Abstract

The article presents a comprehensive literature review of evidence about the psychological needs of students with hearing and, or visual loss, and the effect of their perceptions of need support on their motivation, engagement, and outcomes. A framework based on Self-Determination Theory is used. Nineteen studies were included. Though the results are fragmented in the sense that we found no study that encompassed the Self-Determination Theory as a whole in these target groups, we were able to assess the psychological needs for competence, autonomy, and relatedness separately. Existing literature reports inconsistent findings when it comes to students' perceived competence, autonomy, and relatedness. A few studies suggest that students feel more competent and related in special classroom settings than in mainstream settings. Other studies indicate that the extent to which students feel competent, autonomous, and related is often similar to those of students without sensory loss. Potential implications for educational practice and suggestions for future research are discussed.

KEYWORDS
Self-Determination Theory; psychological needs; motivation; engagement; sensory loss; education
Introduction

Motivated students are engaged in learning tasks and, as a consequence, achieve desired outcomes. Therefore, fostering student motivation is an important goal of educators. Self-Determination Theory (SDT) provides insights into motivational processes (Deci & Ryan, 1985; 2000). According to SDT, the degree to which people perceive that the social context supports their psychological needs has an impact on their motivation and consequently affects outcomes in terms of their development, learning, achievement, and well-being (Deci & Ryan, 2000; Ryan & Deci, 2000).

This theory about motivation and need support is extensive, well-elaborated, and broadly applicable. It has been applied to numerous domains, including organizations, sports, health care, psychotherapy, and education (e.g., Ryan, Lynch, Vansteenkiste, & Deci, 2011; Stroet, Opdenakker, & Minnaert, 2013; Van den Broeck et al., 2011). However, SDT has not yet been applied to the education of students with sensory loss. Research on motivating this group is necessary, since task engagement can be very challenging for them. Although the theory has never been applied to these students, different aspects of their psychological needs have been explored in previous research. Therefore, the purpose of this study is to conduct a literature review on the extent to which students with sensory loss perceive their psychological needs as being met, and to assess whether these findings are consistent with a framework based on SDT.

THEORETICAL BACKGROUND

Figure 1 represents the theoretical framework of this study adapted from Appleton, Christenson, and Furlong (2008).

According to SDT, every student has three basic psychological needs: competence, autonomy, and relatedness. These three needs can be supported by the social context. In the classroom, the social context includes teachers and other students. If students perceive the interactions they have with teachers and other students as need-supporting, they will be motivated to undertake learning tasks and achieve desired outcomes. When the needs for competence, autonomy, and relatedness are not met by the social context, this is assumed to lead to disengagement and negative outcomes. Therefore, within the framework presented in Figure 1, the link between the social context and the student has a crucial impact on the student’s actions and outcomes. The three psychological needs will be further explained in the next section.

STUDENTS WITH SENSORY LOSS

The group of students with sensory loss is very heterogeneous: it includes deaf or hard of hearing (D/HH) students, students who are blind or partially sighted, and students with deafblindness. Even within these different groups there is a large diversity in characteristics, for multiple reasons. For example, hearing or visual loss has various causes and each has a different impact. Despite the heterogeneity, we assume all students with sensory loss have the same three psychological needs. SDT posits that the psychological needs are innate and universal. Therefore, we can assume that students with sensory loss also have these same needs. However, the way these needs are expressed might be different compared to students without sensory loss. The following offers an overview of the three needs in...
relation to students with hearing loss, visual loss or deafblindness.

THE NEED FOR COMPETENCE
This refers to the feeling that one is competent in interacting with the environment (Deci, Ryan, & Williams, 1996). Competence is related to understanding how to attain an outcome and being efficacious in performing the actions required to attain a goal (Deci, Vallerand, Pelletier, & Ryan, 1991). Students gain a sense of competence by conquering challenging tasks. However, it can be challenging for students with sensory loss to feel competent. For instance, they may misinterpret or not notice information given by their environments. Sensory loss can impede a child's awareness of objects and other people, which impacts their intrinsic motivation to approach, explore, and manipulate objects or to have contact with other people. The child may also fail to notice sources of external motivation, such as sounds or visual stimuli offered by others (McInnes & Treffry, 1982). In summary, the inability to receive the correct information from the environment can negatively affect the child's feeling of competence. Without the right amount of support, these children may not experience successful interactions with their environments.

Providing structure for students with sensory loss would include creating a safe, pleasant, and organized environment. Teachers need to consider how to arrange the learning and the physical environment to maximize learning. Structuring the physical environment may include adapting lighting and sound, choosing appropriate materials, and presenting them in the right way (Aitken et al., 2000).

