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11. LEARNING ENVIRONMENT EXPERIENCES IN PRIMARY EDUCATION

Their Importance to Academic Engagement

INTRODUCTION

A growing body of research has established that students' learning environment experiences at school contribute to their learning and achievement. In particular, supportive teacher-student interactions have been mentioned as characteristics of a powerful learning environment and have been connected with students' learning and academic engagement from different perspectives (Opdenakker & Minnaert, 2011). An encompassing theoretical framework that connects teacher-student interactions with students' academic engagement is Self-Determination Theory (SDT; Deci & Ryan, 2000, 2002). Central to SDT is the concept of basic psychological needs. SDT assumes that people are active organisms, with evolved tendencies toward growing, mastering ambient challenges, and integrating new experiences into a coherent sense of self. However, although these developmental tendencies are natural, they require ongoing social nutriment and support. The social context, and thus also teacher-student interactions, can either support or thwart the natural tendencies of students toward active engagement and psychological growth. To the extent that the basic psychological needs are continuously satisfied, people will develop and function effectively and experience wellness. When the needs are thwarted, people more likely evidence ill-being and non-optimal functioning. Related to students this means that students' basic psychological needs should be continuously satisfied in their learning environment (and in particular in their interaction with their teachers) in order to be actively engaged in school and function and develop effectively.

BASIC PSYCHOLOGICAL NEEDS, LEARNING ENVIRONMENTS AND ACADEMIC ENGAGEMENT

Within the Basic Psychological Needs Theory (BPNT), a mini-theory of SDT, the existence of three fundamental psychological human needs is assumed. These needs, which are assumed to be innate and universal, are the needs to feel autonomous, to feel competent, and to feel related. The need to feel autonomous finds its' origin in the inherent desire that people have to experience volition, to be causal agents, and to act in accordance with their sense of self. Feeling autonomous is not the same as feeling independent of others and autonomously initiated actions can be initiated in response to a request of significant others. For students it means

D. Zandvliet et al. (eds.), Interpersonal Relationships in Education: From Theory to Practice, 183–194.

that they experience their engagement for school as a self-chosen act reflecting their own values and needs and experience their willingness to engage as unpressured. Students who feel autonomous are willingly devoting energy and time to their schoolwork (Niemiec & Ryan, 2009). The need for competence refers to the need to feel effective in ongoing interactions with the (social) environment while exercising and expressing one's capacities. Exercising and expressing capabilities gives people an inherent satisfaction (White, 1959). Students feeling competent feel able to meet the challenges of their school work (Niemiec & Ryan, 2009) and feel they acquire control over school outcomes. The feeling of competence provides them the energy for learning. The last need, the need for relatedness, refers to the need to feel connected to others, to belong, and to be cared for by others. It also refers to the desire to care for others. In general, the desire to form and maintain strong and stable interpersonal relationships is central to this need (Ryan, 1995). To feel related implies that people experience an interpersonal bond or a relationship characterized by affective concern and stability. Frequent personal contact that is free from conflict and negative affect and is pleasant and affectively positive is crucial to satisfy the need for relatedness. Students feeling related experience high quality relationships with their teachers and classmates.

