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ORIGINAL ARTICLE

Inclusive education 2025: Global trends, local challenges and solutions

How do autistic students experience need-supportive teaching in mainstream secondary schools? A joint display analysis

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Abstract

The international shift towards inclusive education has increased the enrolment of autistic students in mainstream schools. While mainstream education provides autistic students with valuable opportunities for their (social) development, research consistently shows that these environments struggle to fully include autistic students and address their needs. Taking self-determination theory as a guiding framework for assessing students' basic psychological needs and how these are met by teachers, this study used a joint display analysis to combine different streams of data from secondary school autistic students ($N = 13$; 6 Dutch, 7 Mexican): (1) video observations of classroom interactions analysed using a coding scheme based on self-determination theory, (2) questionnaires about their perspectives on their lessons and interactions with teachers and (3) students' perspectives on these observations obtained through video-stimulated recall interviews. Using joint display analyses, we compared the data from these three sources at both the individual and group level to identify patterns of convergence (agreement), complementarity (expansion) and divergence (contradictions). In doing so, we present a fine-grained, multifaceted picture of the needs of autistic students in mainstream secondary schools and how these are met, incorporating the students' own interpretations into the analysis.

KEYWORDS
autism, joint display methods, mixed method analysis, self-determination theory, teacher–student relationship

Key points

- We used a joint display design to examine autistic students' experiences of need-supportive teaching through connecting (1) classroom observations of teachers' utterances, (2) student questionnaires with open- and closed-ended items and (3) video-stimulated recall (VSR) interviews.
- Classroom observations showed that explicit autonomy support was limited at the group level. However, at the individual level, students who received autonomy support reported positive experiences, noting that opportunities for choice enhanced task engagement and learning progress.
- Although structure is generally considered beneficial for autistic learners, our findings indicate it does not always meet their needs. Nearly a quarter of video-stimulated recall comments described less favourable experiences, including

increased nervousness or heightened self-criticism in response to the amount of structure provided by teachers.
- Students consistently valued teacher involvement, including fairness, approachability and engagement. Notably, perceived involvement was higher than observed, indicating that students may interpret non-verbal cues and broader teacher behaviours beyond what was captured in our classroom observations.

INTRODUCTION

Providing inclusive and equitable quality education has long been a priority for United Nations (UN) member states (UNESCO, 2016). While considerable progress has been made, achieving truly inclusive school environments that meet the needs of *all* learners remains a challenge (Haug, 2017). In fact, numerous barriers persist across countries, including enduring beliefs that some children are better served in segregated settings, negative attitudes towards disabilities and limited teacher preparedness to support diverse learners in mainstream classrooms (Ainscow, 2020, 2024; UNESCO, 2020). These challenges underscore the need for structural changes to effectively implement inclusive education systems, particularly for students requiring additional support (UNESCO, 1990, 1994).

The Netherlands and Mexico, as UN Member States, have demonstrated their commitment to inclusive education by endorsing international agreements such as the Salamanca Statement, the Convention on the Rights of Persons with Disabilities and the Incheon Declaration (CNDH, 2011; UNESCO, 2017). Both countries operate dual education systems, allowing students with special educational needs (SEN) to attend either mainstream or special schools. In the Netherlands, the Inclusive Education Act (Passend Onderwijs) promotes mainstream placement unless specialized settings are deemed more appropriate and equitable (UNESCO, 2017). Admission to special education requires an official eligibility declaration requested by the student's current school and based on expert evaluation of whether the student's specific needs require specialized teaching programmes and expertise that are difficult or impossible to meet in a mainstream environment (Rijksoverheid, n.d.). Similarly, Mexico's General Law for the Inclusion of Persons with Disabilities encourages mainstream enrollment, with special education reserved for cases where schools cannot adequately meet students' needs (CNDH, 2011). Special school services in Mexico are typically offered to students with disabilities who have two or more (official) diagnoses and to autistic students who require 'significant' curricular adjustments, generalized and permanent supports that regular schools cannot provide (Gobierno de México, 2022a). The Dutch education system is characterized by a high degree of school autonomy in curriculum and teaching strategies (OECD, 2016), while schools in Mexico have little autonomy and work with highly diverse classrooms (OECD, 2018).

Notably, both countries face persistent challenges in implementing inclusive practices. For instance, the latest State of Education report from the Netherlands indicates that although most teachers provide clear explanations, many struggle to adequately state lesson objectives and highlight the relevance of topics (Inspectorate of Education, 2023). Moreover, some Dutch educators also report challenges in adapting their instruction to meet students' needs, noting that some learners, such as autistic students, respond better when teaching is more structured and interaction is more clearly guided (van Doodewaard & Knoppers, 2024). In Mexico, although teachers generally report positive attitudes towards inclusive education (Francis et al., 2021; Lavin et al., 2022), concerns have also been raised about the inclusiveness of their teaching practices (Forlin et al., 2010). Specifically, teachers have expressed concerns about their ability to equitably allocate their time and attention between students with disabilities and their peers, fearing that inclusive practices might compromise the learning of one group in favour of the other (Forlin et al., 2010). While these findings indicate the broader challenges in implementing inclusive education, certain groups of students, including autistic learners, may experience unique barriers that are not yet well understood (Sasso, 2025). Consequently, there is a lack of research examining the experiences of autistic students in mainstream secondary schools in both countries, a gap that is particularly important to address in light of the global increase in autism prevalence (Zeidan et al., 2022) and the growing number of autistic learners enrolled in mainstream classrooms (Garrad et al., 2019; Ravet, 2018; Whitaker, 2007), but also given ongoing debates around diagnosis-led frameworks in education (Bodfield & Culshaw, 2023; Davies & Soni, 2025). Indeed, deficit-oriented approaches risk overlooking the potential of neuro-affirmative practices, which recognize and embrace the diverse learning needs of all students (Cook, 2024; Minnaert, 2024).

It is important to emphasize that, in line with the preferences expressed by the autistic community in recent studies (Bosman & Thijs, 2024; Smith et al., 2023; Taboas et al., 2023), including research with Dutch autistic youth (Buijsman et al., 2023), we use identity-first language (i.e. 'autistic students') throughout this paper.

Including autistic students in mainstream education

Autism spectrum disorder is understood as a neurodevelopmental condition in which people experience social and communication difficulties (American Psychiatric Association, 2022). Mainstream schooling can offer autistic learners valuable opportunities, including learning from peers' behaviours (Croydon et al., 2019), developing social skills and forming meaningful connections (Goodall & MacKenzie, 2019). Their inclusion also benefits classmates by fostering respect for (neuro)diversity and encouraging teachers to adapt practices that support all students (Simón et al., 2023). Naturally, each autistic learner brings a unique profile of strengths and challenges (Anderson et al., 2025). For instance, a study examining parental perceptions of autistic adolescents highlighted attributes such as strong analytical and logical skills and the capacity to thrive in structured, organized environments (Warren et al., 2021). Yet, systemic barriers within schools and classrooms continue to limit their inclusion (Goodall & MacKenzie, 2019; Whitaker, 2007). These barriers may include a lack of clear policies regarding the inclusion of autistic students (Senoo et al., 2024), insufficient support from school staff (Schneider et al., 2025) and limited time for professional development (Danker et al., 2019). Indeed, while teachers are expected to foster autistic-friendly learning environments, they are often required to do so without autism-specific training (Wittwer et al., 2024), which can be essential for reducing stigma and increasing knowledge about autism (Obeid et al., 2015). Notably, these systemic issues are likely to interact with other, person-specific barriers, such as varying levels of autism-related knowledge (Harrison et al., 2024), differences in teachers' self-efficacy when educating autistic students (Love et al., 2020) and limited opportunities for meaningful interactions with autistic adolescents that could help teachers to understand their needs (Able et al., 2015).

Another particularly complex barrier for including autistic students in mainstream educational settings concerns the social dimension (Baldwin & Costley, 2016; Bolourian et al., 2022). Communication and social interaction difficulties experienced by autistic people (American Psychiatric Association, 2022) are often regarded as the primary reason why teachers perceive their inclusion as 'challenging' (Soto-Chodiman et al., 2012; Stephenson et al., 2021). However, the success of autistic learners in school depends not only on their individual characteristics but also on how these characteristics interact with the broader contextual factors (O'Neil Woods & Estes, 2023).

