average achievement, 11% special education; 6-8; 104	Correlations; Regression	Clarity – engagement $r = .42$, $\beta = .05$, ns / – expectancy $r = .41$, $\beta = -.04$, ns / Involvement – engagement $r = .44$, $\beta = .06$, ns / – expectancy $r = .27$, $\beta = .03$, ns / Clarity & affection – engagement $r = .63$, $\beta = .49$ / – expectancy $r = .28$, $\beta = .14$, ns <i>Control: achievement; parent relationship; clarity; involvement; contingency; affection</i>
Nie & Lau (2009)	Singapore; 9 (age 15.5); 3,196	HLM	Structure – engagement $\beta = .13$ / Affection – engagement $\beta = .09$ <i>Control: SES, gender / Autonomy support</i> x affection – engagement $\beta = -.02$, ns <i>Control: demographics, control, care</i>
Phelan, Davidson, & Cao (1991)	US; desegregated urban schools; 54; mainly 9	QA	Involvement – engagement Students with congruent worlds and smooth transitions between these worlds face less problems in terms of engagement than students for whom the transition is hazardous or insurmountable.
Pintrich, Roeser, & De Groot (1994)	US; mainly middle class, white; 7; 100	Regression	Clarity (fall; classroom level:) – Expectancy (Δ fall-spring) $\beta = -.27$ / – value (Δ fall-spring) $\beta = -.08$, ns / Clarity (fall; individual deviations of classroom level) – Expectancy (Δ fall-spring) $\beta = -.05$, ns / – value (Δ fall-spring) $\beta = .11$, ns <i>Control: gender; cooperative and productive work</i>
Plunkett et al. (2008)	US; Mexican origin, living in two-parent intact families; 9; 216	Correlations	Guidance – motivation $r = .30$ (girls) / $r = .28$ (boys)
Rakoczy, Klieme, Bürgermeister, & Harks (2008)	Germany; Higher and intermediate track 240	Regression; Mediation Analysis	Feedback (positive, evaluative $\beta = .23$, negative, evaluative $\beta = .06$, ns, informational $\beta = .17$) – interest relationship between informational feedback (=.08) and interest is mediated by emotional experience (=.44) and cognitive processing (=.31)
Reeve, Jang, Carrell, Jeon, Barch (2004)	US; 9-12; 480 (20 teachers)	ANCOVA; Paired-samples t-test; Regression	Control group vs experimental group, manipulation autonomy support; training week 3, self-study week 3-5 – autonomy-support $M = 2.72$ ($SD = .90$) vs $M = 4.76$ ($SD = 1.19$) / Autonomy support (week 5) – engagement (OBS) (Δ between week 2 and week 5; task involvement $R^2 = .35$, influence attempts $R^2 = .35$) / Autonomy support (week 10) – engagement (OBS) (Δ between week 5 and week 10) task involvement $R^2 = .37$, influence attempts $R^2 = .29$
Roeser & Eccles (1998)	US; 7-8; 1,046	Regression	Choice (spring grade 8) – expectancy (Δ between fall grade 7 and spring grade 8) $\beta = .08$ / – value (Δ between fall grade 7 and spring grade 8) $\beta = .04$, ns/Encouragement – expectancy (Δ between fall grade 7 and spring grade 8) $\beta = .21$ / – value (Δ between fall grade 7 and spring grade 8) $\beta = .22$ / <i>Control: demographics; school goal structure</i>