According to BPNT, the satisfaction of the mentioned basic psychological needs positively affects motivation and engagement because they provide the energy and direction for people to engage in activities that satisfy these needs (Deci & Ryan, 2011). Related to school, students' experiences of psychological needs satisfaction play an important role to their academic engagement. Academic engagement refers to students' active involvement during learning activities (Fredericks, Blumenfeld, & Paris, 2004; Skinner, Furrer, Marchand, & Kindermann, 2008; Wellborn, 1991) and refers to behavioral (e.g., participation in school activities) and affective/emotional dimensions (e.g., interest and enjoyment in school tasks). Thus, academic engagement "expresses the behavioral intensity of the active involvement of students in classes as well as the emotional quality of their involvement" (Jang, Reeve, & Deci, 2010, p. 588). Niemiec and Ryan (2009) conclude in their article on intrinsic motivation and engagement that students are more willing to engage in learning tasks (also in relatively uninteresting tasks) when their needs of autonomy, competence, and relatedness are satisfied, which is also confirmed by recent research of Minnaert and Opdenakker and colleagues (Minnaert, Boekaerts, de Brabander, & Opdenakker, 2011; Opdenakker, Minnaert, & Stroet, 2012). In these studies, evidence for the importance of the need for relatedness in addition to the other two needs is stressed. The satisfaction of the need for relatedness facilitates the process of internalization, i.e. the process of adopting or deeply internalizing values, goals, or belief systems, which is essential for students' engagement at school. In addition, Niemiec and Ryan (2009) assert that, according to SDT, the satisfaction of both the need for autonomy and competence is essential to maintain being engaged in learning. Finally, Deci, Vallerand, Pelletier and Ryan (1991) stress that student motivation, in general, will be enhanced or facilitated by support for competence and relatedness.

According to BPNT, social contexts can support or thwart people's basic psychological needs and, therefore, can impact people's engagement. This idea is in line with current views on academic engagement stressing that academic engagement evolves from complex interactions between personal and home characteristics and the school environment (Janosz, Archambault, Morizot, & Pagani, 2008). Schools and teachers create by definition social contexts and play a pivotal role in the satisfaction of their students' needs by supporting their autonomy, competence and relatedness. The availability of autonomy support, structure, and teacher involvement within the learning environment is assumed to positively affect students' need satisfaction and thereby their motivation and academic engagement. This is in line with findings of Opdenakker and colleagues (Opdenakker & Minnaert, 2011; Opdenakker & Maulana, 2010; Opdenakker et al., 2012; Stroet, Opdenakker, & Minnaert, 2013), which indicate that the availability of supportive learning conditions (in particular the availability of structure and autonomy support and of empowered, supportive classroom environments where teacher-student relations are encouraged and nourished and teachers are supportive, warm and responsive) is important for student achievement as well as for students' academic engagement. Research of Skinner and Belmond (1993) also confirms these findings in regard to teacher support, involvement, and students' academic engagement. SDT postulates that basic psychological need satisfaction is the underlying mechanism by which characteristics of the learning environment influence students' academic engagement. Thus, basic psychological needs act as mediators of social context and learning environment experiences. The few studies that paid attention to the mediating role of basic needs, mainly in sport education and related to well- and ill-being and video game playing, provide evidence for (partial) mediation of learning environment characteristics and (manipulated) video game features by basic need satisfaction (Adie, Duda, & Ntoumanis, 2008; Barkoukis, Hagger, Lambropoulos, & Tsorbatzoudis, 2010; Peng, Lin, Pfeiffer, & Winn, 2012; Tylor & Lonsdale, 2010). A recent study, on intrinsic motivation in cognitive subjects in the first grade of secondary education (Opdenakker et al., 2012), delivered also evidence for effects of basic need satisfaction on students' motivation and for the mediation role of basic needs satisfaction in the relationship between learning environment characteristics and student motivation.

STUDENT PERCEPTIONS AND DIFFERENTIAL SENSITIVITY

The way students perceive their learning environment is crucial. Classroom environment research as well as research and theories on motivation and self-determination recognize the importance of student perceptions (Deci & Ryan, 2002; den Brok, Bergen, Stahl, & Brekelmans, 2004; Fraser, 2007) and research of Skinner and Belmont (1993) and Opdenakker and Maulana (2010) showed the importance of student perceptions of teacher support and involvement to students' level and growth of academic engagement. However, not only student perceptions are of importance. There are some indications that teacher support and good teacher-student relations may be more important to young students, at-risk

students, and students with a foreign background (D'Agostino, 2000; Scheerens, 2007; den Brok, van Tartwijk, Wubbels, & Veldman, 2010). This suggests that attention should be paid to student characteristics when effects of learning environments are studied. If supportive and constructive teacher-student interactions are more important for the development of at-risk students, who often live and learn in contexts of poverty (financial, intellectual, language) and inequality of access to learning opportunities, this should receive special attention. Finally, there is also some evidence that competence need satisfaction is more important for highly achievement-motivated students (Schüler, Sheldon & Fröhlich, 2010). This suggests that students more oriented towards the achievement motive domain are more affected by domain-relevant need satisfaction, i.e. competence need satisfaction.