In this regard, the teacher–student relationship is pivotal in supporting autistic learners (Losh et al., 2022). Indeed, teachers' words and actions can strongly influence not only autistic students' engagement (Jarman & Rayner, 2015), but also their overall feelings towards school and learning (Croydon et al., 2019; Goodall & MacKenzie, 2019). Unfortunately, there is substantial evidence that many teachers do not know how to adequately support autistic learners (Cassimos et al., 2015; Cridland et al., 2014; Van Der Steen et al., 2020). In fact, some teachers experience their relationships with autistic students as less close (Blacher et al., 2014; Feldman et al., 2019), distance themselves due to uncertainty about how to approach them (Ravet, 2018) or rely on trial-and-error approaches to discover 'what works best' (Devi & Ganguly, 2024). It is therefore no surprise that many autistic students in mainstream education struggle to navigate their school environment (Brede et al., 2017; MacLeod et al., 2014), which often fails to adequately recognize and respond to their needs (Baldwin & Costley, 2016; Brede et al., 2017). Recent research from the Netherlands and Mexico further emphasizes this point, showing that many of the most pressing needs of autistic students in secondary education are directly connected with the practices of their teachers (Esqueda Villegas et al., 2025a). For example, male autistic students expressed the need for clearer instructional guidance, as difficulties in task completion were often linked to unclear instructions (Esqueda Villegas et al., 2025a). Similarly, autistic females in the Netherlands highlighted the importance of clear and detailed guidance at the beginning of classroom activities to prevent negative emotions such as stress and panic (Esqueda Villegas et al., 2025b). Identifying 'effective ways to educate autistic children' (Pellicano et al., 2014, p. 765) and fulfilling their needs must therefore remain a key priority on the research agenda. With this need-supportive focus in mind, we propose the self-determination theory (SDT) as an appropriate framework for examining autistic students' classroom experiences in secondary education.

Studying the classroom experiences of autistic students through the lens of self-determination theory (SDT)

Applied to the educational context, SDT posits that all students have the need for autonomy, competence and relatedness (Ryan & Deci, 2000, 2018). When students experience autonomy, they have a sense of ownership over their actions (Ryan & Deci, 2018). For students to experience competence, they must be able to believe they can meet the requirements of a task, overcome challenges that arise from schoolwork and achieve a desired outcome (Niemiec & Ryan, 2009; Wang et al., 2019). A sense of relatedness is associated with feeling liked, appreciated and respected by others (Niemiec & Ryan, 2009). In classrooms, these three psychological needs can be satisfied when teachers provide autonomy support, structure and involvement

(Snikkers-Mommer et al., 2024). For instance, an autonomy-supportive teaching style can be observed when teachers encourage students to make their own decisions and value their contributions in classroom activities (Reeve & Jang, 2006; Ryan & Deci, 2018; Stroet et al., 2013). Structure can be fostered by clearly communicating expectations before a task, guiding students step-by-step and offering (constructive) feedback (Jang et al., 2010; Reeve & Jang, 2006; Skinner & Belmont, 1993; Stroet et al., 2013). Involvement is shown when teachers listen to students, validate their emotions, encourage them and dedicate time to answering their questions and addressing their concerns (Neufeld, 2025; Olivier et al., 2021; Ryan & Deci, 2018). Research has identified different configurations of teacher need-supportive practices (Hornstra et al., 2021; Olivier et al., 2021). For example, some teachers may provide high levels of two dimensions (i.e. structure and involvement) and low levels of the other (i.e. autonomy support) or adopt other combinations. Regardless of these different teacher profiles, it is generally recommended that teachers implement each of these need-supportive practices to some extent, as they offer unique benefits for students (Olivier et al., 2021).

It is important to note that not all teaching practices are need-supportive. In fact, some may even be need-thwarting. For instance, teachers may thwart students' autonomy by exerting control and demanding compliance without providing an explanation or rationale (Reeve, 2009). Failing to understand the students' needs and emotions can also be considered an expression of autonomy thwart (Reeve, 2016). Chaos refers to a learning environment characterized by unpredictability, lack of structure and unclear guidance on the steps needed to complete tasks (Stroet, 2014). In such cases, students' need for competence may be frustrated due to insufficient scaffolding or ambiguous expectations (Ryan & Deci, 2017). For many autistic students, chaotic environments can be especially overwhelming, as these students often benefit from step-by-step instructional support (Esqueda Villegas et al., 2025b). Moreover, when teachers' feedback is vague, it can create confusion rather than enhance learning (Howard et al., 2025). Disaffection is typically understood as a form of teachers' emotional disconnection from students, expressed through unfriendly behaviours such as criticism, sarcasm or ridicule (Olivier et al., 2021; Ryan & Deci, 2018; Stroet, 2014). Naturally, these actions may lead students to feel rejected or uncared for, thereby thwarting their need for relatedness (Ryan & Deci, 2017). This is particularly concerning for autistic students, who often experience social exclusion in school settings (Brede et al., 2017), and teachers' disaffection can reinforce negative feelings towards the classroom environment (Baldwin & Costley, 2016). Overall, these need-thwarting actions have the opposite effect of need-supportive teaching, often resulting in student disengagement (Howard et al., 2025) and procrastination (Opdenakker, 2021).

The needs for autonomy, competence and relatedness among autistic students have received only limited and often implicit attention in existing research. A notable exception is a Canadian study involving 31 semi-structured interviews with autistic youth aged 11–18; participants expressed a desire for greater autonomy by making decisions about issues that directly affect them (Tesfaye et al., 2023). Other studies suggest that to experience competence and succeed in the environment, many autistic people need structure, especially through clear explanations and guidelines provided by teachers (Saggers et al., 2011; Warren et al., 2021). Furthermore, autistic students emphasized the importance of feeling cared for and understood by teachers and peers (Esqueda Villegas et al., 2025a; Sproston et al., 2017), which can be conceptualized as relatedness. While these previous studies underscore the importance of autonomy, competence and relatedness for autistic people, these psychological needs have not been explicitly addressed in a single analysis. Moreover, knowledge of how teachers can fulfil these needs is lacking (Olivier et al., 2021), as no research has yet examined how autistic students perceive and evaluate need-supportive teaching (autonomy support, structure and involvement). Nevertheless, such information is valuable to identify teaching practices that resonate with autistic students and enable them to engage with their learning (Pellicano et al., 2014).

It is equally essential to pay close attention to the first-hand experiences of autistic people, as their voices have historically received less attention in research (den Houting & Pellicano, 2019; Goodall, 2018; Goodall & MacKenzie, 2019). Even though recent work has begun to explore autistic students' perspectives in secondary education (Hill, 2014; Josefsson & Taneja Johansson, 2024), such studies remain limited in number. Additionally, current autism research at this educational level has not yet examined these experiences through the lens of SDT. Therefore, the aim of this article is to understand how the different components of need-supportive teaching (autonomy support, structure and involvement) are experienced by autistic students in mainstream secondary education, considering both individual experiences and group-level patterns. As researchers have long advocated for a focus on factors that enhance the educational experiences of autistic learners (Pellicano et al., 2014), the main emphasis of this article is on need-supportive teaching rather than need-thwarting teaching. While understanding need-thwarting behaviours remains important due to variations in teaching profiles (Heinimäki et al., 2026), a stronger emphasis on need-supportive practices has greater potential to inform inclusive educational policy and teacher professional development.

METHOD

Participants

The student sample consisted of six participants from the Netherlands and seven from Mexico ($N = 13$), who took part in a larger research project focusing on teacher–student interactions (Esqueda Villegas et al., 2025c). All participants had a formal autism spectrum diagnosis provided by a healthcare professional, IQs within the average range, and were able to communicate verbally. The students were enrolled in mainstream secondary schools, where their classes in either Mathematics, English, mother language (i.e. Dutch), Physics or Social studies were video recorded. In the Netherlands, students typically enter secondary education around the age of 12 (Ministry of Education Culture and Science, 2007). The Dutch secondary education system is track-based and comprises three main pathways (Government of the Netherlands, 2025): pre-vocational secondary education (VMBO, 4 years), senior general secondary education (HAVO, 5 years) and pre-university education (VWO or Gymnasium, 6 years). On the other hand, Mexico's general secondary education system is divided into two levels: lower and upper secondary, each spanning 3 years (Gobierno de México, 2022b). The system includes both public and private schools, although the majority of students attend public institutions (García-Cedillo et al., 2015). Similar to the Netherlands, students in Mexico usually begin lower secondary education at the age of 12 and transition to upper secondary at age 15 (Gobierno de México, 2022b).

In this study, our Dutch sample included four students who identified as male and two who identified as female (mean age = 15 years). The Mexican sample consisted of six participants who identified as male and one as female (mean age = 16.5 years). Table 1 summarizes the characteristics of the participants.