Table 3 continued

Roeser, Eccles, & Sameroff (1998)	US; 7 (wave 1), 8 (wave 2); 1,041	Regression	Choice (spring grade 8) – expectancy (Δ between fall grade 7 and spring grade 8) $\beta=.03$, ns / –value (Δ between fall grade 7 and spring grade 8) $\beta=.01$, ns / Relevance (grade 8, spring) – expectancy (Δ grade 7, fall and grade 8, spring) $\beta=.14$ / – value (Δ grade 7, fall and grade 8, spring) $\beta=.18$ / Encouragement (grade 8, spring) – expectancy (Δ grade 7, fall and grade 8, spring) $\beta=.22$ / – value (Δ grade 7, fall and grade 8, spring) $\beta=.21$ / Dependability (grade 8, spring) – expectancy (Δ grade 7, fall and grade 8, spring) $\beta=.05$, ns / – value (Δ grade 7, fall and grade 8, spring) $\beta=.08$ Control: demographics; school goal structure; curriculum meaningfulness; expectancy/value (grade 7); differential treatment by race/gender; choice/relevance/encouragement/dependability
Rosenfeld, Richman, & Bowen (2000)	US; 6-12; 827	ANOVA	Involvement – engagement no effect measures
Ryan & Patrick (2001)	US; mainly European- and African-American, working-class background, 75% female; 7-8; 233	Regression	Involvement (grade 8) – engagement (Δ between grade 7 and 8) (disruptive behaviour $\beta=-.21$; self-regulated learning $\beta=.21$) / – expectancy (Δ between grade 7 and 8) $\beta=-.12$, ns Control: demographics; performance goals
Ryan, Stiller, & Lynch (1994)	US; suburban; 7-8; 606	Regression	Involvement (felt security $\beta=.32$, emotional utilization $\beta=.14$, school utilization $\beta=.19$, emulation $\beta=.19$) – engagement / Involvement (felt security $\beta=.24$, emotional utilization $\beta=.23$, school utilization $\beta=.12$, emulation $\beta=.20$) – autonomous motivation Control: gender; grade; felt security/emotional utilization/school utilization/emulation; parent & friend representations
Shih (2008)	Taiwan; middle class; 8; 343	Regression	Autonomy support – autonomous motivation (intrinsic motivation $\beta=.40$, identified regulation $\beta=.56$) / – controlled motivation (introjected regulation $\beta=.37$, external regulation $\beta=.07$, ns) / – engagement (behavioural: involved $\beta=.55$, persisting $\beta=.39$, avoiding $\beta=-.18$, ignoring $\beta=-.34$, participating $\beta=.46$) / – engagement (emotional: curiosity $\beta=.56$, anxiety $\beta=-.29$, anger $\beta=-.10$, ns, enjoyment $\beta=.54$, boredom $\beta=-.42$)
Shih (2009)	Taiwan; middle class; 8; 461	MANCOVA	Autonomy support (high vs low) – autonomous motivation 'high' adjusted mean of almost 1 point higher on a 5-point scale than 'low' Control: parental autonomy support
Skinner, Furrer, Marchand, & Kindermann (2008)	US; rural-suburban, working to middle class; mainly white; 4-7; 805	Regression	Need support (SP; fall) – engagement (Δ between fall and spring; engaged behaviour $\beta=.23$, engaged emotion $\beta=.12$, disengaged behaviour $\beta=-.12$, disengaged emotion $\beta=-.07$) / Need support (TP; fall) – engagement (Δ between fall and spring; engaged behaviour $\beta=.07$, engaged emotion ns, disengaged behaviour ns disengaged emotion ns)
Spaulding (1995)	US; urban, middle and lower class, special education excluded; 7; 185	Regression	Need support x efficacy – engagement (OBS) $R^2=.05$ Control: teacher x gender; audience x teacher; efficacy; efficacy x teacher
Tamutiene (2008)	Lithuania; students with experiences of absenteeism; 5-12; 62	QA	Involvement – motivation Students who face verbal abuse and humiliation by their teacher feel ignored or rejected and indicate not feeling welcome at school anymore, as a consequence they experience loss of learning motivation.