THE NEED FOR AUTONOMY
This refers to the ability to initiate and regulate one's own actions (Deci et al., 1991). For students to feel autonomous, they need to perceive the learning process as relevant to their self-determined interests, goals, and values. Having the opportunity to make their own choices and to complete tasks that allow them to set their own goals or to work on tasks that they find interesting contributes to students' experience of autonomy in learning (Assor, Kaplan, & Roth, 2002). When they function autonomously, students become more deeply engaged and productive (Ryan & Deci, 2006).

Feelings of autonomy are not self-evident for people with sensory loss, who often rely on help from others in certain areas of their lives. Receiving help does not have to conflict with the need for autonomy. Functioning autonomously is not the same as functioning independently: it is possible to be autonomously dependent or forced into being independent (Chirkov, Ryan, Kim, & Kaplan, 2003). An individual can willingly rely on others or be coerced to do so. Willingness indicates choice and autonomy, whereas coercion disregards choice and autonomous action.

If people are able to choose when to seek assistance, they remain in control. However, assistance can be problematic when it diminishes a person's sense of self-determination; for example, when others do tasks for people with sensory loss even though they can do them themselves.

In an environment in which other people are overprotective and offer too much help, children will not grow up to be active, autonomous and self-confident individuals (Marks, 1998). If children are not given the opportunity to explore their environments, they will become increasingly passive in their interaction with the environments (Marks, 1998). This can lead to learned helplessness, a phenomenon which occurs when a person cannot control outcomes and therefore does not perceive a relationship between their behavior and its impact on the environment (Maier & Seligman, 1976). Therefore, children with sensory loss build on other people to support their development without them having to relinquish their autonomy.

THE NEED FOR RELATEDNESS
This involves developing secure and satisfying connections with others and experiencing a sense of belonging (Deci et al., 1991). It also concerns feeling connected with and cared for by others (La Guardia, Ryan, Couchman, & Deci, 2000). Individuals need to experience a sense of interpersonal security or psychological closeness in their relationships in order to display exploratory behavior and well-being (Deci et al., 1996).

In the educational setting, the need for relatedness refers to the quality of the interpersonal relationship between teacher and student (Skinner & Belmont, 1993). Relationships between classmates are also important. Research indicates that students who feel secure with peers and able to turn to them when they have problems tend to cope more positively with academic failure, to be more autonomous in regulating their behavior at school, to be more engaged in learning and to feel better about themselves (Ryan, Stiller, & Lynch, 1994). These peers might be individuals with sensory loss or those who are sighted and hearing, depending on the educational setting.

In line with the Salamanca Statement (UNESCO, 1994), increasing numbers of
students with sensory loss are being educated in mainstream settings. This has a major impact on the relationships students have with their teachers and classmates. Establishing relationships might be difficult, for example, due to communication difficulties (Wolters, Knoors, Cillessen, & Verhoeven, 2011).

Lewis (2003) stated that deafness can be very isolating, especially when there is no opportunity to mix with other deaf children. When D/HH students interact with students with typical hearing, various difficulties may arise due to a lack of understanding, miscommunication, or emotional and social discomfort for both parties (Foster, 1998). Difficulties in interaction can lead to misunderstandings, teasing, social rejection, isolation, withdrawal, and the development of stereotypes and assumptions about deaf people (Foster, 1998).

It is also essential that students with visual loss develop friendships and good social skills (Gray, 2005). However, their visual loss can seriously hinder their ability to establish relationships with others. For instance, they might fail to grasp necessary information from the social-communicative process because sensory loss makes it difficult for them to obtain and send information during social interactions (Erwin, 1994). Other difficulties they may experience include initiating and maintaining conversations, forming impressions, conveying information non-verbally and making sense of people's signals, mixing with people in groups, and locating who is speaking and who is being addressed (Kemp & Rutter, 1986).

It can be even more challenging for children with deafblindness to form and maintain relationships with other people. A child with deafblindness must interact with the environment through physical closeness and touch. He or she can use a variety of unique forms of communication (e.g., bodily movements, tactile cues or muscle tension; Goode, 1994). Since the interactive signals sent by children with deafblindness are often subtle and difficult to interpret, other people can easily miss or misunderstand them (Janssen, Riksen-Walraven, & Van Dijk, 2004).

**Engagement versus Disengagement**

How well students perceive the environment to meet their needs affects their engagement in learning tasks (Appleton et al., 2008). Engagement can be described as the outward manifestation of student motivation (Skinner, Kindermann, & Furrer, 2009) and refers to the intensity and emotional quality of student involvement in initiating and carrying out learning tasks (Connell & Wellborn, 1991). Moreover, it refers to active, goal-directed, flexible, constructive, persistent, focused interactions with the social and physical environment (Furrer & Skinner, 2003; Skinner & Belmont, 1993).