Research design

We employed a joint display design to examine how autistic students experienced need-supportive teaching. According to Fetters (2020, p. 194), a joint display is 'a process' of analysis that enables connections between quantitative and qualitative constructs. The purpose of linking data is to identify areas of agreement, contradiction, expansion or complementation (Fetters, 2020; Fetters et al., 2013; Fetters & Guetterman, 2021; Haynes-Brown & Fetters, 2021). By doing this, researchers can create new insights and meta-inferences; that is, interpretations that go beyond the findings of each dataset on its own (Fetters & Guetterman, 2021; Fetters & Tajima, 2022; Haynes-Brown & Fetters, 2021).

Our positionality was grounded in a commitment to the principle that all students have the right to an equitable and inclusive education (OECD, 2023), with a particular focus on a group of learners (autistic students) who often encounter systemic barriers within educational systems (Fisher et al., 2025; Sasso, 2025). The research team included both Dutch and Mexican researchers with deep cultural and educational familiarity with their respective contexts. Additionally, some team members have autistic family members, which informed our understanding and inevitably shaped the interpretation of the findings. We approached the research reflexively, aiming to represent the experiences of these Dutch and Mexican autistic students as authentically and respectfully as possible.

In this article, quantitative and qualitative data on need-supportive teaching were drawn from three

TABLE 1 Sociodemographic information of Dutch and Mexican participants.

Student pseudonym	Gender	Age at the time of data collection	School pseudonym	School grade	Subject
David[a]	Male	15 years old	School 1	4th	Math
Alan[a]	Male	15 years old	School 1	4th	Math
Rachel[a]	Female	15 years old	School 2	3rd	English
Alex[a]	Male	13 years old	School 3	1st	Mother language
Sandra[a]	Female	16 years old	School 4	4th	Math
Simon[a]	Male	16 years old	School 5	4th	Math
Sebastian[b]	Male	17 years old	School 6	2nd	Physics
Cesar[b]	Male	17 years old	School 6	2nd	Physics
Adrian[b]	Male	16 years old	School 6	2nd	Math
Daniel[b]	Male	17 years old	School 6	2nd	Math
Alberto[b]	Male	Not disclosed	School 6	3rd	Social studies
Jesus[b]	Male	17 years old	School 6	3rd	Social studies
Sara[b]	Female	15 years old	School 6	1st	English

[a]Student is from the Netherlands.

[b]Student is from Mexico.

sources: (1) classroom observations focusing on teachers' utterances (Esqueda Villegas et al., 2025c), (2) student questionnaires including open- and closed-ended items and (3) video-stimulated recall (VSR) interviews with autistic students (Esqueda Villegas et al., 2025d). Notably, although 13 students participated in the classroom observations and VSR interviews, one student did not complete the questionnaire. Given that our joint display analysis required integrating all three data sources, this student was not included in the joint display analysis. However, the student's observational and interview data were fully analysed within the intra-method analyses.

Procedure

After ethical approval was granted by the Pedagogy and Educational Sciences Ethics Review Chamber at the University of Groningen, mainstream secondary schools in the Netherlands and Mexico were contacted and informed about the research project, which entailed classroom observations, an online student questionnaire and VSR interviews. Upon interest in participating, teachers, parents and autistic students received information sheets, as well as consent forms. To take part in the study, all parties (teachers, autistic students and their parents) had to provide their written informed consent. In Mexico, a consent form was also signed by the school principal.

Beyond these formal procedures, the study was guided by inclusive autism research principles (den Houting, 2021) and practices (Autism CRC, 2016) to ensure that ethical considerations were embedded in all phases of the research. During the design stage, we accounted for the diverse communication preferences among autistic people and developed visual aids to support comprehension and facilitate informed decision-making. The research team received prior training to ensure respectful and sensitive interactions with participants. During data collection, VSR interviews were conducted in calm, low-stimulation environments and participants were given the option to be accompanied, for instance, by a parent. Moreover, before each video recording and interview, the research project was verbally and visually re-explained, emphasizing both the voluntary nature of participation and the right to withdraw at any time without any negative consequences.

Once the written informed consent was granted, the scheduling of lesson recordings was coordinated with the school coordinator and teachers. For each student, two lessons were recorded using a dual-camera setup: one camera focused on the teacher and the other on the entire class. Teachers were asked to implement their lessons as they normally would. A few days after the classroom observations took place, autistic students were invited to complete an online questionnaire and participate in (one-on-one) VSR interviews.

The VSR interviews could take place in their preferred location (i.e. at school in a quiet, separate classroom or at home). If requested, a parent could also be present. For the interview, the researcher explained that selected lesson segments would be reviewed together (on the researcher's laptop) and that the student would be asked to share what they had been thinking at specific moments shown in the video. To ensure clarity, the procedure was visually summarized using four cards outlining the sequence: (1) watch lesson excerpts together, (2) pause the video, (3) answer one or more questions and (4) respond verbally, in writing or through drawing. When needed, prompts were adapted to support comprehension and follow-up questions were asked to elicit more detailed accounts. All interviews were audio-recorded with prior consent from the participants. A detailed description of the VSR interview procedure is available in Esqueda Villegas et al. (2025d). An overview of the data collection and the analytical strategies is presented in Figure 1.

Measurements

Classroom observations

Classroom observations provided data on teachers' verbal expressions (hereafter referred to as 'utterances'). The measurement instrument consisted of a coding scheme grounded in SDT classroom research (Loopers et al., 2024; Stroet, 2014; Stroet et al., 2013), which distinguishes between need-supportive utterances (autonomy support, structure, involvement) and need-thwarting utterances (autonomy thwarting, chaos, disaffection). This coding scheme was applied to utterances directed at the whole class, the autistic student or a group of students that included the autistic participant. Table 2 presents an abbreviated version of the coding scheme; the full, detailed version is available in Esqueda Villegas et al. (2025c).

Questionnaires

Students completed a questionnaire grounded in prior SDT research (Ryan & Deci, 2000, 2018). The instrument captured students' likes and dislikes during the videotaped lessons and collected their perceptions of need-supportive teaching. It consisted of two parts: eight open-ended questions (i.e. 'What did you like during these Math lessons?') and 34 closed-ended items rated on a five-point Likert scale (i.e. 'During Math classes, the teacher lets me choose what to do [autonomy support]', 1=never to 5=very often). This particular Likert scale was used to provide participants with a mid-point reflecting, for instance, moderate frequency, which was deemed appropriate given the nature of the items

