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Changes in need-supportive teaching over the course of one school year: differences between students with special educational needs and typically developing students

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ABSTRACT

According to self-determination theory, need-supportive teaching is an important aspect of teacher-student interactions. It involves supporting the basic psychological needs of autonomy, competence, and relatedness. In this study, we observed need-supportive teaching in teacher-student interactions with students with special educational needs (SEN) and typically developing students in pre-vocational secondary education. Need-supportive teaching was coded in teacher-student interactions in 59 lessons across 7 classes. Teachers interacted just as often with students with SEN as they did with students without SEN. Multilevel analysis indicates that teachers provided higher levels of need support to students with behavioural problems. Autonomy support increased slightly throughout the school year. The provision of structure was erratic at first, with the highest level halfway through the school year and the lowest at the end. Involvement declined halfway through the school year and stabilised thereafter. These patterns were largely the same for students with SEN, albeit with more fluctuations between lessons.

KEYWORDS

Self-determination theory; need-supportive teaching; teacher-student interactions; Students with SEN; classroom observations; longitudinal approach

Introduction

Interactions between teachers and students, as they unfold in the daily reality of the classroom, can be seen as the building blocks for the long-term development of students. The quality of these interactions is related to student achievement (Allen et al. 2013), motivation (Opdenakker, Maulana, and den Brok 2012; Maulana, Christine Opdenakker, and Bosker 2016), mental health, and drop-out rates (Krane et al. 2016). The instructional quality of teacher-student interactions (Maulana, Christine Opdenakker, and Bosker 2016) and teacher-student relationships (Opdenakker, Maulana, and den Brok 2012) seems to decline over time, however, especially in the early years of secondary education. Moreover, teachers apparently have difficulty meeting the needs of a diverse student population. It is challenging for teachers to adjust to the needs of students with special educational needs (SEN) while also devoting sufficient attention to the other students in the same classroom. Their ability to use their didactical skills in working with students with SEN is limited (Smeets, Ledoux, and Van Loon-Dikkers 2019). In the United Kingdom, the

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quality of education for students with SEN in regular secondary schools has been questioned, as these students are often placed in separate low-attainment classes, reliance on teaching assistants is high, and teachers lack skills in SEN pedagogy (Blatchford and Webster 2018; Webster and Blatchford 2019). Such conditions are likely to jeopardise the quality of teacher-student interactions with students with SEN, thereby ultimately threatening processes of inclusion.

Self-determination theory (SDT) provides an important lens for examining the support of special educational needs. According to this theory, one essential aspect of teacher-student interactions is need-supportive teaching: teaching practices that foster the basic psychological needs of students for autonomy (sense of ownership), competence (a feeling of being able to achieve their goals), and relatedness (having significant relationships with the teacher and peers) (Ryan and Deci 2000, 2017). Fulfilment of these needs is a necessary condition for the intrinsic motivation, engagement, and well-being of students (Stroet, Opdenakker, and Minnaert 2013). According to SDT, students with SEN have the same needs for autonomy, competence, and relatedness as other students do (Ryan and Deci 2017), and need-supportive teaching has been shown to have positive effects on students with intellectual disabilities (Behzadnia, Rezaei, and Salehi 2022). As demonstrated by one recent study, however, the relative importance of these needs differs from one student to the next and, to some extent, between students with and without SEN (Loopers et al. 2022).

Teachers can either support or thwart the basic psychological needs of students in a variety of ways. First, the autonomy support provided by teachers can satisfy a student's need for autonomy, while teacher behaviours that thwart autonomy can frustrate this need. Autonomy support refers to 'the amount of freedom a child is given to determine his or her own behaviour' (Skinner and Belmont 1993), and it entails 'understanding and relating to the students' perspectives' (Ryan and Deci 2017, 366). Three components of autonomy-supportive behaviour have been distinguished: providing choice, fostering relevance, and showing respect (Stroet, Opdenakker, and Minnaert 2013).

Second, the structure provided by teachers can satisfy a student's need for competence, while teacher behaviours that promote chaos can frustrate this need (Skinner and Belmont 1993). Structure refers to 'the amount of information in the context about how to effectively achieve desired outcomes' (Skinner and Belmont 1993). Although the provision of structure may appear to be at odds with the provision of autonomy support, the two dimensions are complementary (Hyungshim, Reeve, and Deci 2010; Vansteenkiste et al. 2012). Four categories of teacher behaviours that provide structure have been distinguished: providing clarity, providing guidance, encouragement, and giving informational feedback (Stroet, Opdenakker, and Minnaert 2013).