As shown in Figure 1, engagement can be divided into three types (Fredricks, Blumenfeld, & Paris, 2004). The first type is behavioral engagement, which concerns participation or involvement in academic and social or extracurricular activities. The second type is emotional engagement, which reflects positive and negative responses to teachers, classmates, academic achievement, and school. The third type is cognitive engagement, which involves investment or thoughtfulness and willingness to exert the effort necessary to comprehend complex ideas and master difficult skills (Fredricks et al., 2004).

The opposite of engagement is disengagement, which can be characterized in terms of giving up easily or being apathetic, anxious, or rebellious (Furrer & Skinner, 2003; Skinner & Belmont, 1993). Students' engagement or disengagement consequently leads to certain outcomes, which can be academic (e.g., social awareness or relationship skills) or emotional (e.g., emotional regulation) (Appleton et al., 2008).

**study purpose**

To date, there has been no systematic review focusing on students’ perceptions of need support and its impact on student motivation, engagement, and outcomes in students with sensory loss. Therefore, this study aims to gain further insights into: (i) the psychological needs for competence, autonomy, and relatedness in students with hearing loss, visual loss or deafblindness; (ii) the link between the three psychological needs; (iii) the relationship between how well students perceive their environments as need-supporting and the impact on student motivation and engagement; and (iv) the link between student motivation, engagement, and outcomes in terms of learning, achievement, and well-being.
Method

SEARCH STRATEGY

We identified relevant research through a comprehensive search of EBSCOHOST (i.e., a collection of 30 databases, including ERIC and PsycINFO). We formulated four sets of search terms (Appendix A). The first set was related to the three basic psychological needs, as proposed by the theoretical framework. The second set of search terms related to students’ motivation, engagement, and outcomes. A third set of search terms related to the characteristics of the target population. These terms were based on the different forms of sensory loss: hearing loss, visual loss and deafblindness. A fourth set of search terms was added to specify the search to educational settings. The four sets of search terms were used to search abstracts and were combined using the AND operator. The database search produced 1165 references. After automatic removal of duplicates by EBSCOHOST, 1162 articles remained.

PAPER SELECTION

Studies had to meet the following inclusion criteria: published in peer-reviewed journals between 1995 and April 2014, written in English, focused on components of the framework based on SDT and focused on the education of students with hearing loss, visual loss or deafblindness. Additional disabilities were not an exclusion criterion as sensory loss is often accompanied by other disabilities, such as motor problems or intellectual disabilities. There were no restrictions with regard to the type of educational setting; studies conducted in special and mainstream settings were included. Moreover, there were no restrictions on students’ ages or the grade range; we included studies conducted in primary, secondary, and post-secondary schools.

We conducted a detailed examination of the papers, using the abovementioned criteria, the PRISMA checklist (Moher, Liberati, Tetzlaff, & Altman, 2009) and the critical review form for qualitative or quantitative studies (Law et al., 2008; Letts et al., 2007). Ultimately, 19 papers were selected. The other studies were excluded because they did not fit the inclusion criteria. This was for instance prevalence studies, neurological studies, technological studies, and studies on literacy. Another common reason for excluding a study was caused by the use of the search term “blind”: many of the articles we found referred to using a blind or double-blind research design, instead of focusing on blind students.

Results

This section will discuss the 19 papers selected for inclusion in the review. Most of the studies focused on D/HH students (13), followed by students with deafblindness (4), and students with blindness or visual loss (2). Most focused on the need for relatedness (13), followed by autonomy (5), and competence (3). One study addressed both competence and relatedness (Eriks-Brophy et al., 2012), and one study addressed both autonomy and relatedness (Power & Hyde, 2002). Many studies compared students with and without disabilities, or students in mainstream and special educational settings. Most studies used questionnaires and interviews to gather data, while a couple of studies also used classroom observations. While all studies focused on psychological needs, none of the studies investigated the relationship between students’ psychological needs and their level of engagement and outcomes.

STUDENTS’ NEED FOR COMPETENCE

Three studies investigated whether students felt competent in the classroom. Table 1 outlines the key characteristics of these papers.

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Research Design</th>
<th>Study Aim</th>
<th>Overall Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eriks-Brophy, Durieux-Smith, Olds, Fitzpatrick, Duquette, &amp; Whittingham (2012)</td>
<td>45 D/HH students in the United States ages 14-30 years</td>
<td>ME and SE setting</td>
<td>To retrospectively study the factors that facilitate the integration of D/HH students into mainstream classroom environments</td>
<td>ME +</td>
</tr>
<tr>
<td>Hatamizadeh, Ghasemi, Saeedi, &amp; Kazemnejad (2008)</td>
<td>60 D/HH students &amp; 60 students with typical hearing in Iran ages 6-13 years</td>
<td>ME settings in primary schools</td>
<td>To determine the perceived competence of D/HH students in mainstream settings</td>
<td>ME -</td>
</tr>
<tr>
<td>Richardson, Marschark, Sarchet, &amp; Sapere (2010)</td>
<td>271 D/HH students in the United Kingdom ages unknown</td>
<td>ME and SE settings in post-secondary education</td>
<td>To investigate the experiences of post-secondary D/HH students in mainstream programs and separate programs at the same educational institution</td>
<td>ME - SE +</td>
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</tbody>
</table>