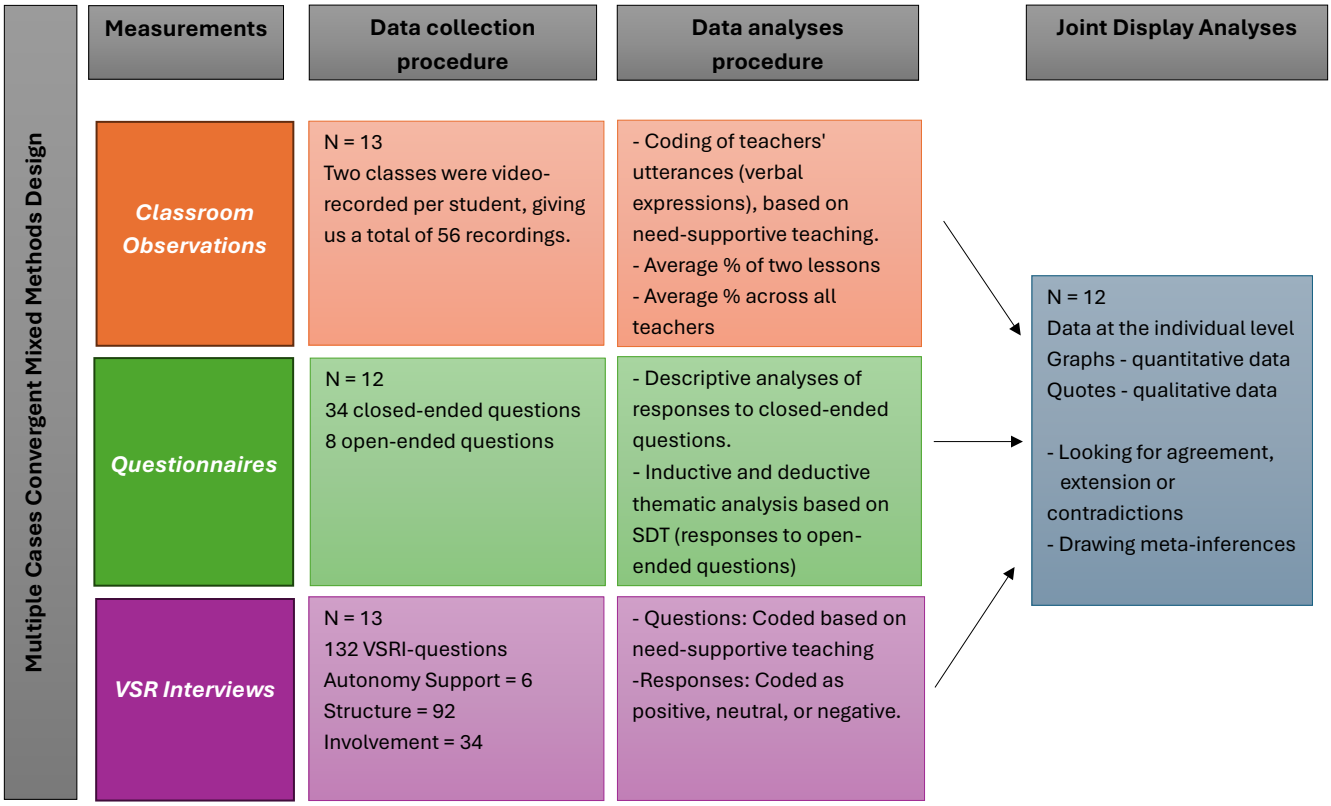


FIGURE 1 Overview of data collection procedure and analyses.

assessing need-supportive teaching perceptions. This allowed autistic students to indicate that an event occurred occasionally without being forced towards over- or underestimation.

VSR interviews

VSR interviews asked participants to reflect on their thoughts during two videotaped lessons, with selected video segments serving as cues to elicit detailed recollections (Gass & Mackey, 2017; Zhai et al., 2024). Prior to the VSR interviews, we purposefully selected video segments for each participant that represented key moments within the two videotaped lessons in terms of autonomy support, structure, involvement, drawing on our knowledge of the components of SDT (Ryan & Deci, 2017). The use of full lesson footage was avoided, as the average lesson duration was 43.3 min and requiring participants to view the entire recording risked inducing fatigue (Gass & Mackey, 2017; Nguyen & Tangen, 2017). Accordingly, segments that were not directly relevant to SDT components were excluded from the material used in the interviews. All segments were compiled into a single video and paired with a protocol containing general instructions of the VSR interview procedure and one or two guiding questions per segment. During the VSR interview, the questions were read aloud by the researcher to elicit the student's experiences at specific moments of the lesson. All interviews were audio-recorded. Table 3 provides examples of video segments and associated questions.

Intra-method data analysis

Before conducting the joint display mixed method analysis, rigorous intra-method analyses were carried out for each dataset, in line with its methodological tradition (Fetters, 2020; Fetters & Guetterman, 2021). Quantitative analyses were performed on classroom observation data, closed-ended questionnaire items and frequency counts from VSR interview comments. Qualitative analyses were applied to open-ended questionnaire responses and VSR interview transcripts. The following subsections provide details of the analytic strategies applied within each methodology.

Classroom observations

A total of 26 lessons from 13 participants were coded using the programme Mediacoder (Bos & Steenbeek, 2017). The analysis focused on the number of teacher utterances coded as need-supportive (autonomy support, structure, involvement) or need-thwarting (autonomy thwart, chaos, disaffection). For each teacher, the percentage of

TABLE 2 Coding scheme for need-supportive and need-thwarting teaching practices.

Codes	Description	Empirical examples
Autonomy support	The teacher allows the student to make decisions. The ideas and suggestions from the student are appreciated. The teacher lets the student(s) know the importance of the tasks they will perform.	*You can choose which paragraph you want to work on first* *It is online [the exam]. Try to do it tomorrow so that I can help you if there is a technical problem.*
Autonomy thwart	The teacher uses controlling language. The teacher sets strict rules or the pace in which students have to work. The teacher does not explain why a task is important or relevant and forces the student to do the activity.	*Alright, youngsters. I want to see you working. On your task. I don't want to see you slacking off.* *Okay, if you wrap it up, please. Three… two… one…*
Structure	The teacher is explicit with regard to what the students have to learn, what they have to do and how. The teacher provides step-by-step directions on what the student has to do during an ongoing activity. The teacher discusses what the students learned or did during the lesson and provides instructions for what follows next (such as homework).	*Today, we are going to start with Question 1 on page 6 and we are going to learn how to…* *Last class we were working with the properties of logarithms[…]. Don't forget to do the assignments and remember that the exam is tomorrow.*
Chaos	The instructions provided by the teacher are confusing and unclear. The teacher uses verbal behaviour to punish the student. The teacher provides negative or purely evaluative feedback when the student does not have the right answer.	*You can do part A or part B, maybe we get to the explanation of part C, but we have to see, maybe not.* *It's the one here; in the middle, okay? Okay, not exactly in the middle. More like over there.*
Involvement	The teacher addresses the students with a friendly tone and shows concern. The teacher is approachable and available for the students. The teacher is caring and supportive towards the student(s).	*Do not be worried about the exam. It will cover topics that we've already looked into.* *Does anyone have a question about the exam or previous classes?*
Disaffection	The teacher talks to the student in an unfriendly tone and treats him/her unfriendly. The teacher is not available when the student looks up for him/her.	*Continue reading. Keep reading. Keep reading* [in a pressuring tone]. *Finish reading it* [the task] *and then you'll find out* [the answer] *No. We do not have time for questions.*

Source: Adapted from Esqueda Villegas et al. (2025c).

TABLE 3 Empirical examples of video segments and questions used in the individualized protocols.

Construct	Description of segment	Example of question
Autonomy support	The teacher explains the homework and gives students the freedom to decide where to start first.	Q: I hear your teacher saying that your homework consists of two parts and that you can decide where you want to start. What did you think then?
Structure	The teacher is showing a video with an explanation of what an advertisement looks like.	Q: I see your teacher is showing you a video about what an advertisement looks like. What did you think of this?
Involvement	The teacher tells the group that they should try to access the online platform today. He says that if they have any problem or can't access it, they can send him an email.	Q: What did you think when your teacher said you can email him if you have trouble accessing the platform?

Source: Adapted from Esqueda Villegas et al. (2025d).

utterances in each category was calculated per lesson. Subsequently, the average across both observed lessons was calculated. To provide a group-level overview, descriptive statistics (means, standard deviations and minimum and maximum percentages) were computed for each construct. This approach enabled examination of both individual teacher profiles and overall patterns of need-supportive teaching.

Questionnaires

Closed-ended items were grouped by construct (4: autonomy support, 18: structure, 12: involvement) and analysed descriptively. Two items were reverse coded: 'During [subject] lessons, I have to do what the teacher says' (autonomy) and 'During [subject] lessons, my teacher uses unclear language' (structure). For these items, 'never'

was scored as 5 and 'very often' as 1. Analyses produced distributions of reported frequencies, indicating how often students perceived each dimension of need-supportive teaching.

Open-ended questions were first labelled as positive (i.e. 'What did you like during these Math lessons?') or negative (i.e. 'What didn't you like during these Math lessons?'). Subsequently, responses were analysed using a combined deductive-inductive approach informed by SDT constructs (Proudfoot, 2023).

Video-stimulated recall interviews

Audio recordings were transcribed verbatim by native speakers (Dutch/Spanish) and translated into English. To ensure translation accuracy, all transcripts were carefully cross-checked by bilingual researchers familiar with the cultural and linguistic nuances of the source languages. However, transcripts were not returned to participants for verification in order to avoid requiring additional time from them. Transcripts were analysed thematically in ATLAS.ti 24.0 using both deductive and inductive approaches (Braun & Clarke, 2022; Proudfoot, 2023). In the deductive phase, questions and responses were coded in relation to SDT constructs (autonomy support, structure, involvement). Inductive coding was then applied to identify subthemes within each construct (i.e. types of structure). Intercoder reliability, assessed via the percentage of agreement, was 85% in the initial coding and 92% in the detailed coding phases.

Recall comments were also categorized as positive, neutral or negative, and frequency counts were calculated. This provided both categorical distributions and thematic depth regarding how students evaluated need-supportive teaching practices.

Joint display analyses

For the 12 students with complete datasets (as one student did not complete the online questionnaire), individual joint displays were constructed through a four-stage process. First, quantitative results from classroom observations and closed-ended survey items were transformed from numerical values into graphical representations (Fetters & Guetterman, 2021). Second, illustrative quotations from open-ended survey responses and VSR interviews were selected to capture students' experiences of need-supportive teaching. Third, these sources were integrated within a data source table to form the joint display (Fetters, 2020). Finally, the displays were examined for agreement, contradiction, expansion or complementation between quantitative and qualitative findings, which were synthesized into meta-inferences (Fetters, 2020; Fetters et al., 2013; Fetters & Guetterman, 2021; Haynes-Brown & Fetters, 2021).