Table 3 continued

Thijs & Verkuyten (2009)	The Netherlands; urban, low SES, ethnically diverse; 9; 503	Multilevel Analysis; Simple Slope analysis	Structure & Involvement – engagement effort $R^2 = .18$, enjoyment $R^2 = .38$) Interaction with personal engagement: (mainly) stronger effects for students low in personal engagement / -Interaction with gender: stronger effects for females
Tucker et al. (2002)	US; mainly attending after school program to enhance academic & social skills, low income, African-American; 1-12; 117	Correlations; Regression; Mediation analysis	Autonomy support $r = .46$, $\beta = .09$, ns, $\beta = -.05$, ns / Structure $r = .47$, $\beta = .09$, ns, $\beta = .03$, ns / Involvement – engagement $r = .63$, $\beta = .42$, $\beta = .37$ Control ($\beta = 1$): grade; need support / Control (-2); grade; need support; need satisfaction; competence; involvement; autonomous motivation
Tyler & Boelter (2008)	US; low income, mainly black; 6-8; 262	Regression	Encouragement – engagement (cognitive $\beta = .37$, behavioural $\beta = .26$, emotional $\beta = .42$) / expectancy $\beta = .32$ Control: gender; grade
Vallerand, Fortier, & Guay (1997)	Canada; French-Canadian; 9-10; 4,537	SEM	Autonomy support – school autonomy $\beta = .22$ / – school competence $\beta = .35$ / School autonomy – autonomous motivation $\beta = .55$ / School competence – autonomous motivation $\beta = .32$ Control: parental and school administrator autonomy support
Van Ryzin, Gravely, & Roseth (2009)	US; rural, middle class mainly white; 7-8; 283	SEM	Structure & involvement (fall) – engagement (spring) $\beta = .29$ Control: peer support; autonomous motivation
Voelkl (1995)	US; 8; 13,121 (NELS)	MANOVA	Affection – engagement (SP $R^2 = .38$ - .53, TP $R^2 = .0065$ - .027)
Wentzel (1997)	US; suburban, mainly white; 6-8; 248	Regression	Structure & involvement (grade 8) – effort (Δ between grade 6 and grade 8) $R^2 = .07$ Control: demographics; goal pursuit; academic and behavioural competence; achievement (all grade 6)
Wentzel (1998)	US; 6; 167	Regression	Structure & involvement – interest (SP) $\beta = .33$ / – interest (TP) $\beta = .18$ Control: demographics; peer support; family cohesion
Wentzel (2002)	US; spec. education excluded, 1 school above average achievement, mainly European-American, 1 school below average achievement, mainly African-American; 6; 452	Correlations; Regression	Encouragement $r = .49$, $\beta = .34$ / Feedback (evaluative) $r = -.30$, $\beta = -.04$, ns / Clarity $r = .33$, $\beta = -.10$ / Affection $r = .43$, $\beta = .13$ / Relevance – interest $r = .45$, $\beta = .27$ Control (): demographics; control beliefs; encouragement/feedback/ clarity/affection
Wentzel, Battle, Russell, & Looney (2010)	US; suburban; 6-8; 358	Regression	Guidance $\beta = .31$ / Encouragement $\beta = .19$ / Affection – interest $\beta = .17$ Control: gender; grade; teacher; peer and teacher guidance/ encouragement/affection
Wesely (2009)	US; 6; 6 (multiple case study)	QA	Need support – motivation Students stress the importance of need supportive teaching in terms of having an effect on their motivation.
Woolley, Strutchens, Gilbert, & Martin (2010)	US; black; 6-8; 933	SEM	Encouragement – interest $\beta = .50$ / Encouragement – expectancy $\beta = .41$ Control: teacher reform practices and high standards
Yin, Lee, & Zhang (2009)	Hong-Kong; 4-9; 2,206	SEM	Structure – motivation $\beta = .11$ / – value $\beta = .47$ Control: student learning community
You & Sharkey (2009)	US; 8 (wave 1)/10 (wave 2)/12 (wave 3); 13,825 (in 934 schools; NELS: 88)	Multilevel Growth Curve Analysis	School: Affection – engagement (grade 8) $ES = .36$ / School: Affection – engagement (Δ between grade 8 and 12) $ES = .058$ Control: demographics; teacher-student ratio; school unsafety; teacher-practice
Zimmer-Gembeck, Chipuer, Hanisch, Creed, & McGregor (2006)	Australia; low middle to upper middle income, mainly white; 9 & 10; 314	SEM, bootstrapping	Need support – engagement $\beta = .69$ Relationship partially mediated (19%) by need satisfaction. Control: peer support

Note: Motivation & engagement are measured via student perceptions unless indicated otherwise (TP = teacher perception, OBS=observation by raters); QA=qualitative analysis)

3.4.2 Structure

3.4.2.1 Association student perceived structure with motivation and engagement

With respect to the *general level of structure*, evidence shows a positive association of structure with motivation (Frey, Ruchkin, Martin, & Schwab-Stone, 2009; Yin, Lee, & Zhang, 2009) and engagement (Nie & Lau, 2009; Tucker et al., 2002). Moreover, the association between structure and engagement is found to be mediated by perceived competence and relatedness (Tucker et al., 2002).

Evidence on the components of structure indicates positive associations of guidance, both informational and positive feedback, and encouragement with students' motivation. We start with evidence on teachers' provision of *clarity*, which is not indicative of a positive association with students' motivation. Pintrich, Roeser, and de Groot (1994) do not find an association with changes in expectancy and value over a period of a half-year, not when clarity is measured at the classroom level, nor when clarity is measured as individuals' deviations from the classroom level. Moreover, unexpectedly, these authors find a negative association between clarity at the level of the classroom and expectancy. Furthermore, no association between a specific aspect of clarity, namely rule clarity, and expectancy is found (Knight, 1991). Interestingly, Wentzel (2002) finds a positive association between rule clarity and interest, but, when control beliefs are added as explanatory variable in the same analysis, this association becomes negative. Murray (2009) does, however, find a positive association between clarity and students' engagement and expectancy. It should be noted that in some of the selected studies clarity was operationalized with items such as: "the teacher explains what will happen when a student breaks a rule". It might be that such items not only contributed to clarity, but to autonomy suppression as well.