Note. ME = mainstream education; SE = special education; + = positive findings; - = negative findings
In the study by Eriks-Brophy et al. (2012), adults looked back on their educational experiences. The results indicated that the students were able to function effectively within integrated school settings and appeared to have average self-esteem. They did not view themselves as different from their peers with typical hearing in various domains, such as academic ability, physical attributes, personal qualities, and relationships with parents and peers. In contrast, Hatamizadeh, Chasemi, Saeedi, and Kazemnejad (2008) found that although most D/HH students in mainstream schools who participated in their study reported moderate levels of perceived self-competence, their scores indicated that they felt less competent than their hearing classmates did.

Richardson, Marshark, Sarchet, and Sapere (2010) also studied aspects of competence related to D/HH students in mainstream post-secondary education classes. They compared the experiences of D/HH students enrolled in mainstream programs with those of D/HH students in separate special programs. They found that the students in mainstream classes worried more about keeping up with their schoolwork than students in special settings. Furthermore, the students in special classes were positive about workload expectations and instructor feedback. The students in mainstream classes did not feel as competent in managing school tasks as the students in special education classes. Moreover, students perceived teachers in the special classes to be more supportive of their need for competence than teachers in mainstream classes.

Students’ Need for Autonomy

Table 2 outlines the characteristics of the five papers that addressed students’ need for autonomy.

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Research Design</th>
<th>Study Aim</th>
<th>Overall Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horvath, Kampfer-Bohabch, &amp; Farmer Kearns (2005)</td>
<td>9 students with deafblindness in the United States ages 10-16 years</td>
<td>Qualitative data collected via interviews with students, parents &amp; school personnel, observations, document analysis, and policy analysis</td>
<td>To investigate the extent to which students with deafblindness used and chose to use accommodations during class</td>
<td>ME - SE -</td>
</tr>
<tr>
<td>Kent &amp; Smith (2006)</td>
<td>16 D/HH students in New Zealand ages 12-18 years</td>
<td>Qualitative data collected via interviews with students</td>
<td>To study the perceptions of D/HH students in mainstream settings with regard to their use of hearing aids</td>
<td>ME +/-</td>
</tr>
<tr>
<td>Power &amp; Hyde (2002)</td>
<td>143 teachers of D/HH students in Australia students’ ages 5-15 years</td>
<td>Quantitative data collected via teacher questionnaires</td>
<td>To study the levels of integration, independence, academic participation and social participation of D/HH students included in regular classes</td>
<td>ME +</td>
</tr>
<tr>
<td>Schick, Skalicky, Edwards, Kushalnagar, Topolski, &amp; Patrick (2013)</td>
<td>211 D/HH students in the United States ages 11-19 years</td>
<td>Quantitative data collected via student questionnaires</td>
<td>To explore the relationship between quality of life and educational placements that do or do not include other D/HH students</td>
<td>ME + SE +</td>
</tr>
<tr>
<td>Smith (2013)</td>
<td>17 D/HH former students in the United States ages 22-57 years</td>
<td>Qualitative data collected via semi-structured group interviews</td>
<td>To retrospectively examine how D/HH former students perceived and reacted to teachers’ expectations of their academic ability</td>
<td>ME -</td>
</tr>
</tbody>
</table>

Note. ME = mainstream education; SE = special education; + = positive findings; - = negative findings; +/- = both positive and negative findings

Power and Hyde (2002) addressed students’ levels of independence in the classroom. They explored how much support D/HH students need to be able to participate in an inclusive classroom. The majority of the D/HH student participants were regarded by their teachers as independent. Nearly half of them functioned independently after some initial support. In other words, they could function independently once they were set up with educational or technical equipment, or physically positioned appropriately. According to the authors, these results present a reasonably encouraging picture of D/HH students who are integrated into regular classes.

Four studies addressed students’ self-advocacy or self-determination. Schick et al. (2013) explored the relationship between quality of life and educational placement in D/HH students. They administered a questionnaire that, amongst others, included items on self-advocacy. Self-advocacy means taking control of one’s life and making one’s own decisions. This can be seen as part of autonomy. The researchers compared the questionnaire scores
of students in schools with no special program for D/HH students, students in schools with a D/HH program and students in schools specifically designed for D/HH students. They found no differences in the self-advocacy behaviors of students in the different educational settings.