All joint displays were reviewed and iteratively refined to enhance clarity. To further strengthen connections across datasets, colour coding was applied consistently to graphs and corresponding text within the columns of our joint displays. Table 4 provides an overview of the joint display format used in this study. In the results section, we present three illustrative joint displays (representing different student cases), while the remaining displays are provided in the Supplementary Materials.

RESULTS

How are the different components of need-supportive teaching (autonomy support, structure and involvement) experienced by autistic participants at the group level?

Classroom observations

The means, standard deviations and the minimum and maximum percentages (at the group level) of teachers' utterances for each need-supportive and need-thwarting constructs are reported in Table 5. Coded data from classroom observations showed that, on average, 73% of utterances across the two recorded lessons could be linked to at least one of these constructs. More specifically, structure was most frequently observed, with an average of 62.5% of utterances, followed by involvement at 16.9%. Strikingly, teachers were more often autonomy thwarting (on average 10.4%) than autonomy supportive (5.2%). Finally, disaffection was present in an average of 8.6% of utterances.

Questionnaires: Closed-ended responses

Closed-ended items examined students' perceptions of autonomy support, structure and involvement (see Figure 2). Table 6 reports construct-level summaries, showing the mean score, standard deviation and observed range across all items and participants. Students reported the highest levels of perceived involvement ($M=4.17$, $SD=0.36$), followed by structure ($M=3.82$, $SD=0.37$), with autonomy support rated as the lowest experienced ($M=3.27$, $SD=0.87$).

To better understand these patterns, individual items were also examined. In terms of autonomy support, students perceived that teachers often explained the relevance of assignments or topics ($M=4.17$). At the same time, many experienced limited choices, indicating that they 'had' to do what the teacher said (reverse coded; $M=2.08$). Considering structure, students experienced teachers as specifying when to begin ($M=4.25$), explaining materials clearly ($M=4.25$) and providing feedback on what they did well ($M=4.25$). In contrast, they perceived less support in teachers dividing lessons into

TABLE 4 Explanation of the Joint Display format used.

Participant name		
Quantitative data	**Qualitative Data**	**Meta-inferences**
Closed-ended questions	Open-ended questions	Integrated interpretation of quantitative and qualitative findings, identifying agreement, contradiction, expansion or complementation. Each meta inference is color coded by construct (**autonomy support, structure, involvement**).
Distribution of responses to closed-ended items, indicating how frequently the student reported experiencing **autonomy support**, **structure** and **involvement**.	Students' responses to open-ended survey items, presented alongside the corresponding questions. Both are color coded by construct (**autonomy support**, **structure**, **involvement**).	
Classroom observations	VSR interview comments	
Average percentages of teachers' utterances coded as **autonomy support**/ thwart, **structure**/chaos and **involvement**/disaffection.	Students' VSR interview comments, shown with the corresponding interview questions. Questions are color coded by construct (**autonomy support, structure**, and/or **involvement**). Participant's responses are further coded as **positive, neutral** or **negative**.	
VSR interview codes:		
Frequency of **positive, neutral** or **negative** student responses to video segments illustrating teacher autonomy support, structure, and/or involvement.		

TABLE 5 Percentages of teachers' utterances related to need-supportive and need-thwarting constructs.

	Mean	SD	Min	Max
Autonomy support	5.2	3.4	0.0	9.9
Autonomy thwart	10.4	7.0	1.1	21.8
Structure	62.5	17.1	37.5	85.4
Chaos	3.5	3.2	1.4	12.2
Involvement	16.9	6.2	5.3	25.2
Disaffection	8.6	5.3	0.0	16.3
Not SDT-related	27	13.3	11	50.5

distinct parts (M = 3.08) and ensuring classmates stayed on task (M = 3.08). Finally, involvement was experienced as consistently high, with teachers described as friendly (M = 4.58), treating students equally (M = 4.58), being easy to get along with (M = 4.50) and engaging in pleasant conversations (M = 4.33).

Questionnaires: Open-ended responses

A total of 12 completed questionnaires yielded 96 responses, almost half of which could be associated with

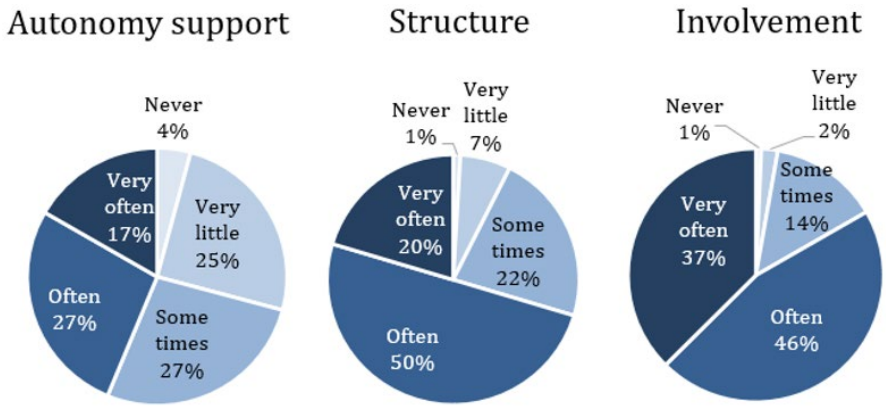


FIGURE 2 Student's perceived level of need support during the recorded lessons.

TABLE 6 Descriptive statistics for questionnaire constructs students experienced during the recorded lessons: autonomy support structure and involvement.

	Number of questions	Mean	SD	Min	Max
Autonomy	4	3.27	0.87	2.08	4.17
Structure	18	3.82	0.37	3.08	4.25
Involvement	12	4.17	0.36	3.58	4.58

Note: Items were rated on a five-point Likert scale: 1 = never to 5 = very often.

one of the SDT components. Among the responses to the positively labelled questions, the majority referred to need-supportive constructs, with 27 focusing on structure (i.e. 'I liked that he [the teacher] gave many examples'), 11 on involvement (i.e. 'I liked that the teacher stood upright with an open and friendly attitude') and two coded as autonomy support (i.e. 'It helped that the way the teacher approaches the subject is interesting'; see Figure 3). By contrast, most responses to the negatively labelled questions could not be linked to need-thwarting constructs (i.e. 'I did not like that it [the classroom] was very cold'), meaning that these negative responses generally reflected contextual or environmental factors rather than teacher autonomy thwart, chaos or disaffection.

Video-stimulated recall interviews

A total of 13 VSR interviews were conducted, comprising 181 questions. The distribution of questions across autonomy support, structure and involvement, as well as the number of responses coded as negative, neutral or positive, are presented in Table 7. Although autonomy support was addressed less frequently, it elicited both positive and negative comments. For two students, the possibility to make choices was experienced as empowering and convenient, whereas another student described it as creating uncertainty about what to do. With respect to structure, students emphasized the value of visual supports, guidance throughout the lesson and linking previous content to current tasks. At the same time, some reported that guidance within tasks fostered over-reliance on teachers, and feedback delivery was occasionally perceived as problematic. For involvement, participants described positive experiences when teachers shared personal stories, demonstrated understanding and offered encouragement. Negative responses in this domain were less often related to need-thwarting constructs but frequently reflected concerns about being ridiculed by peers when making mistakes (e.g. *'Many students also laugh when someone does that [make a mistake]. This makes it difficult to even raise that finger to answer…'*).

Experiences of need-supportive teaching at the individual level through joint display analysis

For almost all participants, the joint displays provided a nuanced understanding of their views regarding teachers' provision of autonomy support, structure and involvement. Across cases, both the video observations and the students' reports indicated minimal autonomy support. Overall, structure emerged as a valued component, particularly when offered through visual aids, examples and guidance; however, perceptions varied considerably, with some students describing it as helpful and others experiencing it negatively. These differences often appeared to be associated with students' internal states, such as feelings of embarrassment or nervousness. Involvement was also widely perceived by students, even though it was less evident in teachers' utterances coded during classroom observations. For several participants, involvement appeared to be a critical component of the teacher–student interaction. Importantly, for several participants, discrepancies were evident between the observed provision of need support and students' self-perceptions.