Guidance, defined here in terms of help with academics, is found to be positively associated with motivation (Alfaro, Umaña-Taylor, & Bámaca, 2006; Plunkett et al., 2008), expectancy (Knight, 1991), and interest (Wentzel et al., 2010).

Students who believe their teachers to have positive expectations regarding their schoolwork can be expected to perceive their teachers as providing them with some sort of *encouragement*. It is this aspect of encouragement that is the focus of a large amount of studies. Evidence indicates that students who perceive their teacher to have higher expectations report feeling more self-efficient (Tyler & Boelter, 2008; Woolley, Strutchens, Gilbert, & Martin, 2010), being more interested in class (Wentzel, 2002; Wentzel, Battle, Russell, & Looney, 2010; Dever & Karabenick, 2011; Woolley et al., 2010), and being more engaged (Tyler & Boelter, 2008), while teachers report these students to be more engaged as well (Murdock, 1999). Furthermore, in two studies a positive relationship is found between the degree to which students think that their teachers believe them to

be a good student in grade 8 and changes in both expectancy and value for schoolwork, in this case between fall in grade 7 and spring in grade 8 (Roeser & Eccles, 1998; Roeser et al., 1998). Focusing on the continuation of the effects of teacher expectations in grade 7 after a period of two years with other teachers, Murdock et al. (2000) do not find associations with changes in expectancy between grade 7 and 9 or value in grade 9². These authors do however find a relationship between teacher expectations in grade 7 and effort in grade 9.

A relatively large part of the evidence on specific components of structure stems from studies investigating teachers' provision of *informational feedback*. Two studies that have used observational measures will be discussed in Section 3.4.2.2. First evidence from two other studies using student perceptions is elaborated on. As mentioned in Section 3.2.1.2, based on SDT both positive and negative informational feedback is expected to positively affect students' motivation and engagement. In addition, a negative effect of, especially negative, evaluative feedback is expected. In line with these expectations, negative evaluative feedback is found to be negatively associated with interest (Wentzel, 2002). In addition, evidence from one study that did not explicitly operationalize feedback in terms of informational aspects, but instead incorporated this idea more implicitly, shows no association between the amount to which students perceive their teachers to let them know how well they are doing and expectancy (Knight, 1991).

3.4.2.2 Association observed structure with motivation and engagement

Evidence is available from several studies in which structure is measured by observations of trained raters. Focusing on the *general level of structure* Jang et al. (2010) do not find a relationship between structure and student-perceived engagement. Interestingly, these authors do find a positive relationship between observed structure and observed collective behavioural engagement. In addition, focusing on a specific component of structure, namely *clarity*, at the level of the class Bergen, van Amelsfoort, and Setz (1994) do not find a relationship with motivation.

Moreover, two of the studies focusing on *feedback* used observational measures. With respect to informational feedback, the results show a positive association between observed informational feedback (both positive and negative) and the level of interest students report to have, with this association being mediated by students' self-reported emotional experience and cognitive support (Rakoczy, Klieme, Bürgermeister, & Harks, 2008). Observed positive evaluative feedback is positively associated with students' interest (Rakoczy et al., 2008), while no association

² The focus on the continuation of effects over time implies that the results of this study cannot be interpreted as lack of support for the existence of an association per se.

between negative evaluative feedback and interest is found. Opting for another focus, Kelly (2007) examined patterns of interaction instead of their content; arguing that the form these patterns take affects the risk for negative evaluation students face. It is assumed that when students face a low risk of negative evaluation, they are more likely to ask and answer questions and to engage in classroom discussions, which are ways to ask for feedback. The results of this large scale study show that when teachers use 'dialogic instruction', a form of instruction in which interaction patterns are considered more optimal than average, students score higher on self-reported effort, but not on observed engagement. Furthermore, contrary to the authors' expectations, student autonomy does not moderate the relationship between dialogic instruction and effort, nor does dialogic instruction appear to be especially beneficial for low-achieving students.

3.4.3 Involvement

3.4.3.1 Association student perceived involvement with motivation and engagement

With respect to the *general level of teacher involvement*, evidence from a series of studies consistently indicates a positive relationship with motivation and, in particular, engagement. The results show that students who perceive their teachers to be more involved, also indicate to be more engaged in their schoolwork (Brewster & Bowen, 2004; Daly, Shin, Thakral, Selders, & Vera, 2009; Martin, Marsh, McInerney, Green, & Dowson, 2007; Murray, 2009; Rosenfeld, Richman, & Bowen, 2000; Ryan, Stiller, & Lynch, 1994; Tucker et al., 2002), to have higher expectations (Murray, 2009), and to be more autonomously motivated (Ryan et al., 1994). Furthermore, teacher involvement in grade 8 is found to be associated with changes in engagement, but not in expectancy, in this case between grade 7 and grade 8 (Ryan & Patrick, 2001). Contrary to what would be expected based on SDT, one study shows that the relationship between teacher involvement and engagement is not mediated by student perceived need satisfaction (Tucker et al., 2002).

