THESIS AIM
The primary purpose of the present study is to contribute to the body of knowledge concerning motivation in students with deafblindness. The two central questions of this thesis are as follows: “To what extent do teachers support the basic psychological needs of students with deafblindness?” and “To what extent does need-supportive teacher behavior influence the motivation and engagement of students with deafblindness?” We investigated these questions by exploring the following themes: 1) the basic psychological needs of students with sensory impairments; 2) the influence of the teacher on motivation, engagement, and learning outcomes of students with sensory impairments; 3) the extent to which an intervention enhances the need-supportive behavior of teachers and the extent to which it also enhances motivation and engagement in students; and 4) the manner in which the need-supportive behaviors of teachers affect motivation and engagement of students with congenital deafblindness and acquired deafblindness. In this final chapter, we discuss the main findings according to the themes that have been mentioned. This discussion is followed by a critical reflection on the study, describing its strengths and limitations. It concludes with recommendations for future research and implications for practice.

THE PSYCHOLOGICAL NEEDS OF STUDENTS WITH SENSORY IMPAIRMENTS
We conducted an extensive overview of recent literature to describe the psychological needs of students with sensory impairments. This literature review provides an overview of published studies concerning the extent to which students with hearing impairments, visual impairments, or deafblindness feel competent, autonomous, and related in the classroom.

A few studies suggest that students feel more competent and related in special educational settings than they do in mainstream settings. Studies have revealed that contact with peers who have similar impairments is easier than is contact with peers without impairments (Angelides & Aravi, 2006; Israelite, Ower, & Goldstein, 2002).

THE INFLUENCE OF TEACHER BEHAVIOR ON STUDENT MOTIVATION
In addition to the first review study focusing on the student perspective, we conducted a second literature study on teacher behavior. The results indicate that, all studies on the provision of structure by teachers contain examples of need-supportive teaching. Teachers
provide structure through the use of prompting, modeling, scaffolding, or providing feedback. Moreover, they adjust their teaching strategies to the level of the students.

In contrast to the overwhelmingly positive findings concerning the provision of structure by teachers, results concerning teachers’ autonomy support and involvement are inconsistent as both negative and positive results were found. Examples of teaching strategies that support autonomy included supporting self-advocacy among students, as well as teaching students skills for coping and functioning independently. Examples of practices that suppress autonomy include offering too much support and relying on rewards and punishments to motivate students, rather than ensuring that the actual learning task is interesting. Examples of teacher involvement include expressing affection, conveying care, being attuned to the student, and being responsive. Examples of need-suppressive behavior include not being responsive to students and a lack of positive affect.

The few studies on the influence of need support on student engagement and outcomes associate the provision of structure with positive engagement scores and educational outcomes for sign language, reading, mathematics, and social skills. Few studies assess the causality of this relationship. Furthermore, involvement seems to be related to positive outcomes (e.g., reduction in problem behaviors and emotional distress in DHH students). None of the studies identified in the literature review addresses the effect of autonomy support on student engagement or outcomes.

If we consider the findings of both literature reviews, we can conclude that prior research was not framed within SDT. This finding suggests a need for SDT-based research on the education of students with sensory loss. Moreover, in both reviews, the studies are unevenly distributed across the three groups of students, with most of the available literature focusing on students who are deaf or hard of hearing. This finding stresses the urgent need for more research on students with visual impairments or deafblindness. One difference between the two reviews is that most of the studies included in the review from the student perspective focus on the need for relatedness, while most of those in the review on teacher behaviors focus on the provision of structure. Taken together, the findings of the first literature review indicate that students differed in the extent to which they felt competent, autonomous and related in the classroom. The second review also reveals variation in the extent to which teachers are involved and in the extent to which they support autonomy. The studies indicate that teachers generally do provide structure.

The results of the two literature reviews provide substantial evidence that the SDT is applicable and useful within this educational context. Finally, both reviews provide concrete points of departure for future research and practice.

**THE EFFECT OF AN INTERVENTION**

We conducted a study to design and evaluate a teacher-focused intervention aimed at fostering student motivation. Using a multiple-case study design with pre-test, post-test, and follow-up measurements, the study was aimed at evaluating a newly developed intervention. After conducting four pilot studies in which an intervention, questionnaire, and coding form were developed and evaluated, the intervention was tested in seven teacher-student pairs. As part of the training, teachers received information on SDT and video fragments of the teacher’s own teaching were discussed, in order to identify strengths and possibilities for improvement in the teacher’s behavior.

A positive finding was that all teachers were open to the intervention. They were positive about the theoretical framework and willing to consider opportunities for engaging in behavior that is more supportive of needs. These attitudes were also evident in the often creative strategies that teachers used in order to enhance their own need-supportive teaching.

Findings from the video analyses also indicate that, in general, teachers were most likely to demonstrate involvement, followed by structure and autonomy support. The greatest improvements after the intervention were observed in the teachers’ provision of structure and autonomy. The video analysis and the results from the teacher questionnaire indicate that, in general, the intervention seems to have greater effects on teachers of students with congenital deafblindness with regard to supporting all three needs than it did on teachers of students with acquired deafblindness. This finding can be explained by the smaller class sizes for students with congenital deafblindness. In mainstream settings, more students are present in the classroom, such that more interactions take place, thus increasing the complexity of the classroom situation, with teachers having to divide their attention among more students.