Tables 8–10 present individual-level joint displays for three students (Alan, Sandra and Sebastian), exemplifying different patterns of need-supportive teaching. Joint

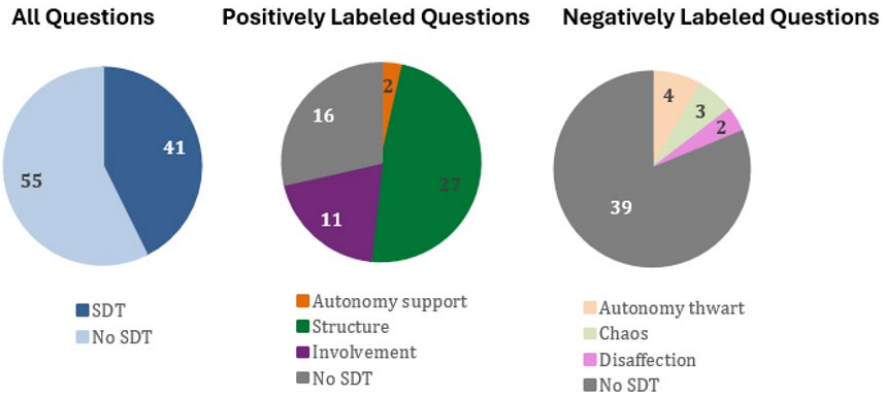


FIGURE 3 Open-ended questions related to need-supportive and need-thwarting constructs.

TABLE 7 Coded responses derived from video-stimulated recall interviews.

Need-supportive component	Total no of questions	Negative responses	Neutral responses	Positive responses	Not coded
Autonomy support	6	1 (16.7%)	0 (0%)	5 (83.3%)	0 (0%)
Structure	92	22 (23.9%)	19 (20.7%)	56 (60.9%)	1 (1.1%)
Involvement	34	3 (8.8%)	7 (20.6%)	25 (73.5%)	1 (2.9%)

displays for the remaining participants are available in the Supplementary Materials.

Alan is a student from the Netherlands, for whom two Math lessons were filmed. Table 8 shows his joint display.

Although Alan seemed to experience little autonomy support, the support he did perceive was experienced positively. In contrast, Sandra, also a student from the Netherlands filmed during two Math lessons, showed a different pattern. Her joint display is shown in Table 9.

Sebastian, a student from Mexico for whom two Physics lessons were filmed, perceived high levels of teacher involvement, even though this was not evident in classroom observations. Unlike Alan and Sandra, whose perceptions aligned with observed high involvement, Sebastian's experience diverged. Table 10 shows his joint display.

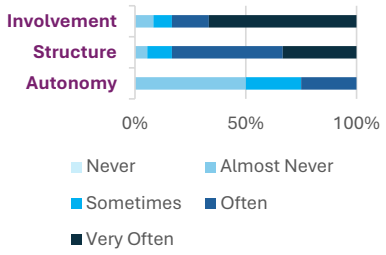
DISCUSSION

The purpose of this study was to examine how autistic students in mainstream secondary schools in the Netherlands and Mexico experienced the three components of need-supportive teaching: autonomy support, structure and involvement. In addition, we explored the extent of agreement, contradiction, expansion or complementation between observed teaching practices and students' self-reports using joint display analyses (Fetters, 2020; Fetters et al., 2013; Fetters & Guetterman, 2021; Haynes-Brown & Fetters, 2021). Below, we discuss our findings for each component in relation to the referred literature.

Autonomy support

At the group level, classroom observations revealed that (explicit) autonomy support occurred only to a limited extent. This finding was mirrored in questionnaire data, where students reported autonomy support less frequently than structure or involvement. The limited perception of autonomy support might explain why students rarely referred to this construct in open-ended questions or VSR interviews. Furthermore, this limited experienced presence may partly reflect teachers' reluctance to implement autonomy-supportive strategies, which sometimes are perceived as the opposite of providing structure (Vansteenkiste et al., 2012). Given that structure is often highly valued by autistic learners (Saggers et al., 2011), and that for students with SEN the needs for competence (which is mainly supported by teachers' structure) and relatedness (mainly supported by involvement) may be perceived as more pressing than autonomy (Loopers et al., 2023), teachers may prioritize providing clarity and predictability over autonomy-supportive practices. However, autonomy support should not be viewed as incompatible with structure. On the contrary, empirical research suggests these dimensions are positively correlated and can both be implemented to foster engagement (Jang et al., 2010). Furthermore, structured autonomy support proved to be the most engaging in students with deafblindness, who are primarily dependent on one-on-one interactions between teacher and student (Minnaert et al., 2025). Our findings thus highlight the importance of integrating both components to create supportive and responsive learning environments for autistic students.

TABLE 8 Joint display of student Alan.

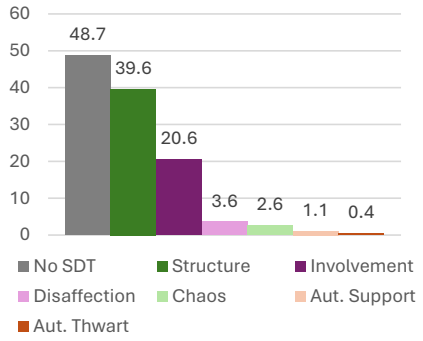
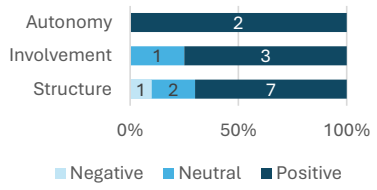
<table>
<tr><th colspan="3">Participant Alan</th></tr>
<tr><th>Quantitative Data</th><th>Qualitative Data</th><th>Meta-inferences</th></tr>
<tr><td><u>Closed-ended questions</u>
 
</td><td><u>Open-ended questions</u>
During these lessons, I liked that… he [the teacher] gave many examples.
I liked this because… I could stay on track during the assignments.

<u>VSR interview comments</u>
I: I hear your teacher discuss your test and explain the planning for the next three weeks. What were you thinking at that moment?
A: I thought it was nice that he provided some overview and that we are also a bit more certain about the material of the test week, because I hope we would not get several paragraphs of test material without explanation. So, I liked it. (Coded: Positive)

I: I see your teacher explaining that you can change the order of the multiplication in the formula.
A: I thought it would be useful to know (…). I liked that he already gave an example, so that we could not go wrong there. (Coded: Positive)
I: I see that your teacher is answering your question. What were you thinking at that moment?
A: I liked that he answered my question quickly and clearly, so that I could continue with the assignment. I liked that. (Coded: Positive)</td><td>Questionnaire data suggests that Alan experiences considerable structure, even though classroom observations indicate that this was reflected in only 39.6% of his teacher's utterances (contradiction). Qualitative data adds that Alan values the structure he is provided with, as it allows him to make progress with assignments (expansion).

Classroom observations indicate that the teacher offers little autonomy support (1.1%), which is in line with Alan's own reports of limited autonomy (agreement). Qualitative data reveals that he perceives autonomy support positively, as the choices offered supported his progress (expansion).

Alan perceives the teacher as highly involved, which is in line with the observed involvement (20,6%) (agreement). Qualitative data further shows that he experiences this involvement as helpful for staying engaged with the assignment (expansion).

Overall, the joint display suggests that Alan values working in a structured environment, with both the autonomy support he reported and teacher involvement, contributing to his ability to continue with tasks.</td></tr>
<tr><td><u>Classroom observations</u>
 
</td><td></td><td></td></tr>
<tr><td><u>VSR interview codes:</u>
 
</td><td></td><td></td></tr>
</table>

Notably, our findings at the individual-level highlighted that when autonomy support was provided, most students experienced it positively, describing how opportunities for choice supported their task engagement and progress (Esqueda Villegas et al., 2025d). This aligns with previous work on the cognitive, emotional

TABLE 9 Joint display of student Sandra.