An influential theoretical framework that guides research on teacher-student relationships is the Model of Interpersonal Teacher Behaviour (Wubbels, Créton, & Hooymayers, 1985). Within this model teacher-student relationships are classified along two dimensions: Influence and proximity; the latter of which is closely related to involvement. Proximity is defined in terms of the degree to which teachers co-operate with students and act friendly. Evidence supports the existence of a positive relationship between student-perceived proximity and student-reported interest (Den Brok, Wubbels, Veldman, & van Tartwijk, 2009), intrinsic motivation, autonomous motivation (Maulana, Opdenakker, den Brok, & Bosker, 2011), motivation (Bergen et al., 1994), as well as an aggregated measure of motivation at the level of the class (Den Brok, Levy, Brekelmans,

& Wubbels, 2005).

Findings with respect to the specific components of teachers' involvement are indicative of a positive association of affection and belongingness with motivation and engagement, while only a small number of studies are available on the other three components of involvement (attunement, dedication of resources, and dependability). With respect to *affection* a positive association is found with students' self-reported level of engagement (Khamis, Dukmak, & Elhoweris, 2008; Košir, Sočan, & Pečjak, 2007; Nie & Lau, 2009; Voelkl, 1995), as well as their engagement as perceived by their teachers (Voelkl, 1995; Košir et al., 2007) and their peers (Košir et al., 2007). Finally, evidence shows a positive association between affection and interest (Dever & Karabenick, 2011; Wentzel, 2002; Wentzel et al., 2010), while the results of a large scale longitudinal study show that affection at the level of the school is positively related to engagement as well as to change in engagement between grade 8 and grade 12 (You & Sharkey, 2009).

Evidence concerning the effects of *attunement* and *dedication of resources*, two other components of involvement, is not available, while the relationship between dependability and motivation and engagement is investigated in two studies only. The results of these studies show *dependability* to be positively related to a combined measure of intrinsic and extrinsic motivation (Lee, 2007). Furthermore, dependability in grade 8 is found to be related to change in value between grade 7 and grade 8, but not to change in expectancy between grade 7 and 8 (Roeser et al., 1998).

As argued in Section 3.2.1.3, a profound reason for the importance of teachers' involvement lies in its effect on students' feelings of *belongingness* to the school or class. In some studies students' feelings of belongingness were in part defined by this influence of the teacher, and items measuring teacher involvement were combined with items measuring school or class belongingness, such as "I often feel out of place in this class" (see Goodenow, 1993). The results of these studies show a positive relationship between belongingness and autonomous motivation (Close & Solberg, 2008), expectancy and value (Goodenow, 1993; Faircloth and Hamm, 2005), and teacher-perceived effort (Goodenow, 1993).

3.4.3.2 Association peer and teacher perceived involvement with motivation and engagement

Evidence is available from two studies that have used peer and/or teacher perceptions to measure one specific component of involvement, namely *affection*. These studies show that both teacher and peer perceived teacher affection are related to students' engagement as perceived by their peers, their teachers, as well as themselves (Košir et al., 2007), while peer-perceived teacher affection also is found to be related to students' self-reported expectancy and value (Davis & Lease, 2007).

3.4.3.3 Longitudinal and interview studies on involvement

The evidence described above all stems from correlational studies. Complementary support for the existence of an effect of teachers' involvement on students' motivation and engagement can be found in a longitudinal study and two interview studies. First, in a longitudinal study, Lapointe, Legault, and Batiste (2005) find students' perceptions of proximity in winter to be related to changes in their expectancies and values between fall and spring. Interestingly, these authors find the strength of the relationship between proximity and expectancy to be considerably smaller for 'learning disabled' students than for 'average' and 'talented' students.

Second, additional evidence concerning the relationship between teacher involvement and motivation originates from two interview studies. Tamutiene (2008) conducted a study among a group of absentee students, whom the author interviewed about their experiences with being bullied by the teacher. The results show that students respond by withdrawing from class or school if teachers make them suffer tension and fear. Students indicate that they do not want to come to class anymore when they are afraid of the teacher, and the teacher, "as a rule" (p.123), yells at them. Quite often, these children face different forms of verbal abuse and humiliation by their teacher, such as a lack of contact or being told unworthy. As a consequence, children feel ignored or rejected by their teachers, and indicate not feeling welcome at school anymore; something that clearly contributes to children's loss of learning motivation. Finally, evidence from another qualitative study concerns the negotiating of boundaries of family, peer, and school cultures (Phelan, Davidson, & Cao, 1991). The results show that students with congruent worlds and smooth transitions between these worlds as well as students who live in different worlds, but manage to cross boundaries face less problems in terms of engagement in schoolwork than students for whom the transition between different worlds is hazardous or insurmountable.