Third, teacher involvement can satisfy a student's need for relatedness, while disaffection or rejection on the part of teachers can frustrate this need (Skinner and Belmont 1993). Involvement refers to 'the quality of the interpersonal relationship with teachers and peers' (Skinner and Belmont 1993). Students of highly involved teachers experience greater involvement on the part of their teachers, as well as more structure and autonomy support (Skinner and Belmont 1993). Four categories of teacher behaviours that support relatedness can be distinguished: showing affection, attunement (showing understanding), dedication of resources (e.g. time), and dependability (Stroet, Opdenakker, and Minnaert 2013).

Individual teacher-student interactions are important to inclusive education:

'The propensity and skill to engage each student in the classroom and thereby to develop a teacher – student relationship that promotes learning at each student's level of engagement is essential for effective teaching overall and for effective inclusive practices' (Jordan, Schwartz, and McGhie-Richmond 2009, 541). Teachers should therefore pay attention to individual learning characteristics. For example, they vary the amount of need support they provide in individual student-teacher interactions (Domen et al. 2019; Hornstra et al. 2018). Need-supportive teaching is thus an important characteristic of one-to-one teacher-student interactions (Hornstra et al. 2018).

Teachers apparently differ in the amount of need support they provide based on the SEN of students. More specifically, they exhibit fewer behaviours that stimulate autonomy and responsibility when working with students with SEN (Smeets, Ledoux, and Van Loon-Dikkers 2019), and they tend to be more controlling towards students with specific learning disorders (Grolnick and Ryan 1990) and ADHD (Rogers and Tannock 2018). In terms of structure, teachers do not always use available information on the needs of individual students to provide appropriate feedback (Minnaert et al. 2011), and tend to provide less feedback altogether to SEN students (Smeets, Ledoux, and Van Loon-Dikkers 2019). Other studies suggest, however, that teachers provide equal amounts of structure to students with and without SEN (Smeets, Ledoux, and Van Loon-Dikkers 2019). They provide low-achieving students with more positive feedback (Woodcock and Hitches 2017), and become more actively involved in the instruction of these students (Nurmi et al. 2012). In terms of involvement, Smeets, Ledoux, and Van Loon-Dikkers (2019) report no differences in the amount of emotional support that teachers provide to students with SEN and to typically developing students. Other evidence suggests, however, that teachers characterise their relationships with students with ASD and ADHD as involving more conflict and less closeness (Marjolein et al. 2020). Students with dyslexia report less closeness, although this is not recognised by their teachers. On the positive side, these students also report less conflict (Marjolein et al. 2020).

The quality of teacher-student relationships (Opdenakker, Maulana, and den Brok 2012) and the instructional quality of teacher-student interactions in secondary education apparently declines over the school year (Maulana, Christine Opdenakker, and Bosker 2016). Results are mixed concerning general trends in need-supportive teaching (Stroet, Opdenakker, and Minnaert 2015; Bartholomew et al. 2018; Skinner et al. 2008), and patterns seem to be different for individual students (Bartholomew et al. 2018). Students with behavioural problems are particularly at risk of becoming 'stuck' in a vicious cycle consisting of conflict with the teachers and receiving sub-optimal levels of need-supportive teaching, thereby exacerbating behavioural problems (Henderien, Jansen, and van Geert 2012; Roorda and Koomen 2021), although this has rarely been subjected to empirical testing.

Current study

Given the individual differences in need-supportive teaching found in earlier research, the objective of this study is to investigate how teachers interact with students with SEN and with typically developing students in terms of need-supportive teaching. Furthermore, in light of the declining and differential trends over the school year that have been

identified, we investigate how need-supportive teaching changes over the course of one school year and explore whether these changes differ for students with SEN and typically developing students. To this end, we combine a cross-sectional and a longitudinal approach. The research questions of this observational study are as follows:

(1) *What are the differences between the need-supportive teaching provided in teacher-student interactions with students with SEN and those with typically developing students?*
(2) *How does need-supportive teaching in teacher-student interactions change during the school year, and to what extent do these changes differ between students with SEN and typically developing students?*

Method

Participants

The present study is part of the large-scale research project entitled 'Differentiation Inside Out'. Participants included students from 11 classes in 7 schools for regular secondary education spread across the Netherlands. All of these students were in the second year of the highest track of pre-vocational secondary education (8th grade) during the 2018/2019 school year. This track is around the middle level of secondary education, and a quarter of all students in secondary education follow this track (Inspectie van het Onderwijs 2020). Students with SEN are over-represented in this track, as compared to the higher tracks (Smeets, Ledoux, and Van Loon-Dikkers 2019; Inspectie van het Onderwijs 2020).