With regard to student engagement, the results indicate that the engagement levels of all students improved at some point during the post-test and/or follow-up periods, with the exception of two students who had already achieved maximum engagement levels during the pre-test phase.

Taken together, the most important contribution of this study is the finding that a brief teacher-focused intervention has the potential to result in positive changes in both
teacher and student behavior.

STUDYING TEACHER-STUDENT INTERACTIONS OF STUDENTS WITH CONGENITAL AND ACQUIRED DEAFBLINDNESS

Chapter 5 presents an in-depth analysis of teacher-student interactions in students with congenital deafblindness, based on a multiple-case study design. Both quantitative and qualitative analyses of videos of teacher-student interactions were conducted from the perspective of SDT. The same design was used to study students with acquired deafblindness (Chapter 6). The results of both studies indicate that the provision of structure, autonomy support, and teacher involvement are often accompanied by positive levels of student engagement. Overall, teachers provided more structure and involvement than autonomy support. The literature study on need-supportive teaching (chapter 3) also found most positive results with regard to teachers’ provision of structure. In addition, the intervention study (chapter 4) indicated most positive results with regard to teachers’ provision of involvement. Moreover, in line with the findings of chapter 4, the results of chapter 5 and 6 showed that teachers least supported students’ need for autonomy.

Furthermore, in both studies we found evidence that need-supportive teacher behaviors seem to have both immediate and delayed effects on student engagement. With regard to the effect of a lack of need support on student engagement, a lack of need support is often accompanied by declining engagement levels. Nevertheless, a temporary lack of need support might not result in a decline in student engagement if the teacher usually does provide need support. Moreover, many fluctuations in need support appeared to lead to many fluctuations in the levels of student engagement over time. In addition, there seem to exist connections between needs. The effect of the presence or absence of support of one need may be strengthened or compensated for by the presence or absence of another. Although the content of need-supportive teaching and student engagement might be different for CDB versus ADB students, the overall patterns appear to be very similar.

LIMITATIONS

Several limitations should be considered when evaluating the results of this study. First, Chapters 4, 5, and 6 are based on a multiple-case study design. One frequently mentioned limitation of case study designs is that it is difficult to generalize the effects obtained (van Loon, van der Meulen, & Minnaert, 2011). Generalizability can nevertheless be enhanced by using multiple and heterogeneous individuals within and across studies (Nock, Michel, & Photos, 2007). On the one hand, therefore, the diversity of the sample addressed in this study could hinder the ability to generalize the results. On the other hand, the inclusion of a diverse sample allows us to demonstrate the broad applicability of the theory and the intervention.

Another limitation of the study relates to the procedure used to code the video data. In this coding procedure, we focused on the presence or absence of need support. Because this thesis is intended as a comprehensive exploration of need-supportive behavior on the part of teachers, we did not specify the forms of need-thwarting behavior. Teachers thwart their students’ needs for competence, autonomy, and relatedness when they create disorganized environments, when they are controlling or authoritarian, and when they act distant towards the students (Van den Berghe et al., 2013; Deci & Ryan, 2000; Soenens, Sierens, Vansteenkiste, Dochy, & Goossens, 2012). One goal for future research could therefore be to explore need-thwarting teaching behaviors and their influence on the motivation and engagement of students.

STRENGTHS

Despite the limitations described above, this study has generated additional knowledge concerning the description, measurement, and improvement of the motivation of students with deafblindness. The study is unique, given that, to the best of our knowledge, it is the first to investigate teacher-student interactions in the education of students with deafblindness according to a motivational theoretical framework (SDT). The results confirm the utility of SDT for studying teacher-student interactions in students with deafblindness. The study has also generated concrete examples of need-supportive teaching behaviors that can be used in teaching students with acquired deafblindness in both mainstream and special educational settings.

It is also the first study to apply an SDT-based intervention within the context of education for students with deafblindness. Another unique feature is that it addresses teacher-student interactions in students with congenital deafblindness, as well as those with acquired deafblindness.

Another major strength of this thesis is its combination of both quantitative and qualitative analysis to study motivation. Almost all previous studies on the relationship
between teacher behavior and student engagement are based on correlational designs with self-report measures (Reeve, Jang, Carrell, Jeon, & Barch, 2004). Self-reports are vulnerable to social desirability bias (McLachlan & Hagger, 2010). In this study, video observations constitute the primary data source. Video data are often used in research on people with deafblindness, given the subtlety and slow pace of their interaction signals, as well as difficulties associated with their recognition, comprehension and interpretation (Janssen, Riksen-Walraven, & Van Dijk, 2002). Moreover, students with deafblindness are often unable to fill in self-reports due to their sensory and, in some cases, cognitive impairments (Huebner, Prickett, Joffee, & Welch, 1996). Using observations instead of self-reports enhances ecological validity and helps to bridge the gap between educational theory and practice (Stroet, Minnaert, & Opdenakker, 2014).