3.4.4 General level of need supportive teaching

3.4.4.1 Association student perceived general level of need supportive teaching with motivation and engagement

With respect to student perceptions of the *general level of need supportive teaching*, evidence rather consistently shows a positive association with students' motivation and engagement. General need support is found to be related to students' self-reported intrinsic motivation in a project-based learning activity (Lam, Cheng, & Ma, 2009), autonomous motivation for bible studies (Katz, Kaplan, & Gueta, 2010), as well as engagement in schoolwork (Klem & Connell, 2004; Zimmer-Gembeck, Chipuer, Hanisch, Creed, & McGregor, 2006), but not to teacher reports of students' engagement (Klem & Connell, 2004). Moreover, aspects of autonomy support (respect),

structure, and involvement in grade 8 are found to be related to changes in expectancy and value between grade 7 and grade 8, as well as to teacher perceived effort in grade 8 (Murdock & Miller, 2003). Interestingly, in one study it is investigated if the relationship between general need support and autonomous motivation is moderated by individual differences in students' expressed needs, measured with items such as: "I need choice of task in homework" (Katz, Kaplan, & Gueta, 2010). The authors do find the relationship between need support and autonomous motivation to be somewhat stronger for students who express a high level of needs, but this difference is not statistically significant. In another study, in line with SDT, the results show the relationship between general need support and engagement to be mediated by students' general level of need satisfaction (Zimmer-Gembeck et al., 2006). In general, inspection of the effect measures shows the magnitudes of the associations with students' motivation and engagement to be larger for the general level of need supportive teaching than for each of the specific dimensions of need supportive teaching separate.

Additional evidence is available from studies focusing on combined effects of (components) of two dimensions of need supportive teaching. With respect to combined measures of (components of) *autonomy support and involvement*, evidence is available from a small body of research. The results show positive associations with expectancy (Hardré & Sullivan, 2008; Marchant et al., 2001, choice and affection), value, effort, as well as engagement (Hardré & Sullivan, 2008). With respect to the combined level of (components of) *structure and involvement* that is offered by the teacher, evidence from a large number of studies rather consistently shows a positive association with students' motivation and engagement. The results show a positive association with student perceived expectancy and engagement (Murray, 2009; clarity and affection), teacher perceived engagement (de Bruyn, 2005), as well as student perceived engagement at the individual level, and at the level of the class (Chua, Wong, & Chen, 2009; guidance and affection). Furthermore, evidence indicates a positive relationship between structure and involvement in grade 8 and change in effort between grade 6 and grade 8 (Wentzel, 1997). Further evidence stems from a study defining equal treatment in terms of students' sense of injustice: The difference between students' ideals of classroom justice and how they perceive the actual classroom to be (Berti, Molinari, & Speltini, 2010). The results show a positive relationship between the combined level of structure and involvement, defined in this way, and students' motivation.

In many studies the combined level of components of structure and involvement is operationalized in terms of 'teacher support' (not to be confused with teachers' need support). Teacher support can consist of social support, academic support, and student appreciation (Dicke, 2011), and often is defined in terms of a combination of these three aspects. Evidence indicates

students' perceptions of how supportive their teachers are, to be positively related to students' self-reported engagement (Košir et al., 2007; Garcia-Reid, 2007; Garcia-Reid, Reid, & Peterson, 2005), peer perceived engagement (Košir et al., 2007), expectancy, value, effort (Hardré, Crowson, Debacker, & White, 2007), and both student and teacher perceived interest (Wentzel, 1998), but not to teacher-perceived engagement (Košir et al., 2007). Moreover, no relationship is found between mean teacher support over a three-year period and students' initial engagement (Green, Rhodes, Hirsch, Suárez-Orozco, & Camic, 2008)³.

3.4.4.2 Association of teacher perceived need supportive teaching with motivation and engagement

Evidence from a study by Skinner et al. (2008) shows 'teacher support' (combined measure components structure and involvement) in grade 7 to be positively predictive of changes in engaged behaviour between grade 7 and grade 8, but no relationship with any of the other dimensions of engagement are found (disengaged behaviour and engaged and disengaged emotion).