For this observational study, 7 classes from 5 schools were selected from a larger sample based on active participation of the class and the teacher during the school year. This resulted in a sample of 166 students (54% girls) and 7 teachers). 5 classes participated with their Dutch teachers, and 2 classes participated with their mathematics teachers. Almost a quarter of the students had at least one special educational need (23.49%), which is comparable to the 26% proportion in the general population (Smeets, Ledoux, and Van Loon-Dikkers 2019). Learning problems (e.g. dyslexia) were the most common (11.45%), followed by internalising or externalising behavioural problems (7.23%). Combinations of learning and behavioural problems were present as well (3.01%). Three of the students (1.81%) had other problems (e.g. physical problems).

Procedure

Schools and teachers were recruited through social media and the contacts of the research team. The inclusion criteria were as follows: teachers needed to teach Dutch, English, or mathematics, and their students needed to be in the second year of pre-vocational secondary education. Teachers and parents of the students gave informed consent. The Ethics Committee of Pedagogical & Educational Sciences of the University of Groningen approved the project (8 October 2018).

Lessons were videotaped nine times a year in three waves, each consisting of three consecutive weeks. The first wave took place around the third month of the school year, the second wave halfway through the school year and the third two to three months

before the end. This resulted in 63 videotaped lessons. Two lessons were excluded because of technical problems, and two were excluded because the teacher had switched from teaching Dutch to teaching mathematics. The analysis is thus based on 59 lessons. The lessons were recorded with two standing cameras (at the front and at the back of the classroom) and a bodycam on the teacher's chest. Transcription and coding were performed by the first author and two research assistants.

Instruments and variables

Need-supportive teaching

The coding scheme for need-supportive teaching was based on Stroet (2014). Each need was divided into sub-items, as shown in Table 1. Each interaction of a teacher with an

individual student or small group of students was coded. In one example of the latter, two students were chatting, and the teacher told them to go back to work. If needed, different codes were assigned for individual students within small-group interactions (e.g. if one student was explicitly pointed out by the teacher). An interaction was defined as a conversation about one topic, starting with a question or remark by the teacher or a student, and ending with the teacher walking away or starting a new conversation, or the student going back to work. Each interaction was assigned a score between −3 (need-thwarting) and +3 (need-supporting) for each dimension of need-supportive teaching. For

Table 1. Coding scheme for need-supportive teaching (based on Stroet (2014)).

Autonomy support	Autonomy thwart	Examples of references	Example need-supportive teaching behaviour
Choice	Control	(Reeve and Jang 2006; Niemiec and Ryan 2009)	Creating opportunities for students to work in their own ways
Fostering relevance	Forcing meaningless activities	(Assor, Kaplan, and Roth 2002; Skinner and Belmont 1993)	Providing a meaningful and realistic rationale when choice is constrained
Showing respect	Showing disrespect	(Reeve and Jang 2006; Hyungshim, Reeve, and Deci 2010)	Listening carefully to students and acknowledging their feelings, thoughts, and perspectives
Provision of structure	**Chaos**		
Clarity	No clarity	(Hyungshim, Reeve, and Deci 2010; Vansteenkiste et al. 2012)	Communicating clear, detailed, and consistent guidelines and expectations
Guidance	No guidance	(Niemiec and Ryan 2009; Ryan and Moller 2019; Hyungshim, Reeve, and Deci 2010)	Providing step-by-step directions when needed, thereby adjusting to the student
Encouragement	Discouragement	(Ryan and Moller 2019; Alfi, Assor, and Katz 2004)	Fostering non-competitive, cooperative, learning structures
Informational feedback	Evaluative feedback	(Hyungshim, Reeve, and Deci 2010; Niemiec and Ryan 2009; Alfi, Assor, and Katz 2004)	Providing students with feedback in the form of cues on how to proceed
Involvement	**Disaffection or rejection**		
Affection	Disaffection	(McHugh et al. 2013; Sparks et al. 2015; Niemiec and Ryan 2009)	Talking in a friendly tone
Attunement	No attunement	(Sparks et al. 2015)	Demonstrating understanding of students regarding what is important to them
Dedication of resources	No dedication of resources	(Skinner and Belmont 1993)	Being available
Dependability	No dependability	(Sparks et al. 2015; McHugh et al. 2013)	Demonstrating commitment to students' learning

structure, a score of 'not applicable' could be assigned if the interactions did not address the content or structure of the lesson.