Smith (2013) examined how deaf adults perceived and reacted to their teachers’ expectations of their academic ability while they were in school. Part of feeling autonomous is attaining meaningful, relevant, challenging, and realistic goals. This study’s participants mentioned that teachers gave them easy work because they had low expectations of their academic abilities. The students had to demand more challenging schoolwork, more opportunities for learning and the same treatment as their hearing classmates. The educational context did not support their need for autonomy. Most of the participants advocated for themselves at one time or another. Deaf teachers usually had higher expectations of them and better anticipated their needs.

Kent and Smith (2006) found that self-perceptions of normality determined whether D/HH students in mainstream settings chose to wear their hearing aids. Since students wanted to be independent and normal, they tended to hide their hearing aids or use them intermittently. Perceptions of normality were more determinant for the use of hearing aids than the age at which the hearing aids were fitted, the length of time since fitting or the extent of deafness. The benefits of wearing hearing aids to enhance communication were hindered by the perceived negative stigma associated with them. Students who had positive relationships with hearing peers were more likely to make confident use of hearing aids than those who expressed difficulties in their relationships with hearing peers. This is an example of how the need for relatedness influences the need for autonomy.

The influence of social factors affecting students’ self-determination was also visible in a study by Horvath, Kampfer-Bohach, and Farmer Kearns (2005) on students with deafblindness in mainstream and special settings. The aim of their study was to explore to what extent students with deafblindness use the support that is provided for them. This includes a variety of accommodations to support their education and provide them access to the educational curriculum (e.g., Braille, large print, special lighting, an interpreter or auditory amplification). Students were allowed to self-determine their accommodations. A lack of student input or self-determination was an important finding in the study. Self-determination was not actively used in the classroom.

Students did not actively choose to use accommodations, but rather refused the use of some accommodations. One reason for refusal was that the use of an accommodation made others aware of their disability and made it more apparent that they were different.

STUDENTS’ NEED FOR RELATEDNESS

Table 3 presents 13 studies that addressed students’ need for relatedness.

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Research Design</th>
<th>Study Aim</th>
<th>Overall Finding</th>
</tr>
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<tbody>
<tr>
<td>Angelides &amp; Aravi (2006)</td>
<td>20 D/HH former students in Cyprus; ages 19-20 years; ME and SE settings in post-secondary education</td>
<td>Qualitative data collected via interviews with former students</td>
<td>To retrospectively analyze the views and experiences of D/HH former students who graduated from special or mainstream schools.</td>
<td>ME - SE +</td>
</tr>
<tr>
<td>Chang &amp; Schaller (2002)</td>
<td>12 students with blindness or visual loss in the United States; ages 14-20 years; ME and SE settings</td>
<td>Qualitative data collected via interviews</td>
<td>To study how students with visual loss perceive support from their teachers for their emotional and learning needs.</td>
<td>ME +/- SE +/-</td>
</tr>
<tr>
<td>Eriks-Brophy, Durieux-Smith, Olds, Fitzpatrick, Duquette, &amp; Whittingham (2012)</td>
<td>43 D/HH students in the United States; ages 14-30 years; ME and SE settings</td>
<td>Quantitative data collected via questionnaires</td>
<td>To retrospectively study the factors that facilitate the integration of D/HH students into mainstream classroom environments.</td>
<td>ME +</td>
</tr>
<tr>
<td>Israelite, Owen, &amp; Goldstein (2002)</td>
<td>7 D/HH students in Canada; ages 14-17 years; ME and SE settings in secondary schools</td>
<td>Qualitative data collected via interviews with students and student questionnaires</td>
<td>To study the school experiences and interactions of D/HH students.</td>
<td>ME - SE +</td>
</tr>
<tr>
<td>Kamenopoulou (2012)</td>
<td>4 students with deafblindness in the United Kingdom; ages unknown; ME settings in secondary schools</td>
<td>Qualitative data collected via interviews with students, parents, and teachers; teacher questionnaire; and observations</td>
<td>To study the social inclusion of students with deafblindness in mainstream schools.</td>
<td>ME -</td>
</tr>
<tr>
<td>Leigh (1999)</td>
<td>34 D/HH students in the United States; ages unknown; ME and SE settings</td>
<td>Qualitative data collected via questionnaires</td>
<td>To retrospectively study the experiences and personal development of D/HH students.</td>
<td>ME +/-</td>
</tr>
</tbody>
</table>
Most studies reported negative findings with regard to the perceived relatedness of students with sensory loss in mainstream settings. Stinson and Liu (1999) identified a number of barriers to D/HH students’ participation in mainstream classes. Firstly, limited communication skills acted as a barrier to participation. Secondly, D/HH students were sometimes reluctant to participate, which could have been caused by difficulties in following a conversation or a lack of confidence in a situation. Thirdly, D/HH students perceived negative attitudes among their hearing peers. They thought that hearing students regarded them as stupid because they could not speak well.