3.4.4.3 Longitudinal studies, intervention studies, and interviews on general need support

Additional evidence originates from a longitudinal, experimental, and an interview study. First, Skinner et al. (2008) find need supportive teaching in fall to be predictive of changes in engagement between fall and spring. Second, Spaulding (1995) manipulated students' experience of psychological presence by the teacher, by asking them to write a text for either the teacher (high psychological presence) or the researcher (low psychological presence). Her results show that students who are assigned to the condition in which they experience a high degree of psychological presence by the teacher are more engaged in their schoolwork than the students who are assigned to the other condition, but only when they report a low level of linguistic competence; for students reporting a high level of linguistic competence, the results are reversed. Third, Wesely (2009) presents evidence from interviews concerning the potential of relationships with teachers to have a substantial influence on students' language learning motivation, both positively and negatively. Although the interview protocol did not contain any questions specifically designed to elicit such reflections, all the student participants spoke about the influence of teachers, thereby stressing the importance of the teacher being available to answer questions, receiving students kindly, listening, and being patient.

³ The focus on the continuation of effects over time implies that the results of this study cannot be interpreted as lack of support for the existence of an association per se.

In addition, evidence is available from a longitudinal and an intervention study that focus on combined effects of (components) of two dimensions of need supportive teaching. Focusing on combined levels of components of *structure and involvement*, operationalized in terms of ‘teacher support’, research shows a positive relationship of student-perceived teacher support in fall with student-reported engagement in spring (Van Ryzin, Gravely, & Roseth, 2009). Furthermore, using vignettes, Thijs and Verkuyten (2009) find that students indicate that they would be more engaged when taught by a teacher who scores higher on both structure and involvement. This effect is stronger among females and among students who score low on personal engagement.

3.4.4.4 Unique associations dimensions of need support with motivation and engagement

As argued in Section 3.2.1.4, based on SDT, we expect support for each of the three needs to have *unique associations* with motivation and engagement. Evidence from studies in which separate measures of support for two or three needs are combined is mixed. While, on the one hand, evidence indicates that support for autonomy, structure, and an aspect of involvement (dependability) each is uniquely associated with students’ autonomous motivation and engagement (Tucker et al., 2002), and (aspects of) structure and involvement are found to be uniquely associated with engagement (structure and affection; Nie & Lau, 2009) as well as interest (guidance, encouragement and affection; Wentzel et al., 2010). On the other hand, other studies show no unique association of aspects of structure and involvement with engagement, or expectancy (clarity, involvement, and a combined measure of affection and clarity; Murray, 2009), or interest at the level of the class (encouragement and affection; Dever & Karabenick, 2011). Furthermore, Roeser et al. (1998) find components of both autonomy support (relevance) and involvement (dependability) to be uniquely and positively associated with changes in expectancy and value between grade 7 and grade 8, while a component of structure (encouragement) is uniquely associated with value. These authors do however not find another component of autonomy support (choice) to be uniquely associated with change in expectancy or value, nor do they find a component of structure (encouragement) to be uniquely associated with expectancy.

3.5 Conclusion and discussion

In Self-Determination Theory (SDT) it is argued that availability of autonomy support, structure, and involvement positively affects satisfaction of fundamental needs and, thereby, motivation and

engagement. In the current review, we aimed at bringing together educational research among early adolescents that fits within the SDT framework. Through a fine-grained overview of research into effectiveness of need supportive teaching, this review brings forth several conclusions on the extent to which available evidence supports SDT, including the gaps that remain. We continue by means of a discussion of these conclusions, classified along the five considerations we suggested to be of relevance in section 3.1.

First, we conclude that *students' perceptions* of need supportive teaching are positively associated with their motivation and engagement. This finding is replicated in a large body of studies. Consistently, positive associations of the general level of need supportive teaching are found, and, of a somewhat smaller magnitude, of each of the respective dimensions of need supportive teaching. In SDT, it is assumed that it is not the behaviour of others per se that influences one's motivation, but rather how one psychologically responds to this behaviour (Deci, 1975). Research focusing on student perceived need supportive teaching is of particular importance, as it provides insight in the relevance of the SDT framework for early adolescents' motivation and engagement.

Second, we conclude that evidence is available from a small number of studies only that have used *observations or teacher perceptions* of need supportive teaching. In addition, in the small body of studies that is available, much smaller or even no associations between need supportive teaching and students' motivation and engagement are found. We consider this a striking finding as, ultimately, practitioners need information on the concrete, observable behaviour that makes students perceive teaching as need supportive. Future studies using observations and teacher perceptions of need supportive teaching are recommended.