THE PRESENT STUDY

The present study investigates whether students' perceptions of their teacher, in relation to the satisfaction of their psychological needs of autonomy, competence and relatedness, explains differences in the (development of) students' academic engagement at the end of primary education. Attention is paid to unique and joint effects of students' perceptions of autonomy, competence and relatedness satisfaction in the learning environment as well as to differential effects for student gender, ethnic-cultural background, and prior academic engagement.

METHOD

Sample and Procedures

Participants were 777 students (mean age 11.6 years) of 41 sixth grade classes (36 primary schools situated in the northern part of the Netherlands). Approximately 53% of the schools were public schools. Questionnaires were used to tap students' learning environment perceptions (end of Grade 6) as well as their academic engagement at the end of Grades 5 and 6. Students' ethnic-cultural backgrounds were tapped as well.

Instruments and Measures

The *Basic Psychological Needs Satisfaction by Teachers Questionnaire* is based on an instrument for gathering data about basic need satisfaction in partner relationships (Basic Need Satisfaction in Relationships Scale) by La Guardia and colleagues (La Guardia, Ryan, Couchman, & Deci, 2000). The original questionnaire consists of 9 items related to the satisfaction of all three basic psychological needs: autonomy, competence and relatedness. An adaptation and translation of this instrument was made to make it suitable to measure primary students' needs satisfaction in their relationship with their teacher. Statements were scored on a five-point Likert-type scale and students rated how well their basic

needs are met when they are with their teacher. Exploratory factor analysis revealed the existence of one general factor, which could be subdivided into three sub-factors referring to the three basic psychological needs. Together, the three factors explained 79% of the total variance. In line with the findings of La Guardia et al., confirmatory factor analysis revealed that a three-factor solution provided an adequate fit to the data ensuring that the items loaded on the three factors as expected (Root mean square error of approximation was .067, p-value of close fit was .14 and comparative fit index was .99). In addition, and in line with La Guardia et al., Chi-square analyses showed that the three-factor model was significantly better than a one-factor model or any of the three possible two-factor models. The reliability coefficients (Cronbach's α) were respectively, .85 (Overall basic needs satisfaction, 6 items), .60 (Autonomy, 2 items), .70 (Competence, 2 items), and .78 (Relatedness, 2 items).

The *Academic Engagement Scale* (based on Roede, 1989) was administered near the end of the school year of Grade 5 (3 items, α = .83) and Grade 6 (9 items, α = .80). Self-rated statements were scored on a five-point Likert-type scale. The scales consisted of items referring to engaged behavior (effort exertion and persistence, indicators of mental effort: attention and concentration) and engaged emotion (enjoyment and enthusiasm), with the strongest focus on engaged behavior. This operationalization of academic engagement is in line with the (behavior) engagement conceptualization of Skinner, Kindermann and Furrer (2009) and current views on academic engagement (Fredericks et al., 2004; Jang et al., 2010; Skinner et al., 2008; Wellborn, 1991).

The students' *ethnic-cultural background* was measured by assessing the amount of Dutch spoken at home (0 refers to only Dutch spoken at home; 4 refers to no Dutch spoken at all at home) and by the nationality of the parents (0 refers to both parents are of Dutch nationality; 1 refers to one of the parents are of Dutch nationality; 2 refers to both parents have a foreign nationality). Approximately 89% of the students spoke only Dutch at home. For approximately 12% of the students, one or both parents had a foreign nationality.