Stinson, Whitmire, and Kluwin (1996) found that D/HH students in mainstream settings had more interaction with hearing peers than with DHH students. Although they had more interactions with hearing peers (probably because they are surrounded by them in mainstream classes), this contact did not appear to promote identification and relational bonds with hearing students. Spending more time in classes with hearing peers did not increase D/HH students’ ratings of emotional security, identification, and relational bonds with hearing classmates. Most of the D/HH students reported that they would prefer to have more time to build relationships with D/HH peers, because they felt more emotionally secure with them and perceived the relationships to be deeper and more satisfying.

Students with deafblindness also face difficulties in mainstream settings. A study by Kamenopoulou (2012) suggests that the social environment of a mainstream secondary school is extremely challenging for pupils with deafblindness. Although peer interactions were found to be a key facilitator of social inclusion, all the participants faced challenges with peer relationships. Four issues relating to social inclusion were identified: 1) a lack of mutuality in relationships (i.e., relationships were only one-sided); 2) bullying by peers; 3) communication breakdowns; and 4) students spending leisure time alone or with family rather than with school peers.

We also found positive results in the literature. For instance, a study by Eriks-Brophy et al. (2012) indicated that D/HH students in mainstream settings are not socially isolated. All the D/HH students had a close friend or group of friends and participated in social events and activities with their hearing peers. Several students also had at least one friend with hearing loss and/or belonged to an organized group for people with hearing loss.

In addition, Power and Hyde (2002) also found positive effects for D/HH students in mainstream settings. Their study revealed that, to a large extent, D/HH students who are
integrated into regular classrooms function socially just as successfully as the majority of their hearing peers. Many students not only participated in regular social activities in the classroom but also exerted an influence within the group. Only a few students were reported to be uninvolved in social activities or uninvolved in interactions with fellow students in the classroom.

Finally, a study by Sall and Mar (1999) showed the changing character of student-peer relationships for a student with deafblindness in an inclusive setting. In the beginning, interactions between the student and his peers were mainly focused on his need for help, rather than socializing. His classmates learned to provide support and assistance in ways that encouraged his participation and increased his independence. Over time, the quality of his involvement with his peers changed: interactions became less assistive and more truly social and defined by mutual interests. The teachers also helped to promote social inclusion. For example, they changed the seating arrangements in the classroom so that the student had more opportunities for social interaction with classmates. In this case, social inclusion was quite successful.

Some studies reported both positive and negative findings for students in mainstream settings. Leigh (1999) found that the majority of the D/HH students in mainstream settings experienced supportive environments with teachers who provided the necessary attention and created friendly social environments. Moreover, they reported both positive and negative perceptions of interactions with hearing or D/HH peers. The students appreciated the diversity in relationships, having good relationships with hearing peers and liking people based on values rather than hearing ability. All the students valued contact with hearing peers. However, some students reported communication difficulties when interacting with hearing peers, which caused frustration and feelings of exclusion. Some students had relationships with hearing peers as comfortable but never completely relaxed. The D/HH students also reported both positive and negative feelings about relationships with deaf peers. For example, while contact with deaf peers was reported to feel like family, a lack of peers with similar values was also reported.

Mixed results were also found in post-secondary education classes. Stinson, Liu, Saur, and Long (1996) classified students into two groups: 1) students who only used speech when communicating with hearing peers and teachers and 2) students who used a variety of methods (including signing, talking, writing or using an interpreter). Students in the mixed group communicated more easily with other deaf students because they knew a variety of ways to communicate. On the other hand, they experienced more frustration when dealing with hearing students. Often, hearing students were not patient or willing to repeat themselves; other times, hearing students were very short and brief with their communication or appeared to be trying to get away from the D/HH student.

A number of studies compared students in mainstream settings with students in special settings. For instance, Angelides and Aravi (2006) found that D/HH students in special schools felt more related and perceived their environment as more need-supportive than students in mainstream classes. In special schools, D/HH students had very good and friendly relationships with their teachers and schoolmates. The students reported that special schools provided more opportunities for communication and interpersonal relationships. In contrast, the students in mainstream schools experienced more isolation and forms of marginalization and exclusion that were due to difficulties in communicating with their teachers and classmates and to a low level of self-esteem. For instance, one student mentioned that he felt too ashamed to participate in a lesson because he thought he talked strangely.

Israelite, Ower, and Goldstein (2002) compared the experiences of D/HH students in mainstream settings with students in special classes within a mainstream setting. The experiences of the students in special classes were very positive: they developed a closeness with other students, which they indicated as being important for their emotional well-being. The students also indicated that the teachers in special classes were patient, understood their problems and helped them improve their communication skills so they could share ideas and opinions with other students. The students appreciated their relationships with classmates and teachers in the special D/HH program because they felt that other D/HH students would always be there for each other and the teachers made them feel safe and secure. In contrast, many of the students’ regular education experiences had been in unsupportive environments in which they felt lonely, rejected, misunderstood and discriminated against because of their hearing status.

In a study by Möller and Danermark (2007), students with post-lingual deafblindness were asked to identify factors that influenced their participation in mainstream or special education. A main finding was that environmental factors seem to hinder participation in education by students with deafblindness. The appraisal of such barriers was influenced by the feeling of ‘considerateness,’ which reflected the students’ perceptions of the behavior and attitudes of people in their immediate educational environment. Showing
Although none of the studies were based on Self-Determination Theory, all of them investigated an aspect of it. Focusing on a certain part of SDT is common in the field of SDT research (Stroet et al., 2013). The following discussion offers an overview of the main findings and recommendations for educational practice and future research.

COMPETENCE

The findings on students’ perceived competence did not all point in the same direction. One study showed that D/HH students in mainstream classes felt as competent as their hearing peers (Eriks-Brophy et al., 2012), while another showed that D/HH students felt less competent than their hearing peers (Hatamizadeh et al., 2008). A third study showed that D/HH students in separate post-secondary education classes felt more competent than D/HH students in mainstream classes (Richardson et al., 2010).

An implication for practice is the suggestion that mainstreamed students’ level of competence is regularly assessed to identify students who need additional support (Hatamizadeh et al., 2008). In addition, teachers need to be coached to provide students with the support they need. Therefore, teachers need guidelines to help them apply strategies to support students’ needs.

AUTONOMY

Some studies found positive results for autonomy, while others found that students do not always actively self-advocate for what they need. Power and Hyde (2002) found clues that D/HH students in mainstream classes felt as autonomous as their hearing peers (Eriks-Brophy et al., 2012), while another showed that D/HH students felt less competent than their hearing peers (Hatamizadeh et al., 2008). A third study showed that D/HH students in separate post-secondary education classes felt more competent than D/HH students in mainstream classes (Richardson et al., 2010).

An implication for practice is the suggestion that mainstreamed students’ level of competence is regularly assessed to identify students who need additional support (Hatamizadeh et al., 2008). In addition, teachers need to be coached to provide students with the support they need. Therefore, teachers need guidelines to help them apply strategies to support students’ needs.

Discussion

The first aim of this study was to gain insights into the psychological needs for competence, autonomy, and relatedness in students with hearing loss, visual loss or deafblindness.
collectively negatively influence the ability of children with congenital deafblindness to develop self-determination (Bruce & Parker, 2012). In addition, Wehmeyer, Agran, and Hughes (2000) found that teachers' negative beliefs are a frequently identified barrier to students with severe disabilities acquiring self-determination skills. In our sample, the study by Smith (2013) confirmed that teachers had low expectations. These findings suggest several courses for action for teaching practice. First, teachers need to have high expectations and to not only advocate for their students, but also to train students to be self-advocates for their own needs. In addition, Abery (1998) advocates giving children with deafblindness ongoing opportunities to exercise personal control so they can acquire and refine the capability to take charge of their lives. Wehmeyer, Palmer, Agran, Mithaug, and Martin (2000) state that promoting students' self-determination is a complex process that will require efforts such as including students in educational planning and decision making, and providing them with opportunities to express preferences, make choices and learn about their individual strengths and limitations. In the context of teacher professionalization, attention should be paid to these issues. Another important implication for practice is that teachers should create social environments in which students feel accepted. Both the studies by Kent and Smith (2006) and Horvath et al. (2005) showed the important influence the social context has on students' self-determination. Interventions focused on enhancing students' autonomy should therefore also be applied within the social context rather than to the individual student (Kent & Smith, 2006).

RELATEDNESS

Most of the studies focused on aspects of relatedness. Because of the trend towards inclusive education, a lot of attention has been paid to how well students are integrated socially and academically in inclusive settings. Overall, most studies conducted in mainstream settings found negative results with regard to the experience of relatedness (Kamenopoulou, 2012; Stinson & Liu, 1999; Stinson, Whitmore, & Kluwin, 1996). Students in mainstream settings reported difficulties with interpersonal relationships related to communication, participation, and acceptance. For instance, students without disabilities were unwilling to be patient or unwilling to make an effort to include students with disabilities (Stinson & Liu, 1999). According to Wolters, Knoors, Cillesen, and Verhoeven (2014), unfamiliarity and a lack of meaningful contact between students with and without disabilities may also strengthen negative perceptions of D/HH youth.

On the other hand, there were some positive indications of students' feelings of relatedness in mainstream settings. For instance, the studies by Eriks-Brophy et al. (2012), Power and Hyde (2002), and Sall and Mar (1999) found that D/HH students or students with deafblindness in mainstream settings are not socially isolated. Findings were positive in the sense that the students were included in the classroom and they had good contact with hearing peers. Contact with students with similar disabilities was often experienced as pleasant since communication is easier and students can understand each other more easily. A study by Antia, Jones, Luckner, Kreimeyer, and Reed (2011) also indicated that in contrast to findings from previous studies, social outcomes may be quite positive for students with sensory loss (D/HH) in mainstream settings. Most studies in special settings found positive results with regard to students' experiences of relatedness. For example, the studies by Angelides and Aravi (2006) and Israelite et al. (2002) found that contact with teachers and peers was easier in special classes than in mainstream classes. In sum, when comparing mainstream schools with special schools, the level of teaching seems to be higher in mainstream classes. In sum, when comparing mainstream schools with special schools, the level of teaching seems to be higher in mainstream schools, while students experience better interpersonal relationships in mainstream schools (Angelides & Aravi, 2006; Richardson et al., 2010). These findings are consistent with those of other studies (e.g., Stinson & Kluwin, 2003).

All in all, the results on students' need for relatedness point to the importance of classroom environments that support meaningful social interactions among peers (Israelite et al., 2002). Supportive and structured school environments serve to enhance the inclusion of students in mainstream settings (Leigh, 1999). Teachers have a key role in facilitating or limiting students' communication access and participation in the classroom (Stinson et al., 1996). Therefore, in educational practice, attention should be paid to how teachers can facilitate communication and participation in the classroom. For instance, opportunities for social support and interaction could be programmed in educational planning (Leigh, 1999). Moreover, teachers could foster meaningful discussions about real-life experiences and create collaborative group activities in the classroom in order to encourage cooperation and respect for each other's ideas and opinions (Israelite et al., 2002).
THE LINK BETWEEN THE THREE PSYCHOLOGICAL NEEDS
The second aim of this study was to explore the link between the three psychological needs. Two studies addressed two dimensions of perceived need support, namely competence and involvement (Eriks-Brophy et al., 2012), and autonomy and involvement (Power & Hyde, 2002). Both studies report positive findings with regard to the dimensions of students’ perceived need support. However, the relationship between the dimensions was not directly assessed. The studies by Horvath et al., (2005) and Kent and Smith (2006) also suggest that needs are connected. Both studies showed that students who do not feel included in the classroom and do not have good relationships with peers and teachers will not self-determine the support they need. More research is necessary to explore how these needs are connected and what their combined effect is on students’ motivation.

THE EFFECTS OF NEED SUPPORT
Finally, we wanted to explore the relationship between need support, motivation, engagement, and outcomes. Surprisingly, none of the studies investigated this link, which could provide essential information on student learning and development. This gap clearly indicates a need for more research to better understand the factors that contribute to this relationship for these students.

STUDY LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH
In order to study all the study aims in depth, we did not include an exploration of the social context in this study. In this first attempt to synthesize research on the motivational processes of students with sensory loss, we focused on students’ perceptions of their psychological needs and not on the teachers’ actual behavior. Since teachers’ behavior can differ from students’ perceptions of that behavior, another study with a focus on teacher behavior should be conducted. In line with SDT, it would be worthwhile to examine the specific characteristics of teacher behavior that support needs. Insights into the characteristics of need-supporting teacher behavior is extremely valuable, foremost because there is scarce empirical research about how to motivate students with sensory loss. Future studies in this area are therefore recommended. Moreover, knowledge about need-supporting teacher behavior would also be of added value for teacher professionalization. Another limitation of this study is the very diverse range of studies included. Since we expected to find few studies on this topic, we purposefully did not use many exclusion criteria. Therefore, we included studies that looked at students with various ages, educational settings and nationalities. A downside of this diversity is the difficulty in comparing the study outcomes. On the positive side, it does provide a broad overview of the available literature.

Another limitation was that the studies were not evenly distributed among the three needs and among the three groups of students. Considerably more work needs to be done to explore the perceptions of need support for autonomy and competence in students with visual loss and deafblindness.

CONCLUSION
This literature review is a first step in exploring whether students with sensory loss perceive their psychological needs as being met and whether this positively or negatively affects their academic motivation and engagement. The findings add to a large and growing body of literature on SDT and to the scarce amount of literature on the motivation of students with sensory loss. By conducting this study, we gained insights into the degree to which students feel competent, autonomous and related in the classroom. Moreover, we have identified the important role of the teacher, which provides fundamental ideas for teacher professionalization. This research will serve as a base for future studies on how need support influences the motivation of students with sensory loss.