Several plausible explanations can be thought of for the fact that evidence on observed and teacher perceived need supportive teaching is mixed. First, based on SDT, it can be expected that student perceptions have a larger impact on motivation and engagement than concrete teaching behaviour. Evidence from educational research does, however, suggest concrete teaching behaviour is meaningful as well, as students who are taught by the same teacher tend to differ less in terms of their motivation than students who are taught by different teachers (e.g. Opendakker et al., 2012). Second, it might be that we are better able to measure the abstract entity of perceived need support than we are able to measure the concrete, observable behaviour that underlies these perceptions. This could be, for example, because trained raters and teachers differ from early adolescents in terms of the characteristics of teaching behaviour that are salient to them. Specifically, whereas early adolescents base their perceptions on a comprehensive set of experiences, trained raters cannot do so. For future research, studies that link observations and student perceptions of need supportive teaching are strongly recommended.

Third, although evidence indicates positive associations of each of the three dimensions of need supportive teaching with students' motivation and engagement, research on their *unique importance* is scarce. Moreover, evidence does not consistently indicate effectiveness of each of the *specific components* of these dimensions of need supportive teaching, as research in this respect is scarce and findings are mixed. Future research should explicitly focus on the (unique) importance of the three dimensions of need supportive teaching, as well as their specific components. Such research is of particular relevance, as it increases our understanding of what it is that makes teaching need supportive.

Fourth, although a large body of correlational research is available, research that is more directly concerned with the *presumed causality of associations* of need supportive with students' motivation and engagement is scarce. Considering causality is of importance in deciding on generality, as it is relevant in deciding about why associations exist and, thereby, under what conditions. Based on this review we can draw some conclusions about causality and about the generality of our findings. First, evidence from the small body of available longitudinal studies, experiments, and interviews does indicate need supportive teaching to positively *affect* students' motivation and engagement. Second, the fact that need supportive teaching is found to be associated with students' motivation and engagement in multiple countries is an indication of the generality as well.

Fifth, our findings indicate a *pattern in the design of studies*; a connection exists between the dimension of need supportive teaching and the outcome measures being used. Specifically, all studies on the general level of autonomy support have focused on students' autonomous motivation or engagement, while studies on the general level of teachers' involvement generally have just used engagement as outcome measure (with those studies that have operationalized involvement in terms of proximity being an exception). Such an incomplete pattern implies a current gap in our knowledge, and might, at the same time, unveil an unfolding trend.

In conclusion, our findings clearly indicate the importance of need supportive teaching for early adolescents' motivation and engagement. At the same time, our review provides insights for future research. Considerably more work needs to be done on observed need supportive teaching, as well as on determining the relative importance of specific components of need support. Finally, if the debate is to be moved forward, more evidence needs to be gathered on the presumed causality of the association between need supportive teaching and students' motivation and engagement.

Appendix Searching terms

1. Teacher-student interaction

teacher N1 student N2 interaction Or teacher N1 pupil N2 interaction Or teacher N1 student N2 relation* Or teacher N1 pupil N2 relation* Or teacher N1 student N2 dialog* Or teacher N1 pupil N2 dialog* Or teacher N10 student N10 communication Or teacher N10 student N10 instructional N10 behaviour Or teacher N10 student N10 instructional N10 practice Or student N10 teach* N1 behaviour Or pupil N10 teach* behaviour Or teach* N1 style And (student Or pupil) Or (instruction* N1 style Or communication N1 style Or interaction N1 style Or interpersonal N1 interaction) And teacher And (student Or pupil) Or (class Or classroom) N10 (dynamic Or climate Or interaction)

2. Learning environment

learning N1 context Or learning N1 environment Or class N1 environment Or classroom N1 environment Or interpersonal N1 teach* N2 behaviour Or competen* Or structure Or chaos Or autonomy Or self-determin* Or control* Or relatedness Or relational Or relationship Or attachment Or bonding Or involv* Or support* N10 teacher Or reject*

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3. Motivation & engagement

motivation* Or amotivation* Or demotivation* Or engage* Or disaffection Or effort Or interest Or expectancy N2 value

4. School

Not (crèche Or kindergarten Or prekindergarten Or preschool Or elementary N1 school Or elementary N1 education Or primary N1 education Or elementary N1 math* Or elementary N1 physics Or elementary N1 grammar Or elementary N1 English Or elementary N1 spelling Or elementary N1 vocabulary Or elementary N1 social N2 studies Or elementary N1 science Or tertiary N1 education Or senior N1 high N2 school Or higher N1 education Or bachelor N1 student Or master N1 student Or college Or university Or adult N1 education Or undergraduate N1 student Or graduate N1 student Or graduate N1 school)

Note: Nx = distance of maximum x between word before and word after Nx; * = for this position all combinations of letters are accepted