FUTURE RESEARCH

The results of this study suggest several avenues for future research. A first suggestion for future research is related to the intervention. In contrast to the individual intervention used in this study, a group intervention could be developed and added in order to train groups of teachers. In addition to increasing the time efficiency and cost efficiency of the intervention, this would allow teachers to learn from each other. Based on the findings of this thesis, we suggest a two-phase training course. The first phase could involve group coaching. During this phase, a group of teachers could be provided with general information on SDT and its implications for teaching practice. The second phase could consist of providing individual coaching to teachers with regard to supporting the needs of the students within the specific contexts of their classrooms. The intervention could be implemented in teacher-professionalization programs for teachers of students in both regular and special education settings.

Second, the findings of this study suggest a number of interconnections between the three needs. Previous research has also provided various suggestions with regard to the connectedness of the three needs. For example, Connell and Wellborn (1991) suggest that the three dimensions of need support complement each other in their effects on the level of need-satisfaction in students without impairments. Future research is needed in order to achieve further elaboration on the role, impact, and possible interplay of each of the three needs in students with deafblindness.

Third, future research could address the impact of motivation and engagement on student outcomes. To assess learning progress, student outcomes are very important. This holds for both students with CDB as well as ADB. For students with ADB in inclusive settings, standardized achievement test scores might be used for their progress monitoring. For students with CDB in special education setting, outcomes are more individually tailored. Their progress monitoring might be captured in an individual education plan. This thesis focuses on the influence of need support on the motivation and engagement of students. The specification and measurement of learning outcomes felt outside the scope of this thesis. Previous SDT studies report that positive learning outcomes accrue in classrooms that support the psychological needs of students (Niemiec & Ryan, 2009; Reeve, 2009). Therefore, would it be interesting to assess these learning outcomes in future research.

Fourth, future research should also investigate peer interactions or other aspects of the learning environment that might affect student motivation. In line with previous research (e.g., Furrer & Skinner, 2003; Hughes & Chen, 2011), future studies could address the possible influence of peer relationships on student motivation or the possibility of correlations between teacher-student relationships and student-peer relationships, as well as their impact on the motivation of students with deafblindness.

Fifth, the behavior of both teachers and students is affected by the personal goals that they value and pursue. Future studies should therefore explore the content of these goals and the influence these goals on the behaviors of teachers and students. Teachers might also be obliged to achieve goals imposed by educational policies. This is likely to bear an influence on teaching practice and thus on the motivation of students. As indicated in a study conducted by Deci, Spiegel, Ryan, Koestner, and Kauffman (1982), pressuring teachers by holding them responsible for ensuring that their students attain certain performance standards made teachers more likely to adopt a controlling teaching style. Such teaching styles could have a negative influence on student learning. It is therefore necessary to explore the pressure that teachers face for their students to attain certain goals. Knowledge on the goals of teachers could be used to formulate recommendations concerning goal setting and curricula development for students with deafblindness. These recommendations could serve as a guide for decision-making concerning educational policy.
IMPLICATIONS FOR PRACTICE

In addition to contributing to the research base on SDT research and research on deafblindness, the results of this study suggest a number of valuable implications for practice. First, they reveal what need-supportive teaching entails for students with deafblindness.

The strategies described in this thesis are directly applicable in practice. Teachers in mainstream, special, primary, and secondary educational settings who teach students with deafblindness can implement the strategies in order to enhance the motivation and engagement of their students. For example, teachers can provide structure by offering clarity, support, encouragement, constructive feedback, and guidance (Skinner & Belmont, 1993; Jang, Reeve, & Deci, 2010). The provision of autonomy support deserves particular attention, given that the findings reported in this dissertation show that this need was least supported by the teachers. Examples of practices that can support autonomy include offering choices, provide optimal challenges and providing meaningful rationales for learning tasks (Reeve, 2006; Assor, Kaplan, & Roth, 2002; Jang et al., 2010). Teachers can provide involvement through such means as showing affection, expressing attunement, and dedicating resources to individual students (Skinner & Belmont, 1993).

Teachers of students with congenital deafblindness as well as those with acquired deafblindness can foster student motivation by supporting their needs. According to our results, however, the instructional approach needed for students with congenital deafblindness differs from that needed by students with acquired deafblindness. Students with congenital deafblindness need more constant support, thus calling for a continuous investment in assistance on the part of the teacher. In this study, the need-supportive behaviors used by the teachers of students with acquired deafblindness were similar to those used by teachers of students without impairments (Stroet, Opdenakker, & Minnaert, 2013). For example, these teachers were able to provide sufficient clarity using methods aimed at the entire classroom group, in contrast to the individualized instruction needed by students with congenital deafblindness. These educational practices could be addressed in teacher-professionalization activities.

In summary, motivation for learning is not an activity that takes place in isolation; it occurs within a context of relationships with teachers (Wigfield, Cambria, & Eccles, 2012). Teacher-student relationships bear a strong influence on the ways in which students learn. This is especially true for students with deafblindness. Creating need-supportive interactions between teachers and students plays a key role in motivating students with deafblindness.