Analyses

Multilevel analyses (MLwiN; Rasbash, Charlton, Browne, Healy, & Cameron, 2005) were used to study effects of students and teachers on students' academic engagement. Two-level hierarchical linear models were constructed with students at the lowest level (level 1) and classes at the higher level (level 2). Effects of teachers on students' academic engagement were studied without and with a control for student background, gender of participant and prior academic engagement. The first analysis shows the total effects of the dimensions of need satisfaction by the teacher (BNST) (Learning environment model). The second analysis reveals the value added effects of these dimensions (Learning environment model – value added). Cross-level interactions between student characteristics and basic needs satisfaction by teacher dimensions were also examined in order to find evidence for differential effects of the basic needs satisfaction dimensions.

RESULTS

Multilevel analysis indicated that about 12% of the differences in academic engagement between students at the end of grade 6 were related to their classroom learning environment. Overall basic need satisfaction by the teacher played a significant role and explained 29.7% of the differences in academic engagement between students and 24.3% of the variance between learning environments, even when ethnic-cultural background, sex of child and prior engagement was controlled for (additional explained variance by the BNST was respectively 12.5% and 13.5%; see Table 1).

Table 1. Results of multilevel models explaining academic engagement of grade 6 – overall BNST

	Null model		Learning environment model		Learning environment model (value added)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect						
Intercept	3.614**	0.037	3.611**	0.032	3.560**	0.028
Overall BNST			0.440**	0.025	0.301**	0.022
Nationality (0=Dutch)					-0.004	0.036
Sex (0=boy)					0.082**	0.029
Language (0=Dutch)					0.001	0.021
Prior engagement					0.341**	0.020
Random effect						
Level 2 variance	0.04	0.012	0.028	0.009	0.013	0.005
Level 1 variance	0.29	0.016	0.202	0.011	0.142	0.008
Deviance	1215.768		952.274		683.014	

* p < .05, ** p < .01

Additional analyses showed that the need satisfaction dimensions played a significant role (31% explained variance between students and 27% between learning environments), even when ethnic-cultural background, sex of child and prior engagement was controlled for (additional explained variance by the BNST dimensions was respectively 12.9% and 13.5%; see Table 2). This finding underpins the importance of students' basic need satisfaction of autonomy, competence and relatedness by the teacher, even after controlling for prior engagement. Furthermore, the satisfaction of the need for competence and the need for relatedness by the teacher were found to be most important in explaining differences in academic engagement. Additional analyses showed that they explained, on their own, respectively 25.7% and 22% of the variance in academic

engagement between students and respectively 27% and 21.6% of the variance between learning environments. In addition to the satisfaction of the previously mentioned basic needs, the satisfaction of the need for autonomy was important as well, but to a lesser extent. The degree to which this need was satisfied explained, on its own, respectively 16.5% of the variance in academic engagement between students and 24.3% of the variance between learning environments. Combined with results of the explained variance by all three basic needs dimensions together, there is evidence for important joint effects of the BNST dimensions, although unique effects of each of them are also visible.

Table 2. Results of multilevel models explaining academic engagement of grade 6 – BNST dimensions

	Null model		Learning environment model		Learning environment model (value added)	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect						
Intercept	3.614**	0.037	3.608**	0.032	3.557**	0.028
BNST-Autonomy			0.066*	0.027	0.074**	0.023
BNST-Competence			0.223**	0.026	0.138**	0.023
BNST-Relatedness			0.147**	0.024	0.090**	0.020
Nationality (0=Dutch)					-0.003	0.036
Sex (0=boy)					0.085**	0.029
Language (0=Dutch)					0.000	0.021
Prior engagement					0.335**	0.020
Random effect						
Level 2 variance	0.04	0.012	0.027	0.009	0.013	0.005
Level 1 variance	0.29	0.016	0.198	0.011	0.141	0.008
Deviance	1215.768		939.136		680.407	