An example of an interaction in a Dutch language class is provided below. In this example, the teacher provides structure especially clearly: she guides the student through explanation, asks questions to check the student's knowledge, and encourages active participation. She demonstrates involvement by taking time for the student.

St: Ma'am, I didn't understand this when . . . , about divisors.

T: Yes. Which numbers can 48 be equally divided by?

St: By 1.

T: If you divide by 1, there is no remainder. For example, can you divide 48 by 5?

St: No.

T: No, so look, the last answer option is off.

St: Yes.

T: Well then, you are going to look at the others.

St: Oh, just when there is no remainder.

T: When there is no remainder, it is a divisor.

St: Oh, okay.

T: Yes, exactly. So, in fact, you could imagine that I have 48 euro coins and I want to divide them. So, I can't say something like 50 cents.

St: Yes.

T: Only whole euros.

The following interaction presents a less need-supportive interaction in terms of autonomy and relatedness. The teacher thwarts the student's autonomy and shows disaffection.

T: {name}, get to work.

St: I am working.

T: You are looking behind you. Don't argue with me, just say, 'Yes sir, I'm going to work'. Done.

Inter-rater reliability was measured using the intraclass correlation coefficient (ICC) based on five double-coded lessons. Given the nature of the data within the scale structure (which also includes interactions scored as 'not applicable'), a somewhat different procedure was followed for this scale. First, Cohen's kappa coefficient was calculated to assess agreement on the coding of the scale structure in general (i.e. to determine whether it is or is not applicable). Second, an ICC was calculated for the interactions in which structure was applicable and had therefore been assigned a code. The reliability of

the autonomy-support scale could be considered moderate (α = .74). For the structure scale, reliability was substantial and moderate (κ = .72, α = .68), with good reliability for the involvement scale (α = .81).

Special educational needs (SEN)

Teachers were asked to indicate whether students in their classes had SEN (with or without formal assessment) and a brief characterisation of which type of SEN. In most cases, the lists of these students were provided by the teachers, with the lists for two classes being provided by the school. The researchers then classified the types of SEN into various diagnostic categories. Three main categories were distinguished: learning problems, behavioural problems, and other, less frequent, problems (e.g. physical impairments). The third category ($N = 3$) was not included in the analyses relating to SEN, given the focus on students with learning and/or behavioural problems.

Statistical analyses

A multilevel model was constructed with three levels, with interactions nested in lessons, which are nested in students. The level of the teacher was not included, due to small ICC values. We can nevertheless not rule out the possibility that students (the highest level in our multilevel models) were completely unrelated to each other.

To answer the first research question, the SEN variable was added to the multilevel model as a categorical variable with four categories: no SEN (reference category), learning problems, behavioural problems, and both. To explore the effect of SEN and the effect of time on need-supportive teaching, SEN, time, and the interaction terms between SEN and time were added to the multilevel model as explanatory variables.

Results

Descriptive statistics

In all, 6,089 coded interactions could be assigned to the participating students. Due to the scoring of structure, fewer interactions could be coded on this variable ($N = 4{,}080$, with 2,009 missing values). Autonomy support ($N = 6{,}086$) and involvement ($N = 6{,}081$) had hardly any missing values. On average, a teacher interacted with each student 4.35 times during a single lesson. Of all 6,089 interactions, 10.77% occurred between a teacher and a student with learning problems, 6.47% between a teacher and a student with behavioural problems, and 3.65% between a teacher and a student with a combination of both. This is comparable to the percentage of students with SEN in the sample (Table 2).

In general, teachers exhibited neutral or slightly positive levels of need support ($M = .23$, $SD = .81$). They provided the highest levels of structure ($M = .44$, $SD = .78$), followed by involvement ($M = .37$, $SD = .98$), and autonomy support ($M = .07$, $SD = .98$).

A three-level multilevel model was estimated with interactions ($N = 6{,}089$) nested in lessons ($N = 9$), which were nested in students ($N = 166$). For all variables, more than 80% of the variance could be explained at the interaction level (Table 3).

Table 2. Interactions with students with SEN and with typically developing students (N = 6,089).

	Number of interactions	Percentage of interactions	Percentage of students
Typically developing students	4,667	76.65%	76.51%
Students with learning problems	656	10.77%	11.45%
Students with behavioural problems	394	6.47%	7.23%
Students with both learning and behavioural problems	222	3.65%	3.01%

Table 3. Explained variance in the empty multilevel models.

Variable	NST total		Autonomy support		Structure		Involvement	
	Variance	ICC	Variance	ICC	Variance	ICC	Variance	ICC
Level 3: student	.060	.091	.053	.055	.017	.028	.104	.109
Level 2: lesson	.055	.084	.070	.073	.034	.056	.077	.081
Level 1: interaction	.542	.825	.840	.872	.557	.916	.774	.810
Total	.657		.963		.608		.955	

Research question 1

Levels of need-supportive teaching in interactions with students with SEN and with typically developing students are presented in Figure 1. In general, teachers exhibited the highest level of need support when interacting with students with behavioural problems and with a combination of behavioural and learning problems. The lowest levels were observed in interactions with typically developing students.

Results from the multilevel models (Table 4) indicate that teachers provided significantly higher levels of need support to students with behavioural problems as compared to typically developing students ($\beta = .237$, $p = .008$). This was especially true for autonomy support and involvement ($\beta = .239$, $p = .010$; $\beta = .341$, $p = .002$). In addition, teachers provided significantly more structure and involvement in interactions with students with both learning and behavioural problems ($\beta = .203$, $p = .027$; $\beta = .397$, $p = .015$). There were no significant differences in need-supportive teaching between interactions with students with learning problems and those with typically developing students.

Research question 2

Changes in the level of need-supportive teaching over the school year are displayed in Figure 2. Results of the multilevel model with a time coefficient (Table 5) indicate a significant main effect only for time on involvement ($\beta = -.007$, $p < .001$), meaning that the provision of involvement decreased slightly over the school year. Visual inspection of the graphs reveals fluctuations between and within each block of three lessons, especially for autonomy support. The provision of structure was erratic in Wave 1, the highest in Wave 2 and the lowest in Wave 3. Involvement apparently declined in Wave 2 and stabilised thereafter.

Changes in the level of need-supportive teaching over the school year for students with SEN and for typically developing students are displayed in Figure 3. Results from the multilevel model (Table 5) indicate a significant interaction effect of time and of having both learning and behavioural problems on autonomy support ($\beta = .027$, $p = .024$). This

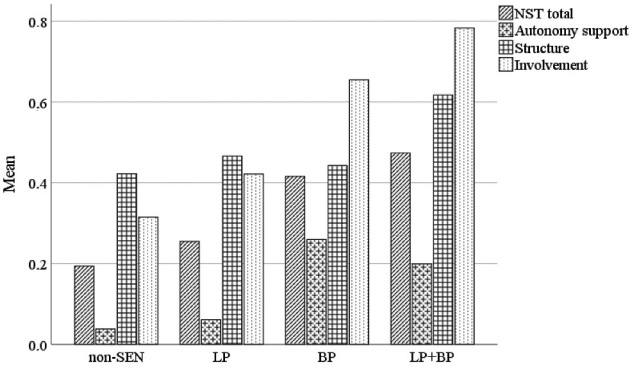

Figure 1. Levels of need-supportive teaching in interactions with students with SEN and with typically developing students. *Note*. LP = learning problems, BP = behavioural problems. Interactions were coded within a range from −3 to +3.

Table 4. Multilevel models of need-supportive teaching provided to students with SEN and to typically developing students.

	NST total		Autonomy support		Structure		Involvement	
	β	*SD*	β	*SD*	β	*SD*	β	*SD*
Fixed effects								
Intercept	.236	.026	.071	.027	.428	.019	.367	.033
LP	.080	.072	.041	.074	.064	.053	.115	.091
BP	.237**	.090	.239*	.093	.033	.068	.341**	.113
LP+BP	.233+	.128	.142	.131	.203*	.092	.397*	.163
Random effects								
Level 3: student	.056	.009	.050	.010	.015	.005	.095	.015
Level 2: lesson	.055	.008	.071	.011	.032	.009	.076	.011
Level 1: interaction	.543	.011	.842	.017	.557	.014	.774	.016
Log likelihood	13,862.792		16,355.801		9,248.990		15,955.136	

Note. LP = learning problems, BP = behavioural problems.
**$p < .10$, * $p < .05$, + $p < .10$.

means that the trend over the school year was more positive for students with both learning and behavioural problems.

Visual inspection of the graphs again reveals fluctuations between lessons, as well as differences between groups of students. First, the levels of and changes in autonomy support were apparently the same for typically developing students and for students with learning problems. Teachers provided somewhat higher levels of autonomy support to students with behavioural problems, but the pattern over time was apparently the same. Interactions with students who had both learning and behavioural problems were more erratic, showing higher levels of autonomy support in Wave 3. In terms of structure, a sudden decline could be observed in the first measurement in Wave 3, but only for typically developing students, with a smoother decline for students with SEN. In general, however, the trends are comparable. The level of involvement provided to typically developing students was relatively stable, while it was more erratic for students with SEN. Interactions with students with learning problems were largely similar to those with students without SEN, except for Lesson 7 (Wave 3). The level of involvement provided to

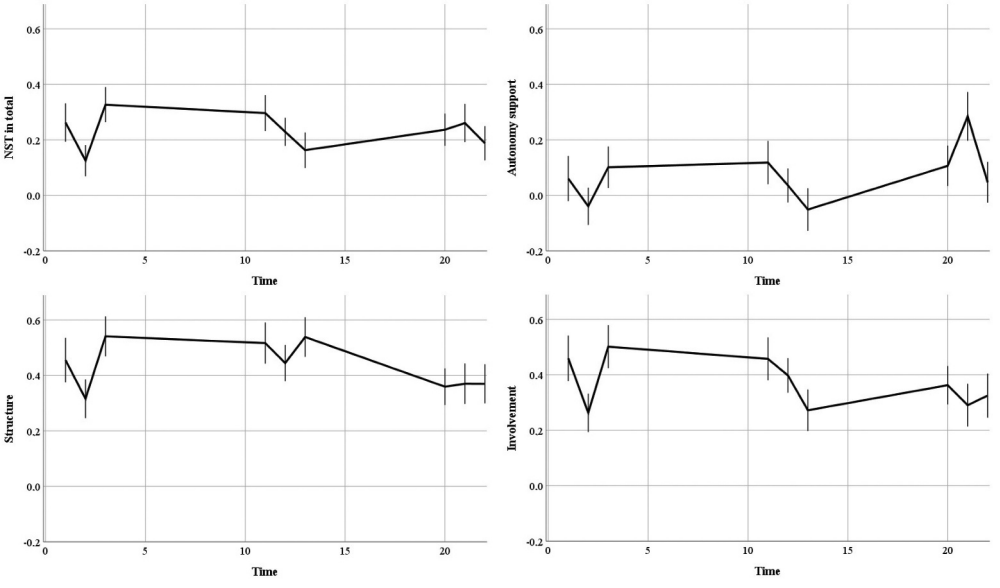

Figure 2. Need-supportive teaching over the school year. Interactions were coded within a range from −3 to +3. Error bars represent 95% confidence intervals.

Table 5. Multilevel models of need-supportive teaching over the school year for students with SEN and for typically developing students.

	NST		Autonomy support		Structure		Involvement	
	β	*SD*	β	*SD*	β	*SD*	β	*SD*
Fixed effects								
Intercept	.266	.034	.037	.037	.464	.030	.443	.042
Time	−.003	.002	.003	.002	−.003	.002	−.007**	.002
LP	.068	.094	.075	.104	.004	.082	.093	.116
BP	.158	.120	.231+	.133	−.025	.109	.222	.147
LP+BP	.068	.167	−.151	.183	.237	.145	.278	.207
LP*Time	.001	.005	−.003	.007	.005	.006	.002	.006
BP*Time	.007	.007	.001	.008	.005	.007	.010	.008
LP+BP*Time	.015	.010	.027*	.012	−.003	.010	.010	.011
Random effects								
Level 3: student	.056	.009	.049	.010	.015	.005	.095	.015
Level 2: lesson	.054	.008	.069	.011	.031	.009	.074	.011
Level 1: interaction	.543	.011	.843	.017	.557	.014	.774	.016
Log likelihood	13,858.799		16,347.152		9,246.038		15,945.579	

LP = learning problems, BP = behavioural problems.
+$p < .10$, * $p < .05$, ** $p < .01$.

students with behavioural problems or a combination of problems was higher, especially from Lesson 5 (Wave 2) onwards.

Discussion

In this study, need-supportive teaching was observed in teacher-student interactions with students with SEN and with typically developing students. We explored whether students with SEN were at risk in terms of need-supportive teaching, how these interactions

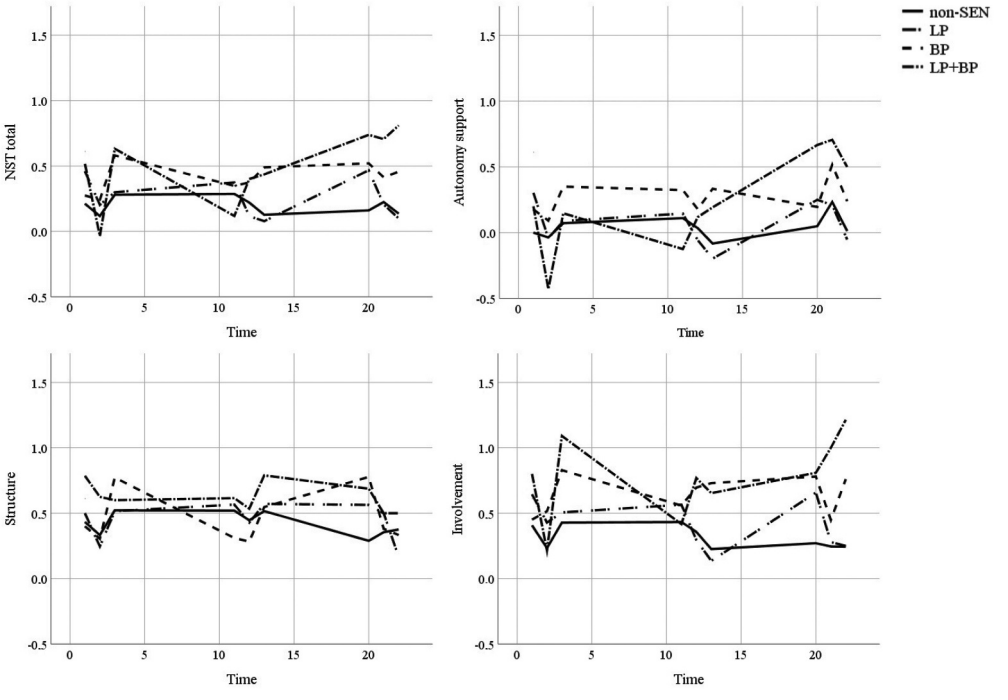

Figure 3. Need-supportive teaching over the school year for students with SEN and for typically developing students. LP = learning problems, BP = behavioural problems. Interactions were coded within a range from −3 to +3.

developed over the course of a school year, and whether any differences in these trends could be observed between students with SEN and typically developing students.

First, the teachers in our study interacted just as often with students with SEN as they did with typically developing students. This is an important finding, as teachers are often concerned that typically developing students do not receive enough attention in the classroom. This is because of the work pressure associated with the presence of students with SEN (Smeets, Ledoux, and Van Loon-Dikkers 2019).

Teachers provided the highest levels of structure, followed by involvement and autonomy support. There were no significant differences in the level of need-supportive teaching provided in interactions with students with learning problems and with typically developing students. Teachers did provide significantly higher levels of autonomy support and involvement to students with behavioural problems. They also provided significantly more structure and involvement in their interactions with students with both learning and behavioural problems. The results are not in line with those of previous studies, which report higher levels of controlling behaviour to students with SEN (Smeets, Ledoux, and Van Loon-Dikkers 2019; Grolnick and Ryan 1990; Rogers and Tannock 2018), and also higher levels of conflict in relationships with students with ADHD, ASD (Marjolein et al. 2020) and externalising problems (Roorda and Koomen 2021). It may be that the teachers in our sample are sensitive to behavioural problems and therefore provide higher levels of need support.

We found no clear linear trend in autonomy support and structure over the school year. This is in contrast to previous studies, which report neutral or declining trends in autonomy support (Stroet, Opdenakker, and Minnaert 2015; Bartholomew et al. 2018). As expected, the level of involvement provided by the teachers in our study decreased slightly over the school year (Stroet, Opdenakker, and Minnaert 2015; Opdenakker, Maulana, and den Brok 2012), although the coefficient was quite small. We did observe fluctuations between time points, indicating that the level of need support varied from lesson to lesson.

The linear trend of need-supportive teaching provided to students with SEN was largely comparable to that provided to typically developing students. We found a more positive linear trend of autonomy support only for students with a combination of learning and behavioural problems. It may be that teachers were initially hesitant to give autonomy to these students, but that they provided more autonomy support throughout the school year, as they saw that it was working. We found no declining trend in the level of structure provided in teacher-student interactions with students with SEN over the school year. This finding was unexpected, in light of the declines in the educational quality of teacher-student interactions that have been identified in previous research (Henderien, Jansen, and van Geert 2012). Although we did find a negative trend in the level of involvement towards the end of the school year, it was not stronger for students with behavioural problems. In contrast, Roorda and Koomen (2021) report that externalising behaviour and conflict negatively reinforce each other over time. In our study, however, we did not investigate externalising problems specifically, but in combination with internalising problems. It may also be that the teachers in our sample realised the importance of good teacher-student relationships and therefore exhibited higher levels of involvement towards these students, thus possibly preventing their interactions from ending up in a vicious cycle.

Patterns over time revealed somewhat more fluctuations between lessons in the level of need support provided to students with SEN, especially in terms of autonomy support and involvement. This was particularly the case for students with behavioural problems or with a combination of both learning and behavioural problems. Differences between interactions with these students and those with typically developing students appeared to increase at the end of the school year, with typically developing students receiving lower levels of need support.

Limitations

In the Netherlands, as in many countries, no nationwide criteria are used to identify which students need extra support. Instead, schools focus on what individual students need. It is therefore difficult to determine the number of students with SEN in a regular classroom (Inspectie van het Onderwijs 2020; Ledoux et al., 2020). Although the indications of teachers are often used to assess the special educational needs of students (e.g. Smeets, Ledoux, and Van Loon-Dikkers 2019), the teachers and schools participating in this research may have differed in their interpretations of the term 'students with SEN'.

Our results may also be subject to selection bias, as teachers who were willing to participate in the study may not have been representative of the population of teachers as a whole. Those who participated might have been more interested in the topic, such that they were more aware of students with SEN in their classrooms.

Future research

This study examines the need-supportive behaviours of teachers. Given the mutual influence that teachers and students have on each other's behaviour over time (e.g. Cents-Boonstra et al. 2020; Hyungshim et al. 2009), future studies should also address the behaviour and engagement of students. This would provide a more comprehensive understanding of how the special educational needs of students relate to patterns in teacher-student interactions. In addition, student's interpretation of the teaching behaviour might be included, as this may differ between individual students. For example, students with ADHD and ASD may be less affected by conflict or closeness in interaction with their teachers, due to specific characteristics of these disabilities (Marjolein et al. 2020).

In recent years, increasing attention has been directed towards need frustration, which might not be the same as the absence of need satisfaction (Vansteenkiste and Ryan 2013, Hyungshim et al., 2009), as need frustration 'involves an active threat of the psychological needs' (Vansteenkiste, Ryan, and Soenens 2020, 9). In our study, need-thwarting teaching behaviours were included in the scale as a bipolar measure ranging from −3 (need-thwarting) to + 3 (need-supporting). In future research, it would be interesting to include a separate measure of observed need-thwarting teaching behaviours, especially when also addressing adaptive and maladaptive student outcomes.

Practical implications

The teachers in our study interacted just as much with students with SEN as they did with typically developing students. This result may be reassuring to teachers and parents who are concerned that the inclusion of students with SEN in a regular classroom will come at the expense of the amount of attention paid to typically developing students. Moreover, the higher level of involvement that teachers demonstrated towards students with behavioural problems may have prevented their relationships with these students from ending up in a vicious cycle. This is an important outcome, as previous studies have indicated that positive teacher-student relationships are associated with lower levels of externalising behaviour in students with externalising problems (Bijstra, de Boer, and van der Hoeven 2020).

We observed fluctuations in the level of need-supportive teaching over time, and these fluctuations did seem to be more pronounced for students with SEN. Teachers should therefore be trained to be need-supportive throughout the entire school year. Interventions aimed at developing the skills necessary to need-supportive teaching have been found to be particularly effective (Aelterman et al. 2013).

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Declaration statement

The authors report there are no competing interests to declare.

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