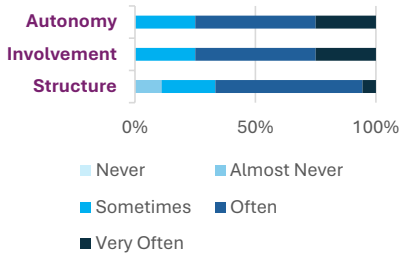
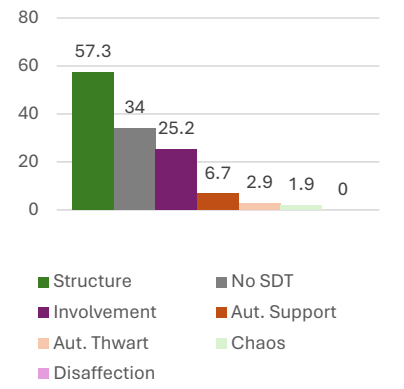
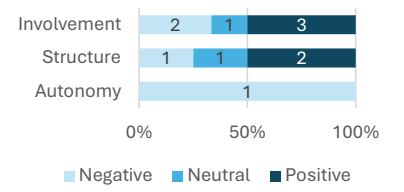
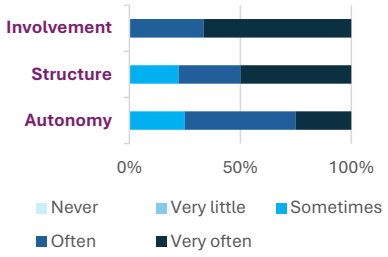
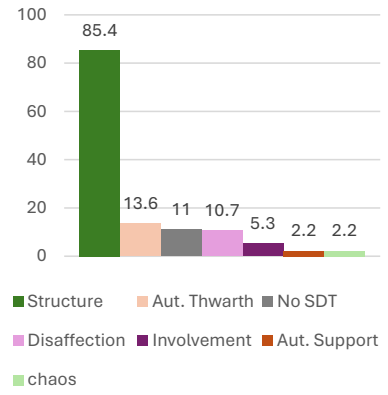
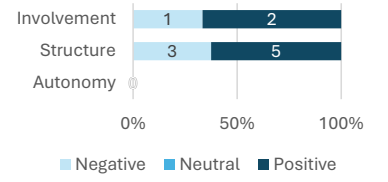
Participant Sandra		
Quantitative Data	**Qualitative Data**	**Meta-inferences**
Closed-ended questions 	Open-ended questions During these lessons, I liked that… the teacher is calm and explains clearly. I liked this because… The explanation was clear, with some example assignments to compare it to, and the teacher also motivates you to get started.	Classroom observations indicate that Sandra's teacher showed the highest level of involvement (25,2%), which is in line with Sandra's own reports of her teacher being highly involved (agreement). Qualitative data expands on this by showing that she valued this involvement, although at times the attention she received also made her feel nervous (expansion). Regarding autonomy support, both observations (6,7%) and Sandra's reports indicate relatively high levels (agreement). However, she does not always experience this support as helpful, as she prefers a clear assignment instead (contradiction). In terms of structure, Sandra's responses to the video segments were mixed, including positive, neutral, and negative evaluations. Qualitative data shows that her positive evaluations often occurred when the teacher combined structure with personal involvement (expansion).
Classroom observations 	VSR interview comments I: I see your teacher comes by and looks at your paper. What did you think then? S: I always get nervous. That feeling, oh, am I doing it right? (…) But it's helpful in itself because it makes me work on it. (Coded: **Positive** and Negative) I: Okay I hear your teacher say that the homework is in two parts and that you can choose where to start. What did you think then? S: I found that a bit… confusing, because I prefer a clear assignment (..) and not free choice to determine that for yourself. (Coded: Negative) I: I see that the teacher comes to you and that you talk about the test for a while, what did you think then? S: That I had to schedule the test soon and make up. (…) But I do like the way he brings it and that he reminds me a little bit, about the test (…) he does that nicely and calmly and not really in a way of: "You still have to catch up on this". (Coded: **Positive**) S: I think Mr. J.'s math classes are actually the best of all the classes I've had (…) [because] he usually manages the class well (…) I like that he is not judgmental about questions to him. He just wants to explain it until you get it yourself (…) And his classes are just very calm and he, when you tell a story he really listens to understand you instead of reacting.	
VSR interview codes: 		

TABLE 10 Joint display of student Sebastian.

Participant Sebastian		
Quantitative Data	**Qualitative Data**	**Meta-inferences**
Closed-ended questions 	Open-ended questions During these lessons, I liked… the explanation with drawings and gestures by the teacher. I liked this because… they help me imagine the situation and how to apply the solution. [it helped me to] ask for explanations, [because] I usually follow instructions and like to understand the "why" behind things.	Classroom observations indicate that Sebastian's teacher provides relatively little involvement (5,3%), whereas Sebastian himself reports experiencing a high level of involvement (contradiction). Qualitative data expands on this by showing that he values the offered involvement because it reduces his nervousness, although he also continues to experience feelings of discomfort (expansion).
Classroom observations 	VSR interview comments I: I heard your teacher say [to you] that the second operation was wrong. What did you think then? S: I wanted to see what had failed me because when I don't understand things I like to ask but I also like to reason to see what failed me (…) to see what the right process was or why it was the right process. (Coded: **Positive**)	With respect to structure, Sebastian's teacher showed the highest observed level of structure (85,4%), yet Sebastian did not report experiencing it to the same extent (contradiction). Qualitative data expands on this by indicating that he appreciated structure, particularly when provided through visual aids and feedback. His negative reactions to video segments illustrating structure were primarily related to internal feelings such as shame and nervousness, rather than to the teacher's behavior itself (expansion).
VSR interview codes: 	I: Here I see that your teacher gave you his calculator. What did you think? S: (…) And that's why I was also a little bit nervous because I didn't have a calculator and I was worried about not being able to answer the questions but there he lends it to me and explained [the exercise] to me again as well. (Coded: **Positive** and Negative) I: And did you feel less… nervous when the teacher gave you the calculator? S: Yes, but I always feel uncomfortable when they lend me something because (...) the things are not mine (…). (Coded: **Positive** and Negative) I: And do you prefer when you ask questions, with the whole class or in private? S: In private. In public I feel embarrassed. (…) Because I feel like these are silly questions. (Coded: Negative)	

and behavioural benefits of autonomy support (Hospel & Galand, 2016; Reeve, 2016), including emerging evidence of its importance for autistic students (Heyworth et al., 2021; Kiblen et al., 2024; Shogren & Raley, 2022).

Structure

Structure emerged as the most prominent need-supportive teaching style in classroom observations, a

positive finding given its established association with student behavioural engagement and use of self-regulation strategies (Hospel & Galand, 2016). Questionnaire data further indicated that students generally perceived structure positively, echoing international research (Saggers et al., 2011; Warren et al., 2021). To be more specific, visual aids, clear expectations, teachers' pointing out where to begin, and feedback were indispensable to engage with tasks.

Although structure is typically perceived positively (Hospel & Galand, 2016), our data also suggests that it was not always aligned with the type of support autistic students needed. Therefore, our findings challenge the notion that *all* autistic people benefit from structured approaches in the classroom. In fact, nearly a quarter of VSR interview comments about structure (23.9%) referred to less favourable experiences. For example, some students reported that teachers' monitoring increased their nervousness, while others described becoming overly self-critical when receiving feedback on mistakes. These findings highlight that while structure can be pivotal, its enactment matters greatly. Notably, two areas for improvement concern dividing lessons into distinct parts and ensuring that peers remain on task. Both are essential for supporting autistic students' competence, particularly since non-autistic peer behaviour can hinder their participation (Settanni et al., 2024) and goal-achievement (Minnaert, 2013).

Involvement

Our results underscore the value of teacher involvement in fulfilling autistic students' need for relatedness (Anderson et al., 2025; Heyworth et al., 2021). Although involvement was not the most frequently observed construct of need-supportive teaching (during the two videotaped lessons), students nevertheless reported experiencing it to a greater extent in the questionnaires. This discrepancy between observed and perceived involvement suggests that teacher behaviours may be interpreted in ways that extend beyond what is explicitly coded in classroom discourse. In this sense, a plausible explanation is that students' perceptions of involvement are not limited to verbal expressions, such as praise or encouragement, but also include non-verbal cues like body language, facial expressions and teachers' tone of voice (Zheng, 2022). These more subtle manifestations of warmth and care may be particularly salient for autistic students, especially for those who are concerned about how peers react to teachers' recognition of their achievements (Esqueda Villegas et al., 2025d). Importantly, the consistent emphasis students placed on involvement across methods indicates that they value teachers who demonstrate fairness and approachability (Saggers et al., 2011). Indeed, previous research has shown that teachers who adopt a warm and friendly stance can foster positive affective experiences at school and contribute to a more inclusive classroom environment (Anderson et al., 2025; Baldwin & Costley, 2016; Lebenhagen, 2024; Sproston et al., 2017).

Joint display analyses

The integration of classroom observations, questionnaires and VSR interviews revealed agreements, contradictions and expansions across datasets. This illustrates the value of joint display analysis in mixed methods research, as these findings would have been overlooked if analysed separately (Fetters & Guetterman, 2021).

At the group level, all intra-methods results pointed to limited autonomy support, with students also perceiving it the least. For structure, however, a discrepancy emerged: while observations indicated that teachers frequently provided structure, nearly one-third of students reported experiencing it only sometimes, rarely or never. This suggests that the *type* of structure provided may not align with the *type* of structure preferred. For instance, some students valued visual supports but perceived less benefit from reviewing previous lessons or receiving excessive guidance, which they felt fostered dependence. Involvement presented another notable contradiction. Although it was less frequently observed in classroom data, all students reported experiencing it most strongly.

It is important to emphasize that the need-supportive teaching strategies employed in teacher–student interactions can be shaped by the subject matter (Maulana et al., 2012). For instance, lessons such as Math, which focus on problem-solving, tend to require high levels of structure. In contrast, discussion-based subjects like Social Studies typically rely more heavily on oral instructions, which can present additional challenges for autistic students who struggle to process large amounts of verbal information (Carrington et al., 2003). Although our analysis did not consider findings by subject, future research could explore how subject-specific characteristics influence students' experiences of need-supportive teaching. Beyond the influence of subject matter, broader systemic and cultural factors may have influenced these experiences at both individual and group levels. For example, educational policies in the Netherlands are in themselves supportive of teacher autonomy (OECD, 2016), which may encourage teachers to tailor lessons accordingly to students' needs, thereby fostering a more need-supportive teaching style (Heinimäki et al., 2026). On the other hand, teachers in Mexico often serve highly diverse classrooms with a high number of students (OECD, 2018), which, combined with limited resources and time constraints, can hinder their ability to meet individual students' needs effectively (Gibbs, 2023). Teacher education and professional development likely also influence classroom dynamics. Although teacher training programmes in both countries emphasize

inclusive education (CNDH, 2015; UNESCO, 2017), Mexico has enacted a federal law specifically addressing the educational rights of autistic students (Diario Oficial de la Federación, 2015). This legislation mandates tailored education based on individual capabilities, and while it lacks specific pedagogical guidelines, its existence may contribute to the implementation of inclusive practices (Ainscow, 2020). In the case of (Mexican) autistic students, such practices might include the use of highly structured lessons, which are known to support their learning (Esqueda Villegas et al., 2025a).

Implications for practice

The results of this study point to several important implications for mainstream secondary school teachers working with autistic students. In terms of teacher education and professional development, previous research has shown that many novice teachers in Mexico express concerns about implementing pedagogical practices that adequately respond to the diverse needs of their students (Forlin et al., 2010), while preservice teachers in the Netherlands reported similar challenges (van Doodewaard & Knoppers, 2024). Therefore, it is essential to incorporate findings such as those derived from this study into both teacher training and in-service development programmes. Evidence-based inclusive teaching practices offer the potential to create successful classroom experiences that benefit both teachers and students (Crispel & Kasperski, 2021; Van Mieghem et al., 2020).

In terms of practice, our findings suggest that autistic students may place differing value on the needs for autonomy, competence and relatedness. Thus, this highlights the importance of a balanced approach to need-supportive education that incorporates autonomy support, structure and involvement (Hospel & Galand, 2016). In practice, teachers can foster autonomy by acknowledging students' perspectives and incorporating their interests into classroom activities (Patzak & Zhang, 2025), a strategy shown to strengthen teacher–student relationships for autistic learners (Bolourian et al., 2022). Importantly, autonomy support does not require a reduction in structure (Vansteenkiste et al., 2012). On the contrary, combining structured and autonomy-supportive practices has been associated with more positive emotional outcomes for students (Hospel & Galand, 2016; Jang et al., 2010; Minnaert et al., 2025). Thus, we encourage teachers to create opportunities for students to take initiative, while simultaneously ensuring clarity and guidance (Minnaert et al., 2025). In addition, our findings underscore the relevance of teacher involvement. This does not solely rely on explicit verbal communication, but can also be conveyed through non-verbal behaviours, such as tone of voice or facial expressions (Zheng, 2022). The fact that autistic students perceived their teachers as highly involved, even when this was less evident in observational data, suggests that more subtle forms of caring are noticed and valued.

Limitations

Our study should be interpreted in the light of several limitations. Although the small sample size enabled an in-depth exploration of these multiple cases, we cannot rule out that additional individual perspectives might have provided a fuller understanding of the needs of autistic learners. With regard to classroom observations, we focused on coding teachers' utterances of autonomy support, structure and involvement (Esqueda Villegas et al., 2025c). As a result, non-verbal behaviours that may have communicated need-supportive practices were not systematically captured (Zheng, 2022), which could mean that differences between constructs might be less pronounced than they appear in our data.

Second, the questionnaire data have some limitations. The unequal number of items across constructs (18 for structure, 12 for involvement and 4 for autonomy support) may have affected how participants responded to the open-ended questions. Moreover, as with any self-report measure, responses are susceptible to social desirability and to potential misinterpretation of item wording.

Third, a limitation of the VSR interviews is that students could not select personally meaningful moments, as the video segments were a priori chosen by the researchers. However, the structured format was deliberately chosen because it was considered suitable for this target group and effectively captured a broad range of SDT-related constructs. Additionally, interviews could not always be scheduled immediately after lessons, increasing the possibility of recall bias or responses shaped by perceived researcher expectations (Gass & Mackey, 2017). While this study foregrounded autistic students' perspectives, they were not involved in the study design. Given the promise of VSR for engaging autistic learners, future research should adopt participatory approaches that involve autistic people at all stages of the research process.

It is important to note that the present analysis primarily foregrounds need-supportive teaching behaviours, with less analytical attention given to need-thwarting interactions (control, chaos or disaffection). This emphasis was partly shaped by the nature of the data, which yielded richer insights into supportive classroom interactions, but also by the study's objective to inform inclusive practices for autistic students (Pellicano et al., 2014). However, teacher–student interactions are dynamic and shift from moment to moment (Kupers et al., 2017), and the distinction between support and thwarting behaviours is not always clear-cut. For instance, what may be experienced as 'structure' by one autistic student might feel overly controlling to another,

and a need-supportive behaviour can be followed immediately by a need-thwarting one (Kingma et al., 2024). Therefore, future research would benefit from a more integrated analytical approach that examines how supportive and thwarting dimensions may coexist or overlap within the same interactions (Kingma et al., 2024; Opdenakker, 2021).

In addition to these methodological considerations, the characteristics of our sample also warrant attention. Most participants in this study identified as male ($n=10$), with only a minority identifying as girls ($n=3$). This male-to-female ratio aligns with previous research on gender distribution in autism, which reports ratios ranging from 4.25:1 (McQuaid et al., 2024) to 3:1 (Loomes et al., 2017). Moreover, as girls are often more prone to receiving a diagnosis later in life than boys (McQuaid et al., 2024; Minutoli et al., 2026; Posserud et al., 2021), they may be under-represented in younger samples of participants such as ours, which focused on students in secondary education. As a result, our findings might be more representative of the experiences of autistic boys in relation to need-supportive teaching.

CONCLUSION

This study provides new insights into how autistic adolescents experience need-supportive education. By integrating classroom observations, questionnaires and VSR interviews in joint display analyses, we found that students particularly valued teachers' structure and involvement, both of which contributed positively to their classroom experiences. In contrast, autonomy support was minimally observed in teachers' utterances and was rarely mentioned by participants, suggesting that this dimension was less prominent in their educational experiences (Loopers et al., 2023). This highlights the need for further investigation into when and how teachers implement autonomy-supportive strategies, as these may also be enacted prior to the lesson, for example, when teachers incorporate students' interests and needs into lesson planning (Reeve, 2016) and therefore cannot always be captured through classroom observations. Moreover, future research should examine how autonomy support can be meaningfully combined with structure and involvement in Dutch and Mexican (mainstream) secondary schools. Since all three dimensions of need-supportive teaching play a role in fostering student engagement, teachers should be encouraged to incorporate each to some extent, thereby ensuring a more balanced and inclusive approach to supporting autistic learners in an equitable way (Olivier et al., 2021).

AUTHOR CONTRIBUTIONS

Fernanda Esqueda Villegas: Conceptualization; data curation; formal analysis; investigation; methodology; writing – original draft preparation. **Esmee Berlang:** Conceptualization; formal analysis; methodology; visualization; writing – original draft preparation. **Steffie van der Steen:** Writing – review and editing; supervision; conceptualization; project administration. **Alexander Minnaert:** Writing – review and editing; supervision; conceptualization; project administration.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to report.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

ETHICS STATEMENT

Approval was obtained from the ethics committee of the University of Groningen.

CONSENT

Written informed consent was obtained from teachers, parents and autistic students in both countries. An additional written informed consent was obtained from the school principal in Mexico, as recommended by the Ethical Committee of the University of Groningen.

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