* p < .05, ** p < .01

Multilevel analysis with cross-level interactions (products of student characteristics and BNST dimensions) revealed only a significant interaction effect between prior academic engagement and the satisfaction of the need for competence by the teacher, indicating that the higher the students' prior academic engagement, the stronger the effect of the basic need satisfaction of competence by the teacher (see Figure 1). The analysis also indicated that, in particular for students with rather high levels of prior engagement, their academic engagement will be more in line with their prior engagement, when they experience a high level

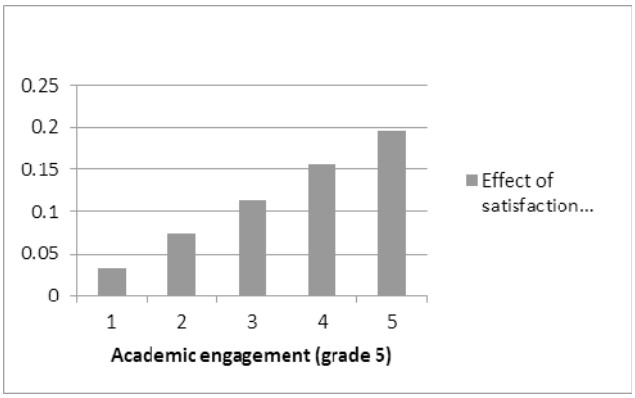

Figure 1. Size of 'basic need satisfaction of competence by the teacher' effect as a function of prior academic engagement

of competence (induced by their teacher). However, when they experience a rather low level of competence, their engagement will be less in line with their prior engagement.

No significant cross-level interactions between the BNST dimension and other student characteristics were found, indicating that the effect of this dimension applies to different groups of students irrespective of their gender or different ethnic-cultural background. The effects of all other BNST dimensions applied in the same way to boys and girls, to children with high and low prior engagement, and to children with different ethnic-cultural backgrounds.

With respect to the overall basic need satisfaction by the teacher, a significant interaction was only found with the language spoken at home, indicating that the overall basic need satisfaction is of lesser importance to the academic engagement of students who speak less or no Dutch at all at home (see Figure 2).

CONCLUSION AND DISCUSSION

This study is one of the first studies in which the satisfaction of the three basic needs, as recognized by SDT, was investigated in a natural teacher-student relationship educational context and were basic need satisfaction was related to academic engagement, focusing on longitudinal, unique, and joint effects of the BNST dimensions. In addition, attention was paid to possible differential effects of the BNST dimensions.

The findings highlight the importance of BNST dimensions to students' (development of) academic engagement at the end of primary education. Evidence was provided supporting the Basic Psychological Needs Theory which postulates that the satisfaction of the basic psychological needs positively affects motivation

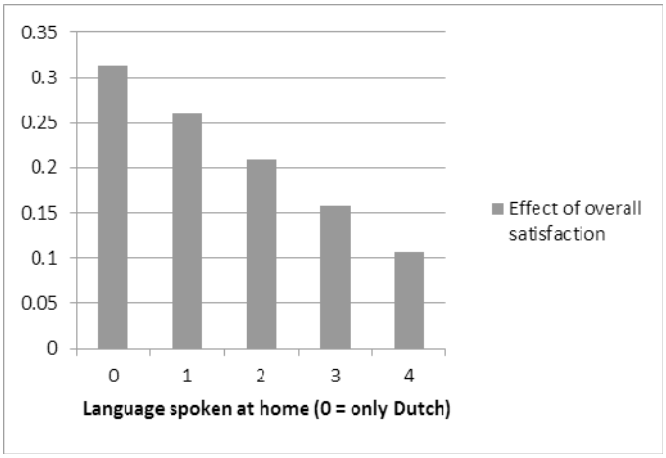

Figure 2. Size of 'overall basic need satisfaction by the teacher' effect as a function of language spoken at home

and engagement because they provide the energy and direction for students to engage in activities that satisfy these needs (Deci & Ryan, 2011). In addition, the results of this study revealed that all BNST dimensions are important for the (development of) students' academic engagement. This is in accordance with the assumptions of BPNT and previous (experimental) studies and delivers evidence for the importance of the SDT-BPNT perspective and the fulfillment of all three basic psychological needs in relation to further understanding and supporting students' academic engagement. In addition to prior engagement, for students to become academically (more) engaged they need to feel competent (because this provides them the energy for learning), to feel related (because this helps them to follow the direction and support of the teacher to engage in activities) and to feel autonomous (because this affects their willingness to devote energy and time to schoolwork). For education, this implies that teachers should provide support to students that lets them experience feelings of competence and autonomy and teachers should also be involvement with students to provide them with experiences and feelings of relatedness. Teachers' perceived support and involvement help students to fulfill all their basic psychological needs in order to get or maintain academically engaged. Further research should investigate how teachers can help and support students to satisfy their basic psychological needs. We are in need of a further understanding of the basic features relevant to need support and the lack thereof.

Our study also challenges current SDT and BPNT. For example, large joint effects of the three BNST dimensions at the end of primary education and differences in the strength of the effects of the different BNST dimensions were found. Findings indicated stronger effects of the basic need satisfaction of competence and of involvement as compared to the satisfaction of the need for

autonomy, while SDT stresses the pivotal role of autonomy and self-determination. However, our findings are also in agreement with Deci et al. (1991) who stress that student motivation, in general, will be enhanced or facilitated by support for competence and relatedness. In addition, although our study revealed that basic psychological need satisfaction mattered for all students irrespective of their gender, background, or prior engagement, we found evidence that need satisfaction of competence by the teacher was more important for prior highly engaged students and that overall need satisfaction was less important for students speaking scarcely or no Dutch at home. At this moment, it is unclear if our findings are related to the students' age/school level and/or the educational system. Additional research on older student populations and other school levels is needed to investigate the generalizability of these findings. However, our finding related to the higher sensitivity of prior highly engaged students to competence need satisfaction is in agreement with studies of Schüler et al. (2010) on older students (undergraduates and university students) within the area of sport activities. This might support the generalizability of this finding.

Our finding regarding the lower sensitivity of students speaking scarcely or no Dutch at all at home in relation to overall basic needs satisfaction by the teacher is less clear and seems not to be in line with findings indicating a higher sensitivity of at-risk students and students with a foreign background (D'Agostino, 2000; Scheerens, 2007; den Brok et al., 2010). The rather small amount of students speaking scarcely or no Dutch at all at home (about 11%) or with a foreign background might explain the lack of differential effects with regard to these student characteristics. It is also possible that the students who speak scarcely or no Dutch at home in the sample of this study are not very representative for students usually labeled as at-risk or with a foreign background.

In conclusion, our study showed that SDT and BPNT offer with their concepts of need satisfaction an important perspective to the study of the (development of) academic engagement of students in relation to students' perception of teacher support and involvement in the learning environment. The findings add evidence that support the underlying mechanism postulated by SDT and BPNT. Indeed, BPNT provides explanatory mechanisms for understanding how teacher-student interactions are associated with students' academic engagement. There is already some evidence in a recent study of Opdenakker et al., (2012) that need satisfaction can serve as a (partial) mediation of (students' perceptions of) learning environment characteristics. Thus, SDT and BPNT offer fertile ground for new explorations in teacher-student interaction experiences and their relation to students' academic engagement. By further enlarging our understanding of the functioning of the basic psychological needs, we will be able to offer teachers cues that help them to evaluate what aspects of the learning environment and social context will significantly enhance versus undermine students' academic engagement and effectiveness within the